The microtype package

Subliminal refinements towards typographical perfection

— IMPLEMENTATION —

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https://github.com/schlcht/microtype

The microtype package provides a LaTeX interface to the micro-typographic extensions that were introduced by pdfTeX and have since also propagated to LuaTeX and XeTeX: 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 XeTeX (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.

```
1 ⟨*package|letterspace⟩
```

1.1 Preliminaries

\MT@MT This is us.

```
\def\MT@MT
⟨package⟩  {microtype}
⟨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.

```
\let\MT@restore@catcodes\@empty
\def\MT@fix@catcode#1#2{%
  \edef\MT@restore@catcodes{%
    \MT@restore@catcodes
    \catcode#1=\the\catcode#1\relax
  }%
  \catcode#1=#2\relax
}
\MT@fix@catcode{17}{14}% ^^Q (comment)
\MT@fix@catcode{24} {9}% ^^X (ignore)
⟨package⟩\MT@fix@catcode{33}{12}% !
⟨package⟩\MT@fix@catcode{34}{12}% "
\MT@fix@catcode{36} {3}% $ (math shift)
\MT@fix@catcode{39}{12}% '
\MT@fix@catcode{42}{12}% *
\MT@fix@catcode{43}{12}% +
\MT@fix@catcode{44}{12}% ,
\MT@fix@catcode{45}{12}% -
\MT@fix@catcode{58}{12}% :
\MT@fix@catcode{60}{12}% <
\MT@fix@catcode{61}{12}% =
\MT@fix@catcode{62}{12}% >
⟨package⟩\MT@fix@catcode{63}{12}% ?
\MT@fix@catcode{94} {7}% ^ (superscript)
\MT@fix@catcode{96}{12}% `
⟨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.

```
⟨*package⟩
\newcommand*\DeclareMicrotypeSet[3][]{}
\newcommand*\UseMicrotypeSet[2][]{}
\newcommand*\DeclareMicrotypeSetDefault[2][]{}
\newcommand*\SetProtrusion[3][]{}
\newcommand*\SetExpansion[3][]{}
\newcommand*\SetTracking[3][]{}
\newcommand*\SetExtraKerning[3][]{}
\newcommand*\SetExtraSpacing[3][]{}
\newcommand*\DisableLigatures[2][]{}
\newcommand*\DeclareCharacterInheritance[3][]{}
\newcommand*\DeclareMicrotypeVariants[1]{}
\newcommand*\DeclareMicrotypeAlias[2]{}
\newcommand*\LoadMicrotypeFile[1]{}
\newcommand*\DeclareMicrotypeFilePrefix[1]{}
\newcommand*\DeclareMicrotypeBabelHook[2]{}
\newcommand*\microtypesetup[1]{}
\newcommand*\microtypecontext[1]{}
\newcommand*\textmicrotypecontext[2]{#2}
\newcommand\leftprotrusion[1]{#1}
\newcommand\rightprotrusion[1]{#1}
\providecommand*\noprotrusion{}
\newcommand*\noprotrusionifhmode{}
```

```
\@ifpackageloaded{letterspace}{\let\MT@textls\relax}{%
⟨/package⟩
\newcommand*\lsstyle{}
\newcommand\textls[2][]{}
\def\textls#1#{}
\newcommand*\lslig[1]{#1}
⟨*package⟩
}
```

These commands also have a starred version.

```
\def\DeclareMicrotypeSet#1#{\@gobbletwo}
\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.

```
\@onlypreamble\DeclareMicrotypeSet
\@onlypreamble\UseMicrotypeSet
\@onlypreamble\DeclareMicrotypeSetDefault
\@onlypreamble\DisableLigatures
\@onlypreamble\DeclareMicrotypeVariants
\@onlypreamble\DeclareMicrotypeBabelHook
\@onlypreamble\DeclareMicrotypeFilePrefix
```

Don't load `letterspace`.

```
\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.

```
\def\MT@old@cmd#1#2{%
  \newcommand*#1{\MT@error{%
    \string#1 is deprecated. Please use\MessageBreak
    \string#2 instead}{As I said}%
    \let #1#2#2}}
\MT@old@cmd\DeclareMicroTypeAlias\DeclareMicrotypeAlias
\MT@old@cmd\DeclareMicroTypeSet  \DeclareMicrotypeSet
\MT@old@cmd\UseMicroTypeSet      \UseMicrotypeSet
\MT@old@cmd\LoadMicroTypeFile    \LoadMicrotypeFile
⟨/package⟩
```

`\MT@warning` `\MT@warning@nl` `\MT@info` `\MT@info@nl` `\MT@vinfo` `\MT@error` `\MT@warn@err` Communicate.

```
\def\MT@warning{\PackageWarning\MT@MT}
\def\MT@warning@nl#1{\MT@warning{#1\@gobble}}
⟨*package⟩
\def\MT@info{\PackageInfo\MT@MT}
\def\MT@info@nl#1{\MT@info{#1\@gobble}}
\let\MT@vinfo\@gobble
\def\MT@error{\PackageError\MT@MT}
\def\MT@warn@err#1{\MT@error{#1}{%
  This error message appears because you loaded the `\MT@MT'\MessageBreak
  package with the option `verbose=errors'. Consult the documentation\MessageBreak
  in \MT@MT.pdf to find out what went wrong.}}
```

1.1.1 Debugging

`\tracingmicrotype` `\MT@dinfo` `\MT@dinfo@nl` Cases for `\tracingmicrotype`:

0: almost none

1: + sets & lists

2: + heirs

3: + slots

4: + factors

```
⟨*debug⟩
\MT@warning@nl{This is the debug version}
\newcount\tracingmicrotype
\tracingmicrotype=2
\def\MT@info#1{\PackageInfo\MT@MT{#1}\MT@addto@annot{#1}}
\def\MT@info@nl#1{\PackageInfo\MT@MT{#1\@gobble}\MT@addto@annot{#1}}
\let\MT@vinfo\MT@info@nl
\def\MT@warning#1{\PackageWarning\MT@MT{#1}\MT@addto@annot{Warning: #1}}
\def\MT@warning@nl#1{\PackageWarning\MT@MT{#1\@gobble}\MT@addto@annot{Warning: #1}}
\def\MT@dinfo#1#2{\ifnum\tracingmicrotype<#1 \else\MT@info{#2}\fi}
\def\MT@dinfo@nl#1#2{\ifnum\tracingmicrotype<#1 \else\MT@info@nl{#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

```
\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.

```
\RequirePackage{pdftexcmds}
\newif\ifMT@inannot \MT@inannottrue
\let\MT@pdf@annot\@empty
\def\MT@addto@annot#1{\ifnum\tracingmicrotypeinpdf>\z@ \ifMT@inannot
  {\def\MessageBreak{^^J\@spaces}%
   \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.

```
\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).

```
\ifx\directlua\@undefined \else
  \protected\def\pdfannot{\pdfextension annot }\fi
\def\MT@show@pdfannot#1{%
  \ifnum\tracingmicrotypeinpdf<#1 \else
    \iftracingmicrotypeinpdfall\leavevmode\fi
    \pdfannot height 4pt width 4pt depth 2pt {%
      /Subtype/Caret
      /T(\expandafter\string\font@name)
      \ifcase#1\or
      /Subj(New font)/C[1 0 0]
      \else
      /Subj(Known font)/C[0 1 0]
      \fi
      /Contents(\MT@pdf@annot)
```

```
    }%
    \iftracingmicrotypeinpdfall\kern1pt \fi
    \global\MT@inannotfalse
  \fi
}
⟨/debug⟩
⟨/package⟩
⟨/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 1.2.8). First, some preparation:

```
⟨*show⟩
\RequirePackage{iftex}
\ifetex\else
  \PackageError{microtype-show}
               {This package only works with e-TeX}{Use e-TeX}
\fi
\ifxetex
  \PackageError{microtype-show}
               {This package only works with pdfTeX or luaTeX}{Don't use XeTeX}
\fi
\PackageWarning{microtype-show}{DO NOT USE THIS PACKAGE FOR REAL DOCUMENTS\@gobble}
\DeclareOption*{\PassOptionsToPackage{\CurrentOption}{microtype}}
\ProcessOptions\relax
\PassOptionsToPackage{verbose}{microtype}
\RequirePackage{microtype,graphicx,xcolor}
```

\ifShowGlyphIndex
\ifShowMissingGlyphs
\GlyphScaleFactor
\Showbaselinecolor
\Showposcolor
\Shownegcolor

The following commands are configurable:

```
\newif\ifShowGlyphIndex
\newif\ifShowMissingGlyphs
\newcommand*\GlyphScaleFactor{2}
\newcommand*\Showbaselinecolor{\color{black!40}}
\newcommand*\Showposcolor{\color{green!50}}
\newcommand*\Shownegcolor{\color{red!50}}
```

\MTS@printtext
\MTS@show@index
\MTS@crulefill

Make sure to have a readable font.

```
\ifluatex
  \def\MTS@printtext#1{{\usefont{TU}{lmr}{m}{n}#1}}
\else
  \def\MTS@printtext#1{{\usefont{T1}{cmr}{m}{n}#1}}
\fi
\def\MTS@show@index#1{\ifShowGlyphIndex{\tiny$_{#1}%
 %  \ifluatex^{\mathrm{%
 %    \MT@lua{tex.print(luaotfload.aux.name_of_slot(tonumber([[#1]])))}}\fi
  $}\fi\space}
\def\MTS@crulefill{\leaders\hrule height \dimexpr1ex/2+.4pt depth -\dimexpr1ex/2\hfill}
```

\MTS@Prot
\MTS@Char

Add the `show` commands to `microtype`'s setup.

```
\g@addto@macro\MT@setupfont{\MTS@Prot\MTS@Char}
\let\MTS@Prot\relax
\let\MTS@Char\relax
```

\MTS@setup
\MTS@glyphlist

Common setup. `\MTS@glyphlist` stores all glyphs we've seen.

```
\def\MTS@setup{%
  \fboxsep=0pt
  \fboxrule=.1pt
  \raggedright
  \let\MTS@glyphlist\@gobble
  \def\MT@feat{pr}%
}
```

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

```
\newcommand*\ShowProtrusion{%
  \begingroup
    \MTS@setup
    \let\MTS@Prot\MTS@Prot@do
    \def\MT@cat{c}%
    \selectfont
}
```

\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.

```
\def\MTS@Prot@do{%
    \MT@ltx@pickupfont
    \let\MT@pr@split@val\MTS@pr@split@val
    \let\MT@load@list\MTS@load@list
    \let\MT@set@pr@prefixes@\MTS@set@pr@prefixes@
    \MTS@show@pr
  \endgroup
  \aftergroup\selectfont
}
```

\ShowCharacterInheritance

```
\newcommand*\ShowCharacterInheritance{%
  \begingroup
    \MTS@setup
    \let\MTS@Char\MTS@Char@do
    \def\MT@cat{inh}%
    \selectfont
}
```

\MTS@Char@do

```
\def\MTS@Char@do{%
    \MT@ltx@pickupfont
    \let\MT@set@pr@prefixes@\MTS@set@pr@prefixes@
    \MTS@show@inheritance
  \endgroup
  \aftergroup\selectfont
}
```

\ShowProtrusionLineGlyph By glyph.

```
\newcommand*\ShowProtrusionLineGlyph[1]{%
  {\MTS@setup
   \MTS@showprotrusionline{`#1}}%
}
```

\ShowProtrusionLineIndex By glyph number.

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

\MTS@showprotrusionline
\MTS@lpcode
\MTS@rpcode

```
\def\MTS@showprotrusionline#1{%
  \edef\MTS@lpcode{\number\lpcode\font#1}%
  \edef\MTS@rpcode{\number\rpcode\font#1}%
  \char#1%
    lorem ipsum dolor sit amet, \MTS@crulefill\ %
    \MTS@printtext{\ifnum\MTS@lpcode=\z@\Showbaselinecolor\fi[\MTS@lpcode]}
    \fbox{\char#1}\MTS@show@index{\number#1}
    \MTS@printtext{\ifnum\MTS@rpcode=\z@\Showbaselinecolor\fi[\MTS@rpcode]}
    \MTS@crulefill\ you know the rest%
  \char#1\par
  \ShowDummyLine
}
```

\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.

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

\ShowProtrusionAll

```
\newcommand*\ShowProtrusionAll{%
  {\MTS@setup
   \MTS@lede{}%
   \MT@do@font{\iffontchar\font\@tempcnta\MTS@showprotrusionline{\@tempcnta}\fi}}%
}
```

\ShowProtrusionDefined

```
\newcommand*\ShowProtrusionDefined{%
  {\MTS@setup
   \MTS@lede{defined}%
   \let\MTS@first\@gobble
   \let\MTS@second\@firstofone
   \MT@do@font{%
     \MTS@firstorsecond
     \MTS@temp{%
       \iffontchar\font\@tempcnta\MTS@showprotrusionline{\@tempcnta}\else
         \MT@warning@nl{Glyph \the\@tempcnta\space is missing in font
                        \MessageBreak\font@name}%
       \fi}}%
}
```

\ShowProtrusionMissing

```
\newcommand*\ShowProtrusionMissing{%
  {\MTS@setup
   \MTS@lede{missing}%
   \let\MTS@first\@firstofone
   \let\MTS@second\@gobble
   \MT@do@font{%
     \MTS@firstorsecond
     \iffontchar\font\@tempcnta\MTS@temp{\MTS@showprotrusionline{\@tempcnta}}\fi}}%
}
```

\MTS@lede

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

\MTS@firstorsecond

```
\def\MTS@firstorsecond{%
  \let\MTS@temp\MTS@first
  \ifnum\lpcode\font\@tempcnta=\z@ \else
    \let\MTS@temp\MTS@second
  \fi
  \ifnum\rpcode\font\@tempcnta=\z@ \else
    \let\MTS@temp\MTS@second
  \fi
}
```

\MTS@charwd Display the glyph with protrusion.

\MTS@lp@

\MTS@rp@

\MTS@show@char@pr

```
\newdimen\MTS@charwd
```

```
\newdimen\MTS@lp@
\newdimen\MTS@rp@
\def\MTS@show@char@pr#1{%
  \xdef\MTS@glyphlist{\MTS@glyphlist,#1}%
  \scalebox{\GlyphScaleFactor}{\strut\escapechar`\\
    \MTS@charwd=\fontcharwd\MT@font#1\relax
```

The baseline rule.

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

Left protrusion.

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

Right protrusion.

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

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

```
    \fbox{\char#1}}\,%
    \MTS@show@index{#1}%
}
```

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

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

`\MTS@show@missing`

```
\def\MTS@show@missing{%
  \MT@ifdefined@c@T\MT@pr@inh@name{%
    \MTS@lp@=\z@ \MTS@rp@=\z@
    \par \MTS@printtext{Glyphs not included in configuration (with defined heirs):}%
    \MT@do@font{%
      \edef\MT@temp{\the\@tempcnta}%
      \MT@ifdefined@n@T{MT@inh@\MT@pr@inh@name @\MT@temp @}{%
        \MT@exp@one@n\MT@in@clist\MT@temp\MTS@glyphlist
        \ifMT@inlist@\else \newline
        \llap{\MTS@show@char@pr{\MT@temp} \MTS@printtext{=} }%
         \MT@exp@cs\MT@map@tlist@c
           {MT@inh@\MT@pr@inh@name @\the\@tempcnta @}%
           \MTS@show@char@x
        \fi
      }%
    }%
  }%
  \MTS@show@missing@
}
```

`\MTS@show@missing@`

```
\def\MTS@show@missing@{%
  \par \MTS@printtext{Other glyphs not in configuration:}\newline
  \MT@do@font{%
    \edef\MT@temp{\the\@tempcnta}%
    \MT@exp@one@n\MT@in@clist\MT@temp\MTS@glyphlist
    \ifMT@inlist@\else
      \MTS@show@char\MT@temp
    \fi
  }%
}
```

\MTS@show@inheritance

```
\def\MTS@show@inheritance{%
  \MT@get@inh@list
  \MTS@printtext{Character inheritance for font `\texttt{\MT@@font}':}\\
  \MT@ifdefined@c@TF\MT@listname{%
    \MTS@printtext{First matching list is for `\texttt{\@tempa}':\\
              \texttt{\MT@listname}:}\par\leavevmode
    \MT@do@font{%
      \MT@ifdefined@n@T{MT@inh@\MT@listname @\the\@tempcnta @}{%
        \newline
        \xdef\MTS@glyphlist{\MTS@glyphlist,\the\@tempcnta}%
        \llap{\MTS@show@char{\the\@tempcnta}\MTS@printtext{= }}%
        \MT@exp@cs\MT@map@tlist@c
          {MT@inh@\MT@listname @\the\@tempcnta @}%
          \MTS@show@char@x
      }%
    }%
    \MT@ifdefined@n@T{MT@inh@\MT@listname @prefixes}{%
      \par \MTS@printtext{(with prefixes:)}%
      \@tempcntb=\z@
      \let\MTS@show@char@pr\MTS@show@char@x
      \MT@set@pr@prefixheirs}%
    \ifShowMissingGlyphs\MTS@show@missing@\fi
  }{%
    \MTS@printtext{NOT DEFINED}%
  }%
  \par
}
⟨/show⟩
```

1.1.3 Requirements

Back to the user packages.

\MT@plain

The `letterspace` package works with:

0: `miniltx`

1: `eplain`

2: LaTeX

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

```
⟨*package|letterspace⟩
⟨*plain⟩
\def\MT@plain{2}
\ifx\documentclass\@undefined
  \def\MT@plain{1}
  \def\hmode@bgroup{\leavevmode\bgroup}
  \def\nfss@text#1{{\mbox{#1}}}
  \let\@typeset@protect\relax
  \ifx\eplain\@undefined
    \def\MT@plain{0}
    \def\PackageWarning#1#2{%
      \begingroup
        \newlinechar=10 %
        \def\MessageBreak{^^J(#1)\@spaces\@spaces\@spaces\@spaces}%
        \immediate\write16{^^JPackage #1 Warning: #2\on@line.^^J}%
      \endgroup
    }
    \def\on@line{ on input line \the\inputlineno}
    \def\@spaces{\space\space\space\space}
  \fi
\fi
```

\MT@requires@latex

Better use groups than plain ifs.

```
\def\MT@requires@latex#1{%
  \ifnum\MT@plain<#1 \expandafter\@secondoftwo\else\expandafter\@firstoftwo\fi
}
⟨/plain⟩
```

For definitions that depend on e-TEX features.

```
\ifcase 0%
  \ifx\eTeXversion\@undefined 1\else
    \ifx\eTeXversion\relax    1\else
      \ifcase\eTeXversion     1\fi
    \fi
  \fi
\else
  \catcode`\^^Q=9 \catcode`\^^X=14
\fi
⟨letterspace⟩^^Q\MT@warning@nl{This package requires the etex extensions.
⟨letterspace⟩^^Q               \MessageBreak Exiting}\MT@restore@catcodes\endinput
⟨debug⟩\MT@dinfo@nl{0}{this is
⟨debug⟩^^Q not
⟨debug⟩  etex}
```

We check whether we are running pdfTEX, XETEX, or LuaTEX, and load the appropriate definition file (later in section 1.4.2).

\MT@clear@options

If we are using neither of these engines, or a too old version, we disable everything and exit.

```
\def\MT@clear@options{%
⟨plain⟩  \MT@requires@latex1{%
  \AtEndOfPackage{\let\@unprocessedoptions\relax\MT@restore@catcodes}%
  \let\CurrentOption\@empty
⟨plain⟩  }\relax
}
```

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.

```
\ifx\normalpdftexversion\@undefined \else
  \let\pdftexversion \normalpdftexversion
  \let\pdftexrevision\normalpdftexrevision
  \let\pdfoutput     \normalpdfoutput
\fi
```

\MT@engine
\ifMT@engine@unfit
\MT@engine@minversion

Old packages might have let `\pdftexversion` to `\relax`.

```
\let\MT@engine\relax
\newif\ifMT@engine@unfit
\MT@engine@unfittrue
\ifx\pdftexversion\@undefined \else
  \ifx\pdftexversion\relax \else
    \def\MT@engine{pdf}
⟨package⟩    \def\MT@engine@minversion{0.14f}
⟨letterspace⟩    \let\MT@pdf@or@lua\@firstoftwo
    \ifnum\pdftexversion
⟨package⟩        > 13
⟨letterspace⟩        > 139
      \MT@engine@unfitfalse
⟨package⟩      \ifnum \pdftexversion=14
⟨package⟩        \ifnum \expandafter`\pdftexrevision < `f
⟨package⟩          \MT@engine@unfittrue
⟨package⟩        \fi
⟨package⟩      \fi
    \fi
  \fi
\fi
```

```
\ifx\directlua\@undefined \else
  \ifx\directlua\relax \else
    \def\MT@engine{lua}
    \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.

```
⟨*letterspace⟩
    \let\MT@pdf@or@lua\@secondoftwo
    \ifnum\luatexversion < 62 \MT@engine@unfittrue
    \else
      \let\MT@lua\directlua
      \ifnum\luatexversion > 84
        \let\pdfoutput\outputmode
        \let\pdfprotrudechars\protrudechars
        \let\pdfadjustspacing\adjustspacing
      \fi
    \fi
⟨/letterspace⟩
  \fi
\fi
⟨*package⟩
\ifx\MT@engine\relax
  \ifx\XeTeXversion\@undefined \else
    \ifx\XeTeXversion\relax \else
      \def\MT@engine{xe}
      \def\MT@engine@minversion{0.9997}
      \ifdim 0\XeTeXrevision pt > 0.9996pt
        \MT@engine@unfitfalse
      \fi
    \fi
  \fi
\fi
⟨/package⟩
⟨/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 (≥ 0.14h)

4: + automatic font expansion; protrusion no longer has to be set up first; scale factor fixed to 1000; default `\efcode` = 1000 (≥ 1.20)

5: + `\(left,right)marginkern`; `\pdfnoligatures`; `\pdfstrcmp`; `\pdfescapestring` (≥ 1.30)

6: + adjustment of interword spacing; extra kerning; `\letterspacefont`; `\pdfmatch`[1]; `\pdftracingfonts`; always e-TEX (≥ 1.40)

7: + `\letterspacefont` doesn't disable ligatures and kerns; `\pdfcopyfont` (≥ 1.40.4)

8: + `\letterspacefont` uses explicit `\fontdimen 6` if specified (≥ 1.40.23)

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

```
⟨*pdf-⟩
⟨debug⟩\MT@dinfo@nl{0}{this is pdftex \the\pdftexversion(\pdftexrevision)}
\def\MT@pdftex@no{8}
\ifnum\pdftexversion = 140
  \ifnum\pdftexrevision < 23
    \def\MT@pdftex@no{7}
    \ifnum\pdftexrevision < 4
      \def\MT@pdftex@no{6}
    \fi
  \fi
\else
  \ifnum\pdftexversion < 140
    \def\MT@pdftex@no{5}
    \ifnum\pdftexversion < 130
      \def\MT@pdftex@no{4}
      \ifnum\pdftexversion < 120
        \def\MT@pdftex@no{3}
        \ifnum\pdftexversion = 14
          \ifnum \expandafter`\pdftexrevision < `h
            \def\MT@pdftex@no{2}
          \fi
        \fi
      \fi
    \fi
  \fi
\fi
⟨debug⟩\MT@dinfo@nl{0}{pdftex no.: \MT@pdftex@no}
⟨/pdf-⟩
```

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

```
⟨*xe-⟩
⟨debug⟩\MT@dinfo@nl{0}{this is xetex (\the\XeTeXversion\XeTeXrevision)}
%\ifdim 0\XeTeXrevision pt < 0.9997pt
%  \def\MT@xetex@no{1}
%\else
%  \def\MT@xetex@no{2}
%\fi
⟨debug⟩%\MT@dinfo@nl{0}{xetex no.: \MT@xetex@no}
⟨/xe-⟩
```

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

0: N/A

1: LuaTeX (< 0.36)

2: + `\directlua` without state number (≥ 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[2] (≥ 0.62)

4: + almost all of the pdfTeX primitives have been renamed (≥ 0.85)

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

6: + `\glet`(≥ 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).

```
⟨*lua-⟩
⟨debug⟩\MT@dinfo@nl0{this is luatex (\the\luatexversion)}
```

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

```
\let\MT@lua\directlua
\def\MT@luatex@no{6}
\ifnum\luatexversion<110
  \def\MT@luatex@no{5}
  \ifnum\luatexversion<90
    \def\MT@luatex@no{4}
    \ifnum\luatexversion<85
      \def\MT@luatex@no{3}
      \ifnum\luatexversion<62
        \def\MT@luatex@no{2}
        \ifnum\luatexversion<36
          \def\MT@lua{\directlua0}
          \def\MT@luatex@no{1}
        \fi
      \fi
    \fi
  \fi
\fi
⟨debug⟩\MT@dinfo@nl{0}{luatex no.: \MT@luatex@no}
⟨/lua-⟩
```

Abort if no capable engine found.

```
⟨*package|letterspace⟩
\ifMT@engine@unfit
  \MT@warning@nl{You
    \ifx\MT@engine\relax
      don't seem to be using pdftex%
⟨package⟩      , luatex or xetex%
⟨letterspace⟩      \space or luatex%
    .\MessageBreak `\MT@MT' only works with these engines.%
    \else
      are using a \MT@engine tex version older than
⟨package⟩       \MT@engine@minversion
⟨letterspace⟩      \MT@pdf@or@lua{1.40}{0.62}%
    .\MessageBreak `\MT@MT' does not work with this version.%
      \MessageBreak Please install a newer version of \MT@engine tex.%
    \fi
    \MessageBreak I will quit now}
  \MT@clear@options
\endinput\fi
⟨/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.

```
⟨*package|letterspace⟩
\RequirePackage{keyval}[1997/11/10]
⟨*package⟩
^^X\RequirePackage{etoolbox}
\providecommand\IfFormatAtLeastTF{\@ifl@t@r\fmtversion}
```

`\MT@toks` We need a token register,

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

`\MT@tempbox` our own box,

```
\newbox\MT@tempbox
```

`\ifMT@if@` and a scratch if.

```
539 \newif\ifMT@if@
```

1.1.4 Declarations

\ifMT@protrusion
\ifMT@expansion
\ifMT@auto
\ifMT@selected
\ifMT@noligatures
\ifMT@draft
\ifMT@disable
\ifMT@spacing
\ifMT@kerning
\ifMT@tracking
\ifMT@babel

These are the global switches . . .

```
540 \newif\ifMT@protrusion
541 \newif\ifMT@expansion
542 \newif\ifMT@auto
543 \newif\ifMT@selected
544 \newif\ifMT@noligatures
545 \newif\ifMT@draft
546 \newif\ifMT@disable
547 \newif\ifMT@spacing
548 \newif\ifMT@kerning
549 \newif\ifMT@tracking
550 \newif\ifMT@babel
```

[This line intentionally left blank.]

\MT@pr@level
\MT@ex@level
\MT@pr@factor
\MT@ex@factor
\MT@sp@factor
\MT@kn@factor

. . . and numbers.

```
551 \let\MT@pr@level\tw@
552 \let\MT@ex@level\tw@
553 \let\MT@pr@factor\@m
554 \let\MT@ex@factor\@m
555 \let\MT@sp@factor\@m
556 \let\MT@kn@factor\@m
```

\MT@pr@unit
\MT@sp@unit
\MT@kn@unit

Default unit for protrusion settings is character width, for spacing `space`, for kerning (and tracking) 1 em.

```
557 \let\MT@pr@unit\@empty
558 \let\MT@sp@unit\m@ne
559 \def\MT@kn@unit{1em}
```

\MT@stretch
\MT@shrink
\MT@step

Expansion settings.

```
560 \let\MT@stretch\m@ne
561 \let\MT@shrink \m@ne
562 \let\MT@step   \m@ne
```

\MT@pr@min
\MT@pr@max
\MT@ex@min
\MT@ex@max
\MT@sp@min
\MT@sp@max
\MT@kn@min
\MT@kn@max
\MT@tr@min
\MT@tr@max

Minimum and maximum values allowed by pdfTEX.

```
563 \def\MT@pr@min{-\@m}
564 \let\MT@pr@max\@m
565 \let\MT@ex@min\z@
566 \let\MT@ex@max\@m
567 \def\MT@sp@min{-\@m}
568 \let\MT@sp@max\@m
569 \def\MT@kn@min{-\@m}
570 \let\MT@kn@max\@m
571 ⟨/package⟩
572 \def\MT@tr@min{-\@m}
573 \let\MT@tr@max\@m
574 ⟨*package⟩
```

\MT@factor@default

Default factor.

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

\MT@stretch@default
\MT@shrink@default

Default values for expansion.

```
576 \def\MT@stretch@default{20 }
577 \def\MT@shrink@default{20 }
```

\MT@letterspace
\MT@letterspace@default

Default value for letterspacing (in thousandths of 1 em).

```
578 ⟨/package⟩
579 \let\MT@letterspace\m@ne
580 \def\MT@letterspace@default{100}
```

```
581 ⟨*package⟩
```

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

```
582 \newif\ifMT@document
583 ⟨/package⟩
584 ⟨/package|letterspace⟩
```

1.1.5 Auxiliary macros

\MT@requires@pdftex For definitions that depend on a particular pdfTEX resp. LuaTEX version.

\MT@requires@luatex

```
585 ⟨*pdf-|lua-⟩
586 \def
587 ⟨pdf-⟩  \MT@requires@pdftex%
588 ⟨lua-⟩  \MT@requires@luatex%
589   #1{\ifnum
590 ⟨pdf-⟩  \MT@pdftex@no
591 ⟨lua-⟩  \MT@luatex@no
592     <#1 \expandafter\@secondoftwo\else\expandafter\@firstoftwo\fi}
593 ⟨lua-&debug⟩\MT@requires@luatex4{\MT@lua{tex.enableprimitives('pdf',{'tracingfonts'})}}\relax
594 ⟨pdf-&debug⟩\MT@requires@pdftex6{
595 ⟨debug⟩\pdftracingfonts=1
596 ⟨pdf-&debug⟩}\relax
597 ⟨/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 LaTeX, we load the `luatexbase` package.

```
598 ⟨lua-⟩\IfFormatAtLeastTF{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.

```
599 ⟨lua-⟩\IfFormatAtLeastTF{2017/01/01}\relax{\RequirePackage{luaotfload}}
600 ⟨letterspace⟩\MT@pdf@or@lua\relax{
601 ⟨letterspace⟩\ifx\newluafunction\@undefined \input ltluatex \fi
602 ⟨lua-|letterspace⟩\MT@lua{require("microtype")}
603 ⟨letterspace⟩}
```

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

```
604 ⟨*luafile⟩
605
606 function microtype.info(...)
607   luatexbase.module_info("microtype",...)
608 end
609
610 local find       = string.find
611 local match      = string.match
612 local tex_write  = tex.write
613
614 local catpackage
615 if luatexbase.registernumber then
616   catpackage = luatexbase.registernumber("catcodetable@atletter") -- LaTeX
617 else
618   catpackage = luatexbase.catcodetables.CatcodeTableLaTeXAtLetter -- luatexbase
619 end
620 function microtype.sprint (...)
621   tex.sprint(catpackage, ...)
622 end
623
```

We need the function `math.tointeger`, which is missing in older LuaTEX versions,

and ConTEXt (inherited via `luaotfload`) faultily overwrites its own definition. The following is the (correct) definition from `l-math.lua`.

```
624 if not math.tointeger or not pcall(math.tointeger,0) then
625   math.mininteger=-0x4FFFFFFFFFFF
626   math.maxinteger=0x4FFFFFFFFFFF
627   local floor=math.floor
628   function math.tointeger(n)
629     local f=floor(n)
630     return f==n and f or nil
631   end
632 end
633
634 ⟨/luafile⟩
```

To be continued, but first back to primitives.

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

```
635 ⟨lua-⟩\MT@requires@luatex6{\let\MT@glet\glet}\relax
636 ⟨*package|letterspace⟩
637 \def\MT@glet{\global\let}
```

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

```
638 \def\MT@exp@cs#1#2{\expandafter#1\csname#2\endcsname}
639 ⟨*package⟩
640 \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`

```
641 \def\MT@def@n{\MT@exp@cs\def}
642 \def\MT@gdef@n{\MT@exp@gcs\gdef}
```

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

`\MT@xdef@n`

```
643 ⟨/package⟩
644 \def\MT@edef@n{\MT@exp@cs\edef}
645 ⟨*package⟩
646 \def\MT@xdef@n{\MT@exp@gcs\xdef}
```

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

`\MT@glet@nc`

```
647 \def\MT@let@nc{\MT@exp@cs\let}
648 \def\MT@glet@nc{\MT@exp@gcs\MT@glet}
```

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

```
649 ⟨/package⟩
650 \def\MT@let@cn#1#2{\expandafter\let\expandafter#1\csname #2\endcsname}
651 ⟨*package⟩
```

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

`\MT@glet@nn`

```
652 \def\MT@let@nn{\MT@exp@cs\MT@let@cn}
653 \def\MT@glet@nn{\MT@exp@gcs{\global\expandafter\MT@let@cn}}
```

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

```
654 \def\MT@@font{\expandafter\string\MT@font}
```

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

```
655 ⟨/package⟩
656 \def\MT@exp@one@n#1#2{\expandafter#1\expandafter{#2}}
```

`\MT@exp@two@c` Expand the next two tokens after ⟨*#1*⟩ once.

```
657 \def\MT@exp@two@c#1{\expandafter\expandafter\expandafter#1\expandafter}
658 ⟨*package⟩
```

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

```
659 \def\MT@exp@two@n#1#2#3{%
660   \expandafter\expandafter\expandafter
```

```
    #1\expandafter\expandafter\expandafter
      {\expandafter#2\expandafter}\expandafter{#3}}
```

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

\MT@ifdefined@c@T
\MT@ifdefined@c@TF
\MT@ifdefined@n@T
\MT@ifdefined@n@TF

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.

```
\def\MT@ifdefined@c@T#1{%
^^X  \ifdefined#1\expandafter\@firstofone\else\expandafter\@gobble\fi
^^Q  \ifx#1\@undefined\expandafter\@gobble\else\expandafter\@firstofone\fi
}
⟨/package⟩
\def\MT@ifdefined@c@TF#1{%
^^X  \ifdefined#1\expandafter\@firstoftwo\else\expandafter\@secondoftwo\fi
⟨package⟩^^Q  \ifx#1\@undefined
⟨package⟩^^Q    \expandafter\@secondoftwo\else\expandafter\@firstoftwo\fi
}
\def\MT@ifdefined@n@T#1{%
^^X  \ifcsname#1\endcsname\expandafter\@firstofone\else\expandafter\@gobble\fi
⟨package⟩^^Q  \begingroup\MT@exp@two@c\endgroup\ifx\csname #1\endcsname\relax
⟨package⟩^^Q    \expandafter\@gobble\else\expandafter\@firstofone\fi
}
\def\MT@ifdefined@n@TF#1{%
^^X  \ifcsname#1\endcsname\expandafter\@firstoftwo\else\expandafter\@secondoftwo\fi
⟨package⟩^^Q  \begingroup\MT@exp@two@c\endgroup\ifx\csname #1\endcsname\relax
⟨package⟩^^Q    \expandafter\@secondoftwo\else\expandafter\@firstoftwo\fi
}
⟨*package⟩
```

\MT@detokenize@n
\MT@detokenize@c
\MT@rem@last@space

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).

```
\def\MT@detokenize@n#1{%
^^X  \expandafter\MT@rem@last@space\detokenize{#1} \@nil
^^Q  \string#1%
}
\def\MT@detokenize@c#1{%
^^X  \MT@exp@one@n\MT@detokenize@n#1%
^^Q  \MT@exp@two@c\MT@rem@last@space\strip@prefix\meaning#1 \@nil
}
\def\MT@rem@last@space#1 #2{#1%
  \ifx\@nil#2\else \space
  \expandafter\MT@rem@last@space\expandafter#2\fi
}
```

\MT@ifempty

Test whether argument is empty.

```
⟨/package⟩
\begingroup
\catcode`\%=12
\catcode`\&=14
\gdef\MT@ifempty#1{&
  \if %#1%&
    \expandafter\@firstoftwo
  \else
    \expandafter\@secondoftwo
  \fi
}
\endgroup
⟨*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).

```
⟨/package⟩
⟨/package|letterspace⟩
⟨pdf-⟩\MT@requires@pdftex6{
⟨letterspace⟩\MT@pdf@or@lua{
⟨*pdf-|letterspace⟩
\def\MT@ifint#1{%
  \ifcase\pdfmatch{^-*[0-9]+ *$}{#1}\relax
    \expandafter\@secondoftwo
  \else
    \expandafter\@firstoftwo
  \fi
}
}{
⟨/pdf-|letterspace⟩
⟨*pdf-|xe-|letterspace⟩
\def\MT@ifint#1{%
  \if!\ifnum9<1#1!\else?\fi
    \expandafter\@firstoftwo
  \else
    \expandafter\@secondoftwo
  \fi
}
⟨/pdf-|xe-|letterspace⟩
⟨pdf-|letterspace⟩}
⟨lua-⟩\def\MT@ifint#1{\csname\MT@lua{microtype.if_int([[#1]])}\endcsname}
⟨*luafile⟩
local function if_int(s)
  if find(s,"^-*[0-9]+ *$") then
    tex_write("@firstoftwo")
  else
    tex_write("@secondoftwo")
  end
end
microtype.if_int = if_int

⟨/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.)

```
⟨*pdf-⟩
\MT@requires@pdftex6{
\def\MT@ifdimen#1{%
  \ifcase\pdfmatch{^([0-9]+([.,][0-9]+)?|[.,][0-9]+)%
                    (em|ex|cm|mm|in|pc|pt|dd|cc|bp|sp|nd|nc|px)? *$}{#1}\relax
    \expandafter\@secondoftwo
  \else
    \expandafter\@firstoftwo
  \fi
}
}{
⟨/pdf-⟩
⟨*pdf-|xe-⟩
\def\MT@ifdimen#1{%
  \setbox\z@=\hbox{%
    \MT@count=1#1\relax
    \ifnum\MT@count=\@ne
      \aftergroup\@secondoftwo
    \else
      \aftergroup\@firstoftwo
    \fi
  }%
}
⟨/pdf-|xe-⟩
⟨pdf-⟩}
⟨lua-⟩\def\MT@ifdimen#1{\csname\MT@lua{microtype.if_dimen([[#1]])}\endcsname}
```

```
⟨*luafile⟩
local function if_dimen(s)
  if (find(s, "^-*[0-9]+(%a*) *$") or
      find(s, "^-*[0-9]*[.,][0-9]+(%a*) *$")) then
    tex_write("@firstoftwo")
  else
    tex_write("@secondoftwo")
  end
end
microtype.if_dimen = if_dimen

⟨/luafile⟩
```

\MT@ifdim Compare floating point numbers.

```
⟨*package⟩
\def\MT@ifdim#1#2#3{%
  \ifdim #1\p@ #2 #3\p@
    \expandafter\@firstoftwo
  \else
    \expandafter\@secondoftwo
  \fi
}
⟨/package⟩
```

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

```
⟨*pdf-|xe-⟩
⟨pdf-⟩\MT@requires@pdftex5{
\def\MT@ifstreq#1#2{%
  \ifnum
⟨pdf-⟩      \pdfstrcmp
⟨xe-⟩       \strcmp
      {#1}{#2}=\z@
    \expandafter\@firstoftwo
  \else
    \expandafter\@secondoftwo
  \fi
}
⟨/pdf-|xe-⟩
⟨*pdf-⟩
}{
\def\MT@ifstreq#1#2{%
  \edef\MT@res@a{#1}%
  \edef\MT@res@b{#2}%
  \ifx\MT@res@a\MT@res@b
    \expandafter\@firstoftwo
  \else
    \expandafter\@secondoftwo
  \fi
}
}
⟨/pdf-⟩
⟨lua-⟩\def\MT@ifstreq#1#2{\csname\MT@lua{microtype.if_str_eq([[#1]],[[#2]])}\endcsname}
⟨*luafile⟩
local function if_str_eq(s1, s2)
  if s1 == s2 then
    tex_write("@firstoftwo")
  else
    tex_write("@secondoftwo")
  end
end
microtype.if_str_eq = if_str_eq

⟨/luafile⟩
```

\MT@xadd Add item to a list.

```
⟨*package⟩
\def\MT@xadd#1#2{%
  \ifx#1\relax
    \xdef#1{#2}%
  \else
    \xdef#1{#1#2}%
  \fi
}
```

\MT@xaddb Add item to the beginning.

```
\def\MT@xaddb#1#2{%
  \ifx#1\relax
    \xdef#1{#2}%
  \else
    \xdef#1{#2#1}%
  \fi
}
⟨/package⟩
```

\MT@map@clist@n
\MT@map@clist@c
\MT@map@clist@
\MT@clist@function
\MT@clist@break
Run ⟨*#2*⟩ on all elements of the comma list ⟨*#1*⟩. This and the following is modelled after LaTeX3 commands.

```
⟨*package|letterspace⟩
\def\MT@map@clist@n#1#2{%
  \ifx\@empty#1\else
    \def\MT@clist@function##1{#2}%
    \MT@map@clist@#1,\@nil,\@nnil
  \fi
}
\def\MT@map@clist@c#1{\MT@exp@one@n\MT@map@clist@n#1}
\def\MT@map@clist@#1,{%
  \ifx\@nil#1%
    \expandafter\MT@clist@break
  \fi
  \MT@clist@function{#1}%
  \MT@map@clist@
}
\let\MT@clist@function\@gobble
\def\MT@clist@break#1\@nnil{}
⟨*package⟩
```

\MT@map@tlist@n
\MT@map@tlist@c
\MT@map@tlist@
\MT@tlist@break
Execute ⟨*#2*⟩ on all elements of the token list ⟨*#1*⟩. `\MT@tlist@break` can be used to jump out of the loop.

```
\def\MT@map@tlist@n#1#2{\MT@map@tlist@#2#1\@nnil}
\def\MT@map@tlist@c#1#2{\expandafter\MT@map@tlist@\expandafter#2#1\@nnil}
\def\MT@map@tlist@#1#2{%
  \ifx\@nnil#2\else
    #1{#2}%
    \expandafter\MT@map@tlist@
    \expandafter#1%
  \fi
}
\def\MT@tlist@break#1\@nnil{\fi}
```

\ifMT@inlist@
\MT@in@clist
Test whether item ⟨*#1*⟩ is in comma list ⟨*#2*⟩. Using `\pdfmatch` would be slower.

```
\newif\ifMT@inlist@
\def\MT@in@clist#1#2{%
  \def\MT@res@a##1,#1,##2##3\@nnil{%
    \ifx##2\@empty
      \MT@inlist@false
    \else
      \MT@inlist@true
    \fi
  }%
  \expandafter\MT@res@a\expandafter,#2,#1,\@empty\@nnil
```

```
}
```

\MT@rem@from@clist

Remove item ⟨*#1*⟩ from comma list ⟨*#2*⟩. This is basically `\@removeelement` from `ltcntrl.dtx`. Using `\pdfmatch` and `\pdflastmatch` here would be really slow!

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

\MT@in@tlist
\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.

```
\def\MT@in@tlist#1#2{%
  \MT@inlist@false
  \def\MT@res@a{#1}%
  \MT@map@tlist@c#2\MT@in@tlist@
}
\def\MT@in@tlist@#1{%
  \edef\MT@res@b{#1}%
  \ifx\MT@res@a\MT@res@b
    \MT@inlist@true
    \expandafter\MT@tlist@break
  \fi
}
```

\MT@in@rlist
\MT@in@rlist@
\MT@in@rlist@@
\MT@size@name

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

```
\def\MT@in@rlist#1{%
  \MT@inlist@false
  \MT@map@tlist@c#1\MT@in@rlist@
}
\def\MT@in@rlist@#1{\expandafter\MT@in@rlist@@#1}
\def\MT@in@rlist@@#1#2#3{%
  \MT@ifdim{#2}=\m@ne{%
    \MT@ifdim{#1}=\MT@size
      \MT@inlist@true
      \relax
  }{%
    \MT@ifdim\MT@size<{#1}\relax{%
      \MT@ifdim\MT@size<{#2}%
        \MT@inlist@true
        \relax
    }%
  }%
  \ifMT@inlist@
    \def\MT@size@name{#3}%
    \expandafter\MT@tlist@break
  \fi
}
```

\MT@loop
\MT@iterate
\MT@repeat

This is the same as LaTeX's `\loop`, which we mustn't use, since this could confuse an outer `\loop` in the document.

```
⟨/package⟩
\def\MT@loop#1\MT@repeat{%
  \def\MT@iterate{#1\relax\expandafter\MT@iterate\fi}%
  \MT@iterate \let\MT@iterate\relax
}
\let\MT@repeat\fi
```

\MT@while@num

Execute ⟨*#3*⟩ from ⟨*#1*⟩ up to (excluding) ⟨*#2*⟩ (much faster than LaTeX's `\@whilenum`).

```
\def\MT@while@num#1#2#3{%
  \@tempcnta#1\relax
  \MT@loop #3%
```

```
    \advance\@tempcnta \@ne
    \ifnum\@tempcnta < #2\MT@repeat
}
⟨/package|letterspace⟩
```

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

```
⟨letterspace⟩\MT@pdf@or@lua{\let\MT@if@luaotf@font\@secondoftwo}{
⟨*lua-|letterspace⟩
\def\MT@if@luaotf@font{\csname\MT@lua{%
  microtype.if_luaotf_font()
  }\endcsname
}
⟨/lua-|letterspace⟩
⟨letterspace⟩}
⟨*luafile⟩
local function if_luaotf_font()
  local thefont = font.getfont(font.current())
  if thefont and ( thefont.format == "opentype" or thefont.format == "truetype" )
    then tex.write("@firstoftwo")
    else tex.write("@secondoftwo")
  end
end
microtype.if_luaotf_font = if_luaotf_font

⟨/luafile⟩
```

\MT@do@font Execute ⟨*#1*⟩ 256 times,

```
⟨pdf-|letterspace⟩\def\MT@do@font{\MT@while@num\z@\@cclvi}
```

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

```
⟨*lua-⟩
\def\MT@do@font#1{%
  \MT@if@luaotf@font{%
    \def\MT@dofont@function{#1}%
    \MT@lua{microtype.do_font()}%
  }{\MT@while@num\z@\@cclvi{#1}}%
}
⟨/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.

```
⟨*luafile⟩
local function do_font()
  local thefont = font.getfont(font.current())
  if thefont then
    for i,v in next,thefont.characters do
      if v.index == nil or ( v.index > 0 and i < 1114112 ) then
        microtype.sprint([[\@tempcnta=]]..i..[[\relax\MT@dofont@function]])
      end
    end
  end
end
microtype.do_font = do_font

⟨/luafile⟩
```

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

```
⟨*xe-⟩
\def\MT@do@font#1{%
  \@tempcnta=\z@
  \MT@loop
```

```
    \iffontchar\MT@font\@tempcnta #1\fi
    \advance\@tempcnta\@ne
    \ifnum\@tempcnta < \XeTeXlastfontchar\MT@font \MT@repeat
}
⟨/xe-⟩
⟨*package⟩
```

\MT@count
\MT@increment

Increment macro ⟨*#1*⟩ by one. Saves using up too many counters. The e-TEX way is slightly faster.

```
\newcount\MT@count
\def\MT@increment#1{%
^^X  \edef#1{\number\numexpr #1 + 1\relax}%
^^Q  \MT@count=#1\relax
^^Q  \advance\MT@count \@ne
^^Q  \edef#1{\number\MT@count}%
}
```

\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.

```
\def\MT@scale#1#2#3{%
^^Q  \multiply #1 #2\relax
  \ifnum #3 = \z@
^^X    #1=\numexpr #1 * #2\relax
  \else
^^X    #1=\numexpr #1 * #2 / #3\relax
^^Q    \divide #1 #3\relax
  \fi
}
```

\MT@abbr@pr
\MT@abbr@ex
\MT@abbr@pr@c
\MT@abbr@ex@c
\MT@abbr@pr@inh
\MT@abbr@ex@inh
\MT@abbr@nl
\MT@abbr@sp
\MT@abbr@sp@c
\MT@abbr@sp@inh
\MT@abbr@kn
\MT@abbr@kn@c
\MT@abbr@kn@inh
\MT@abbr@tr
\MT@abbr@tr@c

Some abbreviations. Thus, we can have short command names but full-length log output.

```
\def\MT@abbr@pr{protrusion}
\def\MT@abbr@ex{expansion}
\def\MT@abbr@pr@c{protrusion codes}
\def\MT@abbr@ex@c{expansion codes}
\def\MT@abbr@pr@inh{protrusion inheritance}
\def\MT@abbr@ex@inh{expansion inheritance}
\def\MT@abbr@nl{noligatures}
\def\MT@abbr@sp{spacing}
\def\MT@abbr@sp@c{interword spacing codes}
\def\MT@abbr@sp@inh{interword spacing inheritance}
\def\MT@abbr@kn{kerning}
\def\MT@abbr@kn@c{kerning codes}
\def\MT@abbr@kn@inh{kerning inheritance}
\def\MT@abbr@tr{tracking}
\def\MT@abbr@tr@c{tracking amount}
```

\MT@rbba@protrusion
\MT@rbba@expansion
\MT@rbba@spacing
\MT@rbba@kerning
\MT@rbba@tracking

These we also need the other way round.

```
\def\MT@rbba@protrusion{pr}
\def\MT@rbba@expansion{ex}
\def\MT@rbba@spacing{sp}
\def\MT@rbba@kerning{kn}
\def\MT@rbba@tracking{tr}
```

\MT@features
\MT@features@long

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

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

\MT@is@feature

Whenever an optional argument accepts a list of features, we can use this command to check whether a feature exists in order to prevent a rather confusing

'Missing \endcsname inserted' error message. The feature (long form) must be in ⟨*#1*⟩, the type of list to ignore in ⟨*#2*⟩, then comes the action.

```
\def\MT@is@feature#1#2{%
  \MT@in@clist{#1}\MT@features@long
  \ifMT@inlist@
    \expandafter\@firstofone
  \else
    \MT@error{`#1' is not an available micro-typographic\MessageBreak
      feature. Ignoring #2}{Available features are: `\MT@features@long'.}%
    \expandafter\@gobble
  \fi
}
```

1.1.6 Compatibility

For the record, the following LaTeX kernel commands will be modified by microtype:

- \pickup@font
- \do@subst@correction
- \add@accent (all in section 1.2.10)
- \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.

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

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

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

```
⟨/package⟩
⟨*package|letterspace⟩
⟨plain⟩\MT@requires@latex1{
\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.

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

Don't hesitate with miniltx.

```
⟨plain⟩}{\let\MT@addto@setup\@firstofone}
```

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

```
\def\MT@with@package@T#1{\@ifpackageloaded{#1}\@firstofone\@gobble}
⟨/package|letterspace⟩
⟨*package⟩
```

\MT@with@babel@and@T LaTeX's \@ifpackagewith ignores the class options.

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

`\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 XHTEX. The successor packages `eledmac` and `reledmac` are also supported.

```
⟨/package⟩
⟨pdf-⟩\MT@requires@pdftex5{
⟨*pdf-|lua-|xe-⟩
  \def\MT@ledmac@setup{%
    \ifMT@protrusion
      \MT@ifdefined@c@TF\l@dunhbox@line{%
```

`\MT@led@unhbox@line`

Hook.

```
        \MT@info@nl{Patching ((r)e)ledmac to enable character protrusion}%
        \let\MT@led@unhbox@line\l@dunhbox@line
        \renewcommand*{\l@dunhbox@line}[1]{%
          \ifhbox##1%
            \kern\leftmarginkern##1%
            \expandafter\MT@led@unhbox@line\expandafter##1\expandafter
            \kern\rightmarginkern##1%
          \fi
        }%
      }{%
        \MT@warning@nl{%
          Character protrusion in paragraphs with line\MessageBreak
          numbering will only work if you update ledmac,\MessageBreak
          or use one of its successors, eledmac or reledmac}%
      }%
    \fi
  }
⟨/pdf-|lua-|xe-⟩
⟨*pdf-⟩
}{
  \def\MT@ledmac@setup{%
    \ifMT@protrusion
      \MT@warning@nl{%
        The pdftex version you are using does not allow\MessageBreak
        character protrusion in paragraphs with line\MessageBreak
        numbering by the `((r)e)ledmac' package.\MessageBreak
        Upgrade pdftex to version 1.30 or later}%
    \fi
  }
}
⟨/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 \#.

```
⟨*package|letterspace⟩
⟨*package⟩
\def\MT@restore@p@h{\chardef\%`\% \chardef\#`\# }
```

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

\ifMT@xunicode

```
\newif\ifMT@fontspec
\MT@with@package@T{fontspec}\MT@fontspectrue
\newif\ifMT@xunicode
\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).

```
\IfFormatAtLeastTF{2020/10/01}
  {\IfFormatAtLeastTF{2021/11/15}
    {\AddToHook{package/fontspec/after}{\MT@fontspectrue}}
    {\AddToHook{package/after/fontspec}{\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

```
\let\MT@maybe@gobble@with@tikz\@firstofone
\def\MT@tikz@setup{%
  \def\MT@maybe@gobble@with@tikz{%
    \ifnum\tikz@expandcount>\z@
      \expandafter\@gobble
    \else
      \expandafter\@firstofone
    \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`.)

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

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

```
  \MT@if@false
  \MT@with@babel@and@T{spanish} \MT@if@true
  \MT@with@babel@and@T{galician}\MT@if@true
  \MT@with@babel@and@T{mexican} \MT@if@true
  \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.)

```
  \MT@with@package@T{csquotes}{%
    \@ifpackagelater{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`.

```
  \MT@if@false
  \MT@with@package@T{hyperref}  \MT@if@true
  \MT@with@package@T{tex4ht}    \MT@if@true
  \MT@with@package@T{mathastext}\MT@if@true
```

```
  \ifMT@if@\MT@restore@p@h\fi
  \MT@with@package@T{tikz}\MT@tikz@setup
}
```

Check again at the end of the preamble.

```
⟨/package⟩
\MT@addto@setup{%
⟨*package⟩
```

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

```
  \MT@with@package@T{pdfcprot}{%
    \MT@error{Detected the `pdfcprot' package!\MessageBreak
              `\MT@MT' and `pdfcprot' may not be used together}{%
The `pdfcprot' package provides an interface to character protrusion.\MessageBreak
So does the `\MT@MT' package. Using both packages at the same\MessageBreak
time will almost certainly lead to undesired results. Have your choice!}%
  }%
  \MT@with@package@T  {ledmac}\MT@ledmac@setup
  \MT@with@package@T {eledmac}\MT@ledmac@setup
  \MT@with@package@T{reledmac}\MT@ledmac@setup
  \MT@with@package@T{xunicode}\MT@xunicodetrue
  \MT@with@package@T{fontspec}\MT@fontspectrue
```

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

```
  \MT@glet\MT@setupfont@hook\@empty
```

`microtype` is so so loquacious ... Sometimes you just want to silence it when debugging a document.[3]

```
 %\gdef\MT@setupfont@hook{\ifnum\tracingmacros>\z@\tracingnone
 %  \MT@info{->Silently doing my `magic' (Mittelbach) for font\MessageBreak->\MT@@font}\fi}%
  \MT@if@false
  \MT@with@babel@and@T{spanish} \MT@if@true
  \MT@with@babel@and@T{galician}\MT@if@true
  \MT@with@babel@and@T{mexican} \MT@if@true
  \ifMT@if@
    \g@addto@macro\MT@setupfont@hook{%
      \MT@ifdefined@c@T\percentsign{\let\%\percentsign}}%
  \fi
  \MT@with@package@T{csquotes}{%
    \@ifpackagelater{csquotes}{2005/05/11}{%
      \g@addto@macro\MT@setupfont@hook\@disablequotes
```

For `\leftprotrusion`, we disable `csquotes`'s tracking of group level and type, because we'll probably be typesetting the opening quotes only.

```
      \g@addto@macro\MT@prot@hook{%
        \def\csq@bqgroup{\begingroup\leavevmode
          \let\MT@csq@eqgroup\endgroup}%
        \let\csq@eqgroup\endgroup}%
    }{%
      \MT@warning@nl{%
        Should you receive warnings about unknown slot\MessageBreak
        numbers, try upgrading the `csquotes' package}%
    }%
  }%
```

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.

```
  \MT@if@false
⟨/package⟩
⟨plain⟩  \MT@requires@latex2{
  \MT@with@package@T{hyperref}{%
```

3 Cf. https://www.youtube.com/watch?v=7FQLnggVgDE&t=38m24s

```
    \pdfstringdefDisableCommands{%
⟨*package⟩
      \MT@ltx@pickupfont
      \let\textmicrotypecontext\@secondoftwo
      \let\microtypecontext\@gobble
⟨/package⟩
      \def\lsstyle{\pdfstringdefWarn\lsstyle}%
      \def\textls#1#{\pdfstringdefWarn\textls}%
    }%
⟨package⟩    \MT@if@true
  }%
⟨plain⟩  }\relax
⟨*package⟩
  \MT@with@package@T{tex4ht}{%
    \def\MT@apply@patch#1{\MT@info{Not applying patch `#1' (for tex4ht)}}%
    \def\MT@undo@patch#1{\MT@info{Not undoing patch `#1' (for tex4ht)}}%
    \MT@if@true
  }%
  \MT@with@package@T{mathastext}\MT@if@true
  \ifMT@if@\g@addto@macro\MT@setupfont@hook\MT@restore@p@h\fi
```

The `listings` package makes numbers and letters active,

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

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

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

Inside a listing, `\space` is redefined.

```
      \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.

```
      \let\lst@ProcessLetter\@empty
    }%
  }%
```

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

```
⟨/package⟩
  \ifx\SOUL@\@undefined\else
    \soulregister\lsstyle 0%
    \soulregister\textls  1%
    \ifx\XeTeXrevision\@undefined
      \let\MT@SOUL@doword\SOUL@doword
      \def\SOUL@doword{\pdfadjustspacing=\z@ \MT@SOUL@doword}%
    \fi
  \fi
⟨*package⟩
  \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.

```
  \MT@with@package@T{pinyin}{%
    \let\MT@orig@py@macron\py@macron
    \@ifpackagelater{pinyin}{2005/08/11}{% 4.6.0
      \def\py@macron#1#2{%
        \MT@ltx@pickupfont
        \MT@orig@py@macron{#1}{#2}%
        \MT@MT@pickupfont}%
    }{%
      \def\py@macron#1{%
        \MT@ltx@pickupfont
        \MT@orig@py@macron{#1}%
        \MT@MT@pickupfont}%
    }%
  }%
```

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.

```
  \MT@with@package@T{unicode-math}{%
    \MT@let@nc{__um_sub_or_super:n}\relax
  }%
⟨/package⟩
}
⟨*package⟩
```

1.1.7 Protrusion patches

\ifMT@patch@ok
\MT@patch@info
\MT@patch@warn
\MT@patch@undef
\MT@patch@info@undo

We have to patch some macros to get protrusion right.

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

\MT@patches@def
\MT@define@patch

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

```
\let\MT@patches@def\@gobble
\def\MT@define@patch#1#2#3{%
  \MT@ifdefined@n@TF{MT@patch@@#1}{%
    \MT@warning{Patch `#1' already defined.\MessageBreak Cannot define it}%
  }{%
    \g@addto@macro\MT@patches@def{,#1}%
    \MT@gdef@n{MT@patch@@#1}{#2}%
    \MT@gdef@n{MT@patch@undo@@#1}{#3}%
  }%
}
```

\MT@redefined@patches
\MT@redefine@patch

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).

```
\let\MT@redefined@patches\@empty
\def\MT@redefine@patch#1#2#3{%
  \g@addto@macro\MT@redefined@patches{%
    \MT@ifdefined@n@TF{MT@patch@@#1}{%
      \MT@gdef@n{MT@patch@@#1}{#2}%
      \MT@gdef@n{MT@patch@undo@@#1}{#3}%
    }{%
      \MT@warning{Patch `#1' undefined.\MessageBreak Cannot redefine it}%
    }%
  }%
```

```
}
```

Both macros are only allowed in the preamble.

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

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

```
\def\MT@append@patch#1#2{%
  \MT@remember@patch{#1}%
  \apptocmd#1{#2}\relax\MT@patch@okfalse
}
\def\MT@patch@patch#1#2#3{%
  \MT@remember@patch{#1}%
  \patchcmd#1{#2}{#3}\relax\MT@patch@okfalse
}
```

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

```
\def\MT@remember@patch#1{%
  \MT@ifdefined@n@TF{MT@patch@saved@\string#1}\relax
    {\MT@let@nc{MT@patch@saved@\string#1}#1%
     \MT@exp@cs\g@addto@macro{MT@patch@undo@@\MT@patch@name}%
       {\MT@let@cn#1{MT@patch@saved@\string#1}}}%
}
```

`\MT@patches@applied` `\MT@apply@patch` 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).

```
\let\MT@patches@applied\@gobble
\def\MT@apply@patch#1{%
  \MT@patch@oktrue
  \MT@ifdefined@n@TF{MT@patch@@#1}
    {\MT@in@clist{#1}\MT@patches@applied
     \ifMT@inlist@
       \MT@warning{Patch `#1' has already been applied,\MessageBreak
                   cannot reapply it}%
     \else
       \let\MT@restore@catcodes\@empty
       \MT@with@babel@and@T{spanish} {\MT@fix@catcode{62}{12}}% >
       \MT@with@babel@and@T{galician}{\MT@fix@catcode{62}{12}}% >
       \def\MT@patch@name{#1}%
       \g@addto@macro\MT@patches@applied{,#1}%
       \@nameuse{MT@patch@@#1}%
       \@nameuse{MT@patch@\ifMT@patch@ok info\else warn\fi}{#1}%
       \MT@restore@catcodes
     \fi}
    {\MT@patch@undef{#1}}%
}
```

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

```
\def\MT@undo@patch#1{%
  \MT@in@clist{#1}\MT@patches@applied
  \ifMT@inlist@
    \MT@rem@from@clist{#1}\MT@patches@applied
    \@nameuse{MT@patch@undo@@#1}%
    \MT@patch@info@undo{#1}%
  \else
    \MT@warning{Patch `#1' hasn't been applied,\MessageBreak cannot revert it}%
  \fi
}
```

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.

```
{\catcode`\#=12
```

```
\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

```
  \MT@define@patch{item}{%
    \MT@append@patch\@item\leftprotrusion
    \MT@patch@patch\@item{\everypar{}}{\everypar{\leftprotrusion}}%
```

- `beamer` patches it too

```
    \@ifclassloaded{beamer}
      {\MT@append@patch\beamer@@callorigitem\leftprotrusion
       \MT@patch@patch\beamer@callorigitem{\ignorespaces}{\ignorespaces\leftprotrusion}}
```

- the `simplecv` class

```
      {\@ifclassloaded{simplecv}
        {\MT@append@patch\@topic@item\leftprotrusion}
        {}}%
  }{}%
```

toc: TOC and friends

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

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

```
    \@ifclassloaded{memoir}
      {\MT@append@patch\booknumberline\leftprotrusion
       \MT@append@patch\partnumberline\leftprotrusion
       \MT@append@patch\chapternumberline\leftprotrusion
       \MT@append@patch\cftbookafterpnum\noprotrusion
       \MT@append@patch\cftpartafterpnum\noprotrusion
       \MT@append@patch\cftchapterafterpnum\noprotrusion
       \MT@append@patch\cftsectionafterpnum\noprotrusion
       \MT@append@patch\cftsubsectionafterpnum\noprotrusion
       \MT@append@patch\cftsubsubsectionafterpnum\noprotrusion
       \MT@append@patch\cftparagraphafterpnum\noprotrusion
       \MT@append@patch\cftsubparagraphafterpnum\noprotrusion
       \MT@append@patch\cftfigureafterpnum\noprotrusion
       \MT@append@patch\cfttableafterpnum\noprotrusion}
      {}%
  }{}%
```

- 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 `\noprotrusion`. 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.

```
%   \@ifpackageloaded{tocbasic}
%     {\MT@define@patch{toc}
%       {\MT@append@patch\numberline\leftprotrusion
%        \setuptoc{toc}{noprotrusion}%
%        \setuptoc{lof}{noprotrusion}%
%        \setuptoc{lot}{noprotrusion}}
%       {\unsettoc{toc}{noprotrusion}%
%        \unsettoc{lof}{noprotrusion}%
%        \unsettoc{lot}{noprotrusion}}}{}%
```

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

`eqnum`: equation numbers

- `IEEEtran`

```
\MT@define@patch{eqnum}{%
  \@ifclassloaded{IEEEtran}
    {\MT@patch@patch\theequationdis{(){\leftprotrusion{(}}%
     \MT@patch@patch\theequationdis{)}{\rightprotrusion{)}}}%
     \MT@patch@patch\theIEEEsubequationdis{(){\leftprotrusion{(}}%
     \MT@patch@patch\theIEEEsubequationdis{)}{\rightprotrusion{)}}}}%
    {}%
```

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

```
   \@ifpackageloaded{amsmath}
     {\MT@patch@patch\tagform@{(){\leftprotrusion{(}}%
      \MT@patch@patch\tagform@{)}{\rightprotrusion{)}}}%
```

  The command has been made robust in 2022.

```
      \MT@ifdefined@n@TF{eqref }
        {\MT@exp@cs\MT@patch@patch{eqref }}{\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.

```
      \MT@with@package@T{mathtools}{%
        \ifMT@patch@ok\else \MT@patch@oktrue
          \MT@info@nl{The `eqnum' patch may not be effective because you are\MessageBreak
              using the mathtools package. Make sure to insert\MessageBreak
              `\@backslashchar leftprotrusion' and
              `\@backslashchar rightprotrusion' as\MessageBreak
              appropriate in mathtools's `\@backslashchar newtagform' command}%
        \fi}}
      {\MT@patch@patch\@eqnnum{(){\leftprotrusion{(}}%
       \MT@patch@patch\@eqnnum{)}{\rightprotrusion{)}}}%
}{}%
```

`footnote`: footnote text (only visible with block paragraphs)

- `hyperref` also patches this command (but only if `hyperfootnotes=true`, `implicit=true` and `\hyper@nopatch@footnote` is undefined)

```
\MT@define@patch{footnote}{%
  \@ifpackageloaded{hyperref}
      {\MT@if@false
       \ifHy@implicit
         \ifHy@hyperfootnotes
           \MT@ifdefined@c@TF\hyper@nopatch@footnote\relax
             \MT@if@true
         \fi
       \fi
       \ifMT@if@\expandafter\@firstoftwo\else\expandafter\@secondoftwo\fi}
      \@secondoftwo
     {\MT@patch@patch\@footnotetext{\ignorespaces}{\ignorespaces\leftprotrusion}%
      \MT@patch@patch\@footnotetext{\@empty\ignorespaces}{\@empty\ignorespaces\leftprotrusion}%
      \MT@patch@patch\@mpfootnotetext{\ignorespaces}{\ignorespaces\leftprotrusion}%
      \MT@patch@patch\@mpfootnotetext
```

```
              {{\expandafter\hyper@@anchor\expandafter
                  {\Hy@footnote@currentHref}{\relax}}\ignorespaces}
              {{\expandafter\hyper@@anchor\expandafter
                  {\Hy@footnote@currentHref}{\relax}}\ignorespaces\leftprotrusion}}
```

- `memoir` additionally allows footnotes in the margins

```
        {\@ifclassloaded{memoir}
          {\MT@patch@patch\@footnotetext{\foottextfont #1}{\foottextfont\leftprotrusion #1}%
           \MT@patch@patch\@mpfootnotetext{\foottextfont #1}{\foottextfont\leftprotrusion #1}}
```

- `beamer` has it its own way, of course

```
          {\@ifclassloaded{beamer}
            {\MT@exp@cs\MT@patch@patch{beamerx@\string\beamer@framefootnotetext}
                 {\ignorespaces}{\ignorespaces\leftprotrusion}%
             \MT@exp@cs\MT@patch@patch{beamerx@\string\@mpfootnotetext}
                 {\ignorespaces}{\ignorespaces\leftprotrusion}}
```

- the `KOMA` classes

```
            {\MT@ifdefined@c@TF\KOMAClassName
              {\MT@patch@patch\scr@saved@footnotetext{\ignorespaces}{\ignorespaces\leftprotrusion}}%
```

- the base classes

```
              {\MT@patch@patch\@footnotetext{\ignorespaces}{\ignorespaces\leftprotrusion}}%
             \MT@patch@patch\@mpfootnotetext{\ignorespaces}{\ignorespaces\leftprotrusion}}}}%
    }{}%
```

`verbatim`: disable all microtypographic extensions in verbatim blocks. (This could have been a nice opportunity to use the new LaTeX hook management, however, the hook here is executed too early – namely, before the `\par` in `\@verbatim`, which may result in spilling the microtypographic settings to the preceding paragraph – so we're resorting to patching, again.)

- Appending to `\@verbatim` works for, at least, the standard classes, `verbatim` (and `memoir`); the implementations in `fancvrb` and `listings` don't allow protrusion anyway.

```
    \MT@define@patch{verbatim}{%
      \MT@append@patch\@verbatim{\microtypesetup{activate=false}}%
```

- package `alltt`

```
      \MT@with@package@T{alltt}{\MT@append@patch\alltt{\microtypesetup{activate=false}}}%
    }{}
```

Finally, execute any redefinitions.

```
  \MT@redefined@patches
}}
⟨/package⟩
⟨/package|letterspace⟩
```

1.2 Font setup

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

```
⟨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`).

```
⟨*pdf-|lua-|xe-⟩
\def\MT@setupfont{%
```

With XeTeX 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.

```
⟨xe-|lua-⟩  \MT@font
```

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

```
  \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).

```
⟨pdf-⟩\MT@requires@pdftex7{
⟨pdf-|lua-⟩\g@addto@macro\MT@setupfont\MT@copy@font
⟨pdf-⟩}\relax
```

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

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

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

```
  \MT@exp@one@n\MT@find@file\MT@family
  \ifx\MT@familyalias\@empty \else
    \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.)

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

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

```
⟨pdf-⟩\MT@requires@pdftex6
⟨lua-⟩\MT@requires@luatex3
⟨pdf-|lua-⟩  {\g@addto@macro\MT@setupfont\MT@tracking}\relax
\g@addto@macro\MT@setupfont{%
  \MT@check@font
  \ifMT@inlist@
⟨debug⟩\MT@show@pdfannot2%
  \else
    \MT@vinfo{Setting up font `\MT@@font'\on@line}%
    \MT@info@notracking
```

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.

```
  \MT@protrusion
⟨pdf-|lua-⟩  \MT@expansion
}
```

Interword spacing and kerning (pdfTeX 1.40).

```
⟨*pdf-⟩
\MT@requires@pdftex6{
\g@addto@macro\MT@setupfont{\MT@spacing\MT@kerning}
}\relax
⟨/pdf-⟩
```

Disable ligatures (pdfTeX 1.30).

```
⟨pdf-⟩\MT@requires@pdftex5{
```

```
⟨pdf-|lua-⟩\g@addto@macro\MT@setupfont\MT@noligatures
⟨pdf-⟩}\relax
\g@addto@macro\MT@setupfont{%
```

Debugging.

```
⟨debug⟩\MT@show@pdfannot1%
```

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

```
    \MT@register@font
  \fi
}
⟨/pdf-|lua-|xe-⟩
```

\MT@copy@font
\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.

```
⟨*pdf-|lua-⟩
\let\MT@copy@font\relax
⟨pdf-⟩\MT@requires@pdftex7{
\def\MT@copy@font@{%
```

\MT@font@copy

For every new protrusion and expansion context, we create a new copy.

```
  \xdef\MT@font@copy{\csname\MT@@font/\MT@pr@context/\MT@ex@context\endcsname}%
  \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.

```
    \edef\MT@font@orig{\csname\expandafter\string\font@name @orig\endcsname}%
    \expandafter\ifx\MT@font@orig\relax
      \MT@exp@two@c\MT@glet\MT@font@orig\font@name
    \else
      \MT@exp@two@c\let\font@name\MT@font@orig
    \fi
⟨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.

```
⟨lua-⟩    \MT@exp@two@c\MT@lua@copyfont\meaning\font@name\@nil
⟨debug⟩\MT@dinfo1{creating new copy: \MT@font@copy}%
```

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

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

We only need the font identifier for letterspacing.

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

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

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

\MT@rem@from@list

```
\def\MT@rem@from@list#1{%
  \MT@exp@cs\ifx{MT@\@tempa @#1font@list}\relax\else
    \expandafter\MT@exp@one@n\expandafter\MT@rem@from@clist\expandafter
      \MT@font \csname MT@\@tempa @#1font@list\endcsname
  \fi
}
⟨pdf-⟩}\relax
```

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

```
⟨lua-⟩\def\MT@lua@copyfont #1 #2 #3\@nil{%
⟨lua-⟩  \global\expandafter\font\MT@font@copy=#3\relax}
⟨/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 (and since pdfTEX 1.40.23, this also works for `\letterspacefont`). XETEX doesn't provide an equivalent to `\pdffontsize`, so we use the nominal size instead.

```
⟨*pdf-|lua-|xe-⟩
\def\MT@fix@fontdimen@six{%
  \ifnum\fontdimen6\MT@font=\z@
    \fontdimen6\MT@font=%
⟨pdf-⟩      \pdffontsize\MT@font
⟨lua-⟩      \MT@requires@luatex4{\pdffeedback fontsize}{\pdffontsize}\MT@font
⟨xe-⟩      \MT@size pt
    \MT@info{Fixing zero \@backslashchar fontdimen 6 for font `\MT@@font'\MessageBreak
               (new value: \the\fontdimen6\MT@font)}%
⟨pdf-⟩    \MT@requires@pdftex8\relax{\MT@glet@nc{\MT@@font-fake6}\@empty}%
  \fi
  \edef\MT@dimen@six{\number\fontdimen6\MT@font}%
}
⟨/pdf-|lua-|xe-⟩
```

\MT@split@name
\MT@encoding
\MT@family
\MT@series
\MT@shape
\MT@size

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

counter.

```
⟨*package⟩
\def\MT@split@name#1/#2/#3/#4/#5/#6\@nil{%
  \def\MT@encoding{#1}%
  \ifMT@fontspec
    \edef\MT@family{\MT@scrubfeature#2()\relax}%
  \else
    \def\MT@family{#2}%
  \fi
  \def\MT@series  {#3}%
  \def\MT@shape   {#4}%
  \def\MT@size    {#5}%
  \MT@fix@fontdimen@six
```

\MT@familyalias Alias family?

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

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

\MT@scrubfeatures

```
\def\MT@scrubfeature#1(#2)#3\relax{#1}
\def\MT@scrubfeatures#1(#2)#3\relax{%
  #1%
  \ifx\relax#3\relax\else
    \MT@scrubfeatures#3\relax
  \fi
}
```

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

\MT@feat

\MT@maybe@do

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

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

```
  \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).

```
    \MT@dotrue
    \edef\@tempa{\csname MT@#1@setname\endcsname}%
    \MT@map@clist@n{font,encoding,family,series,shape,size}{%
      \MT@ifdefined@n@TF{MT@checklist@##1}%
        {\csname MT@checklist@##1\endcsname}%
        {\MT@checklist@{##1}}%
      {#1}%
    }%
  \else
    \MT@dofalse
  \fi
  \ifMT@do
```

\MT@feat stores the current feature.

```
    \def\MT@feat{#1}%
    \csname MT@set@#1@codes\endcsname
  \else
    \MT@ifstreq{#1}{tr}%
      {\let\MT@info@notracking\MT@info@notracking@}%
      {\MT@vinfo{... No \@nameuse{MT@abbr@#1}}}%
  \fi
}
```

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

\MT@info@notracking@
```
\let\MT@info@notracking\relax
\def\MT@info@notracking@{\MT@vinfo{... No tracking}}
```

\MT@dinfo@list
```
⟨debug⟩\def\MT@dinfo@list#1#2#3{\MT@dinfo@nl{1}{\@nameuse{MT@abbr@#1}: #2
⟨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).

```
\def\MT@checklist@#1#2{%
⟨!debug⟩  \MT@ifdefined@n@T
⟨debug⟩  \MT@ifdefined@n@TF
      {MT@#2list@#1@\@tempa}{%
```

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

```
    \expandafter\MT@exp@one@n\expandafter\MT@in@clist
      \csname MT@#1\expandafter\endcsname
      \csname MT@#2list@#1@\@tempa\endcsname
    \ifMT@inlist@
⟨debug⟩\MT@dinfo@list{#2}{#1}{in}%
      \MT@dotrue
    \else
⟨debug⟩\MT@dinfo@list{#2}{#1}{not in}%
      \MT@dofalse
      \expandafter\MT@clist@break
    \fi
  }%
```

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.

```
⟨debug⟩  {\MT@dinfo@list{#2}{#1}{}}%
}
```

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

```
\def\MT@checklist@family#1{%
⟨!debug⟩  \MT@ifdefined@n@T
⟨debug⟩  \MT@ifdefined@n@TF
      {MT@#1list@family@\@tempa}{%
    \MT@exp@two@n\MT@in@clist
        \MT@family{\csname MT@#1list@family@\@tempa\endcsname}%
    \ifMT@inlist@
⟨debug⟩\MT@dinfo@list{#1}{family}{in}%
      \MT@dotrue
    \else
⟨debug⟩\MT@dinfo@list{#1}{family}{not in}%
      \MT@dofalse
      \ifx\MT@familyalias\@empty \else
        \MT@exp@two@n\MT@in@clist
            \MT@familyalias{\csname MT@#1list@family@\@tempa\endcsname}%
        \ifMT@inlist@
⟨debug⟩  \MT@dinfo@list{#1}{family alias}{in}%
          \MT@dotrue
⟨debug⟩\else\MT@dinfo@list{#1}{family alias}{not in}%
        \fi
      \fi
    \fi
    \ifMT@do \else
      \expandafter\MT@clist@break
    \fi
  }%
⟨debug⟩  {\MT@dinfo@list{#1}{family}{}}%
}
```

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

```
\def\MT@checklist@size#1{%
⟨!debug⟩  \MT@ifdefined@n@T
⟨debug⟩  \MT@ifdefined@n@TF
      {MT@#1list@size@\@tempa}{%
    \MT@exp@cs\MT@in@rlist{MT@#1list@size@\@tempa}%
    \ifMT@inlist@
⟨debug⟩\MT@dinfo@list{#1}{size}{in}%
      \MT@dotrue
    \else
⟨debug⟩\MT@dinfo@list{#1}{size}{not in}%
      \MT@dofalse
      \expandafter\MT@clist@break
    \fi
  }%
⟨debug⟩  {\MT@dinfo@list{#1}{size}{}}%
}
```

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

```
\def\MT@checklist@font#1{%
⟨!debug⟩  \MT@ifdefined@n@T
⟨debug⟩  \MT@ifdefined@n@TF
      {MT@#1list@font@\@tempa}{%
```

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

```
    \edef\@tempb{\MT@encoding/\MT@family/\MT@series/\MT@shape/\MT@size}%
    \expandafter\MT@exp@one@n\expandafter\MT@in@clist\expandafter
      \@tempb \csname MT@#1list@font@\@tempa\endcsname
    \ifMT@inlist@
⟨debug⟩\MT@dinfo@list{#1}{font}{in}%
      \expandafter\MT@clist@break
    \else
⟨debug⟩\MT@dinfo@list{#1}{font}{not in}%
      \MT@dofalse
    \fi
  }%
⟨debug⟩  {\MT@dinfo@list{#1}{font}{}}%
}
```

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.

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

\MT@protrusion Set up for protrusion?

```
\def\MT@protrusion{\MT@maybe@do{pr}}
⟨/package⟩
```

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

```
⟨*pdf-|lua-|xe-|show⟩
⟨show⟩\def\MTS@show@pr
⟨pdf-|lua-|xe-⟩\def\MT@set@pr@codes
  {%
⟨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).

```
⟨show⟩  \MTS@printtext{Protrusion settings for font `\texttt{\MT@@font}':}\\
  \MT@if@list@exists{%
```

```
⟨*pdf-|lua-|xe-⟩
    \ifMT@nofamily
      \MT@ifdefined@n@TF{\MT@encoding-\MT@family-settings}\relax{%
        \MT@info@nl{Loading generic protrusion settings for font family\MessageBreak
                    `\MT@family' (encoding: \MT@encoding).\MessageBreak
                    For optimal results, create family-specific settings.\MessageBreak
                    See the microtype manual for details}%
        \MT@glet@nc{\MT@encoding-\MT@family-settings}\@empty
      }%
    \fi
⟨/pdf-|lua-|xe-⟩
⟨show⟩    \MTS@printtext{First matching list is for `\texttt{\@tempa}':\\\texttt{\MT@pr@c@name}}%
    \MT@get@opt
    \MT@reset@pr@codes
```

Get the name of the inheritance list and parse it.

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

Set an input encoding?

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

Load additional lists?

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

Load the main list.

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

Set unconditional heirs.

```
    \MT@set@pr@prefixheirs
⟨show⟩    }}%
⟨show⟩    \ifShowMissingGlyphs\MTS@show@missing\fi
  }%
⟨show⟩  {\MTS@printtext{NOT DEFINED}%
  \MT@reset@pr@codes
⟨show⟩  }\par
}
```

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

```
⟨*pdf-|lua-|xe-⟩
\def\MT@set@all@pr#1#2{%
⟨debug⟩\MT@dinfo@nl{3}{-- lp/rp: setting all to #1/#2}%
  \let\MT@temp\@empty
  \MT@ifempty{#1}\relax{\g@addto@macro\MT@temp{\lpcode\MT@font\@tempcnta=#1}}%
  \MT@ifempty{#2}\relax{\g@addto@macro\MT@temp{\rpcode\MT@font\@tempcnta=#2}}%
  \MT@do@font\MT@temp
}
```

`\MT@reset@pr@codes@` `\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.

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

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

```
\def\MT@the@pr@code{\@tempcntb}
```

```
⟨*pdf-|lua-⟩
⟨pdf-⟩\MT@requires@pdftex6
⟨lua-⟩\MT@requires@luatex3
  {\def\MT@the@pr@code@tr{%
    \numexpr\@tempcntb+\MT@letterspace@/2\relax
  }
}\relax
⟨/pdf-|lua-⟩
```

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

```
\def\MT@set@codes#1,{%
  \ifx\relax#1\@empty\else
    \MT@split@codes #1==\relax
    \expandafter\MT@set@codes
  \fi
}
```

\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.

```
\def\MT@split@codes#1=#2=#3\relax{%
  \def\@tempa{#1}%
  \ifx\@tempa\@empty \else
    \MT@get@slot
⟨pdf-|lua-⟩    \ifnum\MT@char > \m@ne
⟨xe-⟩    \ifx\MT@char\@empty \else
      \MT@get@char@unit
      \csname MT@\MT@feat @split@val\endcsname#2\relax
    \fi
  \fi
}
```

\MT@pr@split@val

```
\def\MT@pr@split@val#1,#2\relax
⟨/pdf-|lua-|xe-⟩
⟨show⟩\def\MTS@pr@split@val#1,#2\relax
⟨show⟩  {\def\@tempb{#1}%
⟨show⟩  \MT@ifempty\@tempb
⟨pdf-|lua-|xe-⟩    \relax
⟨show⟩  {\MTS@lp@=\z@ \let\MTS@lpcode\@empty}%
⟨show⟩  {\MT@scale@to@em
⟨pdf-|lua-|xe-⟩    \lpcode\MT@font\MT@char=\MT@the@pr@code
⟨show⟩    \MTS@lp@=\dimexpr\@tempcntb em/1000\relax\relax
⟨show⟩    \edef\MTS@lpcode{[\@tempb] \the\@tempcntb/\the\MTS@lp@}%
⟨debug⟩\MT@dinfo@nl{4}{;;; lp (\MT@char): \number\lpcode\MT@font\MT@char: [#1]}%
⟨show⟩  }%
⟨show⟩  \def\@tempb{#2}%
⟨show⟩  \MT@ifempty\@tempb
⟨pdf-|lua-|xe-⟩    \relax
⟨show⟩  {\MTS@rp@=\z@ \let\MTS@rpcode\@empty}%
⟨show⟩  {\MT@scale@to@em
⟨pdf-|lua-|xe-⟩    \rpcode\MT@font\MT@char=\MT@the@pr@code
⟨show⟩    \MTS@rp@=\dimexpr\@tempcntb em/1000\relax\relax
⟨show⟩    \edef\MTS@rpcode{[\@tempb] \the\@tempcntb/\the\MTS@rp@}%
⟨debug⟩\MT@dinfo@nl{4}{;;; rp (\MT@char): \number\rpcode\MT@font\MT@char: [#2]}%
⟨show⟩  }%
⟨show⟩  \llap{\MTS@show@char@pr\MT@char\quad}%
⟨show⟩  \parbox[b][][b]{3.5cm}{\MTS@printtext{%
⟨show⟩      \footnotesize\makebox[.4cm][l]{L:} \MT@ifempty{\MTS@lpcode}{---}{\MTS@lpcode}\\
⟨show⟩                  \makebox[.4cm][l]{R:} \MT@ifempty{\MTS@rpcode}{---}{\MTS@rpcode}}}%
⟨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*⟩@.

```
  \MT@ifdefined@c@T\MT@pr@inh@name{%
    \MT@ifdefined@n@T{MT@inh@\MT@pr@inh@name @\MT@char @}{%
      \MT@exp@cs\MT@map@tlist@c
        {MT@inh@\MT@pr@inh@name @\MT@char @}%
⟨pdf-|lua-|xe-⟩       \MT@set@pr@heirs
⟨show⟩      \MTS@show@char@pr
    }%
  }%
⟨show⟩  }\newline
}
⟨*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. `\rpcode`, since this would disallow protrusion factors larger than the character width (since `\[lr]pcode`'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`.

```
⟨pdf-⟩\MT@requires@pdftex3{
\def\MT@scale@to@em{%
  \@tempcntb=\MT@count\relax
```

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

```
  \MT@scale\@tempcntb \@tempb \MT@dimen@six
  \ifnum\@tempcntb=\z@ \else
    \MT@scale@factor
  \fi
}
```

\MT@get@charwd

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

```
\def\MT@get@charwd{%
⟨*pdf-⟩
^^X  \MT@count=\fontcharwd\MT@font\MT@char\relax
^^Q  \setbox\z@=\hbox{\MT@font \char\MT@char}%
^^Q  \MT@count=\wd\z@
⟨/pdf-⟩
⟨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).

```
⟨*xe-⟩
  \ifnum\MT@char@<\z@
    \setbox\z@=\hbox{\MT@font \XeTeXglyph-\MT@char@}%
    \MT@count=\wd\z@
  \else
    \MT@count=\fontcharwd\MT@font\MT@char@\relax
  \fi
⟨/xe-⟩
  \ifnum\MT@count=\z@ \MT@info@missing@char \fi
}
```

For letterspaced fonts, we have to subtract the letterspacing amount from the characters' widths. The protrusion amounts will be adjusted in `\MT@set@pr@codes`.

The letterspaced font is already loaded so that 1 em = `\fontdimen 6`.

```
⟨*pdf-⟩
\MT@requires@pdftex6{
  \g@addto@macro\MT@get@charwd{%
    \MT@ifdefined@c@T\MT@letterspace@
      {\advance\MT@count -\dimexpr\MT@letterspace@ sp *\dimexpr 1em/1000\relax}%
  }
}\relax
}{
```

No adjustment with versions 0.14f and 0.14g.

```
\def\MT@scale@to@em{%
  \MT@count=\@tempb\relax
  \ifnum\MT@count=\z@ \else
    \MT@scale@factor
  \fi
}
```

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

```
\def\MT@get@charwd{\MT@count=\MT@dimen@six}
}
⟨/pdf-⟩
⟨/pdf-|lua-|xe-⟩
⟨/pdf-|lua-|xe-|show⟩
```

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

```
⟨*package⟩
\def\MT@get@font@dimen#1{%
  \ifnum\fontdimen#1\MT@font=\z@
    \MT@warning@nl{Font `\MT@@font' does not specify its\MessageBreak
      \@backslashchar fontdimen #1 (it's zero)!\MessageBreak
      You should use a different `unit' for \MT@curr@list@name}%
  \else
    \MT@count=\fontdimen#1\MT@font
  \fi
}
```

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

```
\def\MT@info@missing@char{%
  \MT@info@nl{Character `\the\MT@toks'
^^X   \ifnum\MT@char@<\z@ is missing\else
^^X     \iffontchar\MT@font\MT@char@
                has a width of Opt
^^X      \else is missing\fi\fi
^^Q    \MessageBreak (it's probably missing)
    \MessageBreak in font `\MT@@font'.\MessageBreak
    Ignoring protrusion settings for this character}%
}
```

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

```
\def\MT@scale@factor{%
  \ifnum\csname MT@\MT@feat @factor@\endcsname=\@m \else
    \expandafter\MT@scale\expandafter \@tempcntb
      \csname MT@\MT@feat @factor@\endcsname \@m
  \fi
  \ifnum\@tempcntb>\csname MT@\MT@feat @max\endcsname\relax
    \MT@exp@cs\MT@warn@code@too@large{MT@\MT@feat @max}%
  \else
    \ifnum\@tempcntb<\csname MT@\MT@feat @min\endcsname\relax
      \MT@exp@cs\MT@warn@code@too@large{MT@\MT@feat @min}%
    \fi
  \fi
}
```

`\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.

```
\def\MT@warn@code@too@large#1{%
  \@tempcnta=#1\relax
  \ifnum\csname MT@\MT@feat @factor@\endcsname=\@m \else
    \expandafter\MT@scale\expandafter\@tempcnta\expandafter
      \@m \csname MT@\MT@feat @factor@\endcsname
  \fi
  \MT@scale\@tempcnta \MT@dimen@six \MT@count
  \MT@warning@nl{The \@nameuse{MT@abbr@\MT@feat} code \@tempb\space
    is too large for character\MessageBreak
    `\the\MT@toks' in \MT@curr@list@name.\MessageBreak
    Setting it to the maximum of \number\@tempcnta}%
  \@tempcntb=#1\relax
}
```

\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.).

```
\def\MT@get@opt{%
  \MT@set@listname
```

\MT@pr@factor@ Apply a factor?

\MT@sp@factor@

\MT@kn@factor@

```
  \MT@ifdefined@n@TF{MT@\MT@feat @c@\csname MT@\MT@feat @c@name\endcsname @factor}{%
    \MT@let@nn{MT@\MT@feat @factor@}
        {MT@\MT@feat @c@\csname MT@\MT@feat @c@name\endcsname @factor}%
    \MT@vinfo{... : Multiplying \@nameuse{MT@abbr@\MT@feat} codes by
                    \number\csname MT@\MT@feat @factor@\endcsname/1000}%
  }{%
    \MT@let@nn{MT@\MT@feat @factor@}{MT@\MT@feat @factor}%
  }%
```

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

\MT@sp@unit@

\MT@kn@unit@

```
  \MT@ifdefined@n@TF{MT@\MT@feat @c@\csname MT@\MT@feat @c@name\endcsname @unit}{%
    \MT@let@nn{MT@\MT@feat @unit@}%
        {MT@\MT@feat @c@\csname MT@\MT@feat @c@name\endcsname @unit}%
    \MT@exp@cs\ifx{MT@\MT@feat @unit@}\@empty
      \MT@vinfo{... : Setting \@nameuse{MT@abbr@\MT@feat} codes
                      relative to character widths}%
    \else
      \MT@exp@cs\ifx{MT@\MT@feat @unit@}\m@ne
        \MT@vinfo{... : Setting \@nameuse{MT@abbr@\MT@feat} codes
                        relative to width of space}%
      \fi
    \fi
  }{%
    \MT@let@nn{MT@\MT@feat @unit@}{MT@\MT@feat @unit}%
  }%
```

\MT@get@space@unit The codes are either relative to character widths, or to a fixed width. For spacing 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.

\MT@get@char@unit

```
  \let\MT@get@char@unit\relax
  \let\MT@get@space@unit\@gobble
  \MT@exp@cs\ifx{MT@\MT@feat @unit@}\@empty
    \let\MT@get@char@unit\MT@get@charwd
  \else
    \MT@exp@cs\ifx{MT@\MT@feat @unit@}\m@ne
      \let\MT@get@space@unit\MT@get@font@dimen
    \else
      \MT@exp@cs\MT@get@unit{MT@\MT@feat @unit@}%
    \fi
```

```
  \fi
```

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

```
  \MT@ifdefined@n@T{MT@\MT@feat @c@\csname MT@\MT@feat @c@name\endcsname @preset}{%
    \csname MT@preset@\MT@feat\endcsname
    \MT@let@nc{MT@reset@\MT@feat @codes}\relax
  }%
}
```

\MT@get@unit
\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.

```
\def\MT@get@unit#1{%
  \expandafter\MT@get@unit@#1 e!\@nil
  \ifx\x\@empty\else\let#1\x\fi
  \@defaultunits\@tempdima#1 pt\relax\@nnil
  \ifdim\@tempdima=\z@
    \MT@warning@nl{%
      Cannot set \@nameuse{MT@abbr@\MT@feat} factors relative to zero\MessageBreak
      width. Setting factors of list `\@nameuse{MT@\MT@feat @c@name}'\MessageBreak
      relative to character widths instead}%
    \let#1\@empty
    \let\MT@get@char@unit\MT@get@charwd
  \else
    \MT@vinfo{... : Setting \@nameuse{MT@abbr@\MT@feat} factors relative
                    to \the\@tempdima}%
    \MT@count=\@tempdima\relax
  \fi
}
\def\MT@get@unit@#1e#2#3\@nil{%
  \ifx\\#3\\\let\x\@empty \else
    \if m#2%
      \edef\x{#1\fontdimen6\MT@font}%
    \else
      \if x#2%
        \edef\x{#1\fontdimen5\MT@font}%
      \fi
    \fi
  \fi
}
```

\MT@set@inputenc

The configurations may be under the regime of an input encoding.

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

\MT@cat

We remember the current category (`c` or `inh`), in case of warnings later.

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

\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.

```
\MT@addto@setup{%
  \@ifpackageloaded{inputenc}{%
    \@ifpackagelater{inputenc}{2006/02/22}{%
      \def\MT@set@inputenc@{%
        \MT@ifstreq\inputencodingname{\csname\@tempa\endcsname}\relax
          \MT@load@inputenc
      }%
    }{%
      \let\MT@set@inputenc@\MT@load@inputenc
    }%
```

```
  }{%
    \def\MT@set@inputenc@{%
      \MT@warning@nl{Key `inputenc' used in \MT@curr@list@name, but the `inputenc'
          \MessageBreak package isn't loaded. Ignoring input encoding}%
    }%
  }%
}
```

`\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.

```
\def\MT@load@inputenc{%
  \MT@cfg@catcodes
⟨debug⟩\MT@dinfo@nl{1}{loading input encoding: \@nameuse{\@tempa}}%
  \inputencoding{\@nameuse{\@tempa}}%
}
```

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

```
\def\MT@set@pr@heirs#1{%
  \lpcode\MT@font #1=\lpcode\MT@font\MT@char\relax
  \rpcode\MT@font #1=\rpcode\MT@font\MT@char\relax
⟨debug⟩\MT@dinfo@nl{2}{-- heir of \MT@char: #1}%
⟨debug⟩\MT@dinfo@nl{4}{;;; lp/rp (#1): \number\lpcode\MT@font\MT@char/%
⟨debug⟩                                \number\rpcode\MT@font\MT@char}%
}
```

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

```
\def\MT@set@pr@prefixheirs{%
  \MT@ifdefined@c@T\MT@pr@inh@name{%
    \MT@ifdefined@n@T{MT@inh@\MT@pr@inh@name @prefixes}{%
      \MT@exp@cs\MT@map@tlist@c
        {MT@inh@\MT@pr@inh@name @prefixes}%
        \MT@set@pr@prefixes
    }%
  }%
}
⟨/package⟩
```

`\MT@set@pr@prefixes` `\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 XeTeX, we may have to translate to glyph numbers because `\fontcharwd` doesn't have the nice feature of understanding the 'U' or '/' prefixes.

```
⟨*pdf-|lua-|xe-|show⟩
⟨pdf-|lua-|xe-⟩\def\MT@set@pr@prefixes#1{\MT@set@pr@prefixes@#1}
⟨pdf-|lua-|xe-⟩\def\MT@set@pr@prefixes@#1#2#3#4%
⟨show⟩\def\MTS@set@pr@prefixes@#1#2#3#4%
  {%
⟨show⟩  \MTS@lp@=\z@ \MTS@rp@=\z@
⟨show⟩  \ifnum#1=\@tempcntb \else
⟨show⟩    \par\leavevmode
⟨show⟩    \llap{\MTS@show@char@pr{#1} \MTS@printtext{=} }%
⟨show⟩  \fi
⟨*xe-⟩
  \edef\@tempa{\expandafter\ifx\@car#1\@nil U\@gobble#1\else\number\XeTeXglyphindex"#1" \fi}%
  \edef\@tempb{\expandafter\ifx\@car#2\@nil U\@gobble#2\else\number\XeTeXglyphindex"#2" \fi}%
⟨/xe-⟩
  \@tempcnta=\z@
  \ifnum#3>\z@
    \@tempcnta=\numexpr
⟨pdf-|lua-|show⟩      (\fontcharwd\MT@font#2-\fontcharwd\MT@font#1)%
⟨xe-⟩       (\fontcharwd\MT@font\@tempb-\fontcharwd\MT@font\@tempa)%
      *#3/\MT@dimen@six\relax
  \fi
⟨pdf-|lua-|xe-⟩  \lpcode\MT@font #2=\numexpr\lpcode\MT@font#1+\@tempcnta\relax
⟨show⟩  \MTS@lp@=\dimexpr\numexpr\lpcode\MT@font#1+\@tempcnta\relax em/1000\relax
```

```
  \@tempcnta=\z@
  \ifnum#4>\z@
    \@tempcnta=\numexpr
⟨pdf-|lua-|show⟩      (\fontcharwd\MT@font#2-\fontcharwd\MT@font#1)%
⟨xe-⟩      (\fontcharwd\MT@font\@tempb-\fontcharwd\MT@font\@tempa)%
      *#4/\MT@dimen@six\relax
  \fi
⟨pdf-|lua-|xe-⟩  \rpcode\MT@font #2=\numexpr\rpcode\MT@font#1+\@tempcnta\relax
⟨show⟩  \MTS@rp@=\dimexpr\numexpr\rpcode\MT@font#1+\@tempcnta\relax em/1000\relax
⟨debug⟩\MT@dinfo@nl{2}{-- (prefix) heir of #1: #2}%
⟨debug⟩\MT@dinfo@nl{4}{;;; lp/rp (#2): \number\lpcode\MT@font#2/%
⟨debug⟩                                \number\rpcode\MT@font#2}%
⟨show⟩  \MTS@show@char@pr{#2}%
⟨show⟩  \@tempcntb=#1\relax
}
⟨/pdf-|lua-|xe-|show⟩
```

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

`\MT@preset@pr@`

```
⟨*package⟩
\def\MT@preset@pr{%
  \expandafter\expandafter\expandafter\MT@preset@pr@
    \csname MT@pr@c@\MT@pr@c@name @preset\endcsname\@nil
}
\def\MT@preset@pr@#1,#2\@nil{%
  \ifx\MT@pr@unit@\@empty
    \MT@warn@preset@towidth{pr}%
    \let\MT@preset@aux\MT@preset@aux@factor
  \else
    \def\MT@preset@aux{\MT@preset@aux@space2}%
  \fi
  \MT@ifempty{#1}{\let\@tempa\@empty}{\MT@preset@aux{#1}\@tempa}%
  \MT@ifempty{#2}{\let\@tempb\@empty}{\MT@preset@aux{#2}\@tempb}%
  \MT@set@all@pr\@tempa\@tempb
}
```

`\MT@preset@aux` Auxiliary macro for presetting. Store value ⟨*#1*⟩ in macro ⟨*#2*⟩.

`\MT@preset@aux@factor`
`\MT@preset@aux@space`

```
\def\MT@preset@aux@factor#1#2{%
  \@tempcntb=#1\relax
  \MT@scale@factor
  \edef#2{\number\@tempcntb}%
}
\def\MT@preset@aux@space#1#2#3{%
  \def\@tempb{#2}%
  \MT@get@space@unit#1%
  \MT@scale@to@em
  \edef#3{\number\@tempcntb}%
}
```

`\MT@warn@preset@towidth`

```
\def\MT@warn@preset@towidth#1{%
  \MT@warning@nl{%
    Cannot preset characters relative to their widths\MessageBreak
    for \@nameuse{MT@abbr@#1} list `\@nameuse{MT@#1@c@name}'.
    Presetting them\MessageBreak relative to 1em instead}%
}
```

1.2.2 Manual protrusion

`\noprotrusion` This command may be used to inhibit protrusion on either side. It's part of LaTeX since 2018-12-01. We provide it for older releases.

```
\MT@ifdefined@c@TF\noprotrusion\relax{
  \DeclareRobustCommand\noprotrusion{\leavevmode\kern-\p@\kern\p@}
}
```

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

```
\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).[4]

```
\DeclareRobustCommand\leftprotrusion{%
  \MT@toks{}%
  \MT@prot@toks{}%
  \let\MT@prot@l\MT@prot@l@
  \let\MT@maybe@textcmd\@firstofone
  \MT@prot@get@firstgroup
}
```

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

```
\def\MT@prot@l@#1{%
  \MT@get@prot{#1}{left}%
  #1%
}
```

\MT@prot@toks If \leftprotrusion is followed by a text command, we trial-typeset only the
\MT@prot@l@tc first glyph, then actually typeset the whole argument, which we've saved in
\MT@gobble@to@nil \MT@prot@toks, and finally gobble anything that might still be left in the input stream (see \MT@prot@check@F below).

```
\newtoks\MT@prot@toks
\def\MT@prot@l@tc#1{%
  \MT@get@prot{\MT@maybe@textcmd{#1}}{left}%
  \the\MT@prot@toks
  \MT@gobble@to@nil
}
\def\MT@gobble@to@nil#1\MT@nil{}
```

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

```
\DeclareRobustCommand\rightprotrusion{\MT@prot@r}
\def\MT@prot@r#1{%
  {#1}%
  \MT@get@prot{#1}{right}%
}
```

\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 (currently used for csquotes only),

\MT@csq@eqgroup and a dedicated command to end csquotes's group (because we actually typeset the quote character, instead of disabling quotes altogether (as we suggested for [issue #1], which was wrong)). Compatibility with csquotes is also the reason for the extra \relax after ⟨*#1*⟩.

\MT@noindent Finally, LaTeX's new paragraph hooks require special attention, as they're (currently?) unable to distinguish between real typesetting and trial runs. In our case,

4 LuaTeX 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.

fortunately, we really don't want to trigger the hooks.[5] Also, as far as I can tell, we don't need a `\RawParEnd` at the end (as suggested in `ltpara`), because none of our commands are `\long` anymore.

```
\let\MT@prot@hook\@empty
\let\MT@csq@eqgroup\relax
\IfFormatAtLeastTF{2021/11/15}
  {\let\MT@noindent\RawNoindent}
  {\let\MT@noindent\noindent}
\def\MT@get@prot#1#2{%
  \begingroup
    \setbox\MT@tempbox\vbox{%
      \everypar{}%
      \parfillskip=\z@skip
      \hbadness\@M
      \clubpenalty\z@
      \widowpenalty\z@
      \interlinepenalty\z@
      \@newlistfalse
      \MT@prot@hook
      \MT@noindent #1\relax\MT@csq@eqgroup}%
    \vbadness=\@M
    \splittopskip=\z@
    \vfuzz=\maxdimen
    \setbox\MT@tempbox\vbox{%
      \ifvbox\MT@tempbox
        \global\setbox\MT@tempbox=\vsplit\MT@tempbox to \normalbaselineskip
        \unvbox\MT@tempbox
        \global\setbox\MT@tempbox=\lastbox
      \fi
    }%
  \endgroup
  \ifhbox\MT@tempbox
    \@tempdima=\@nameuse{#2marginkern}\MT@tempbox\relax
    \expandafter\ifdim\@tempdima=\z@ \else
      \leavevmode
      \MT@vinfo{|<< adding #2 margin kern for `#1':\MessageBreak
        \the\@tempdima \on@line}%
      \kern\@tempdima
⟨debug⟩%\vbox toOpt{\vss\llap{\fbox{%
⟨debug⟩%      \MT@ifstreq{#2}{left}{\kern\@tempdima}\relax
⟨debug⟩%      \kern-\fboxsep\unhbox\MT@tempbox\kern-\fboxsep
⟨debug⟩%      \MT@ifstreq{#2}{right}{\kern\@tempdima}\relax}\hskip\marginparsep}}%
    \fi
  \fi
}
```

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

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

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

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

`\MT@prot@ifmacro` `\MT@prot@ifmacro@` Test whether ⟨*#1*⟩ is a macro or an active character that does not take an argument. As we're using `etoolbox` here, this only works with e-TEX.

```
^^X\def\MT@prot@ifmacro@{%
^^X  \ifdefmacro\MT@prot@next{\ifdefparam\MT@prot@next\@gobble\@firstofone}\@gobble}
^^Q\let\MT@prot@ifmacro\@gobble
```

5 Well, in some cases we do, but this indeed 'needs further analysis' (cf. https://github.com/latex3/latex2e/issues/880).

\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.

```
\def\MT@prot@iffirstcmd#1{%
  \ifx\relax#1\expandafter\@secondoftwo\else
    \MT@exp@two@c\ifx\MT@car\MT@prot@next\relax\@nil#1%
      \expandafter\expandafter\expandafter\@firstoftwo
    \else
      \expandafter\expandafter\expandafter\@secondoftwo
    \fi
  \fi
}
```

\MT@car A long car.

```
\long\def\MT@car#1#2\@nil{#1}
```

\MT@prot@iflicrcmd Fun with LICR: If we have an encoding command, test if the first command of the third command (e.g., \T1\") is \@text@composite, in which case also grab the next token, otherwise it should be a text command.

```
\def\MT@getthird#1#2#3#4\@nil{#3}
\def\MT@prot@iflicrcmd{%
  \MT@prot@iffirstcmd\@current@cmd\@secondoftwo\@firstofone
    {\MT@prot@iffirstcmd\@changed@cmd\@firstofone\@gobble}%
  {\expandafter\expandafter\expandafter\let
      \expandafter\expandafter\expandafter\@tempa
      \expandafter\MT@getthird\MT@prot@next\relax\@nil
    \MT@exp@two@c\ifx\@car\@tempa\relax\@nil\@text@composite
      \def\MT@temp*##1##2{\MT@exp@one@n\MT@prot@l{\the\MT@toks##1##2}}%
    \else
      \def\MT@temp*##1{\MT@exp@one@n\MT@prot@l{\the\MT@toks##1}}%
    \fi
  }%
}
```

\MT@prot@addgroup If we have a group, we inject \MT@prot@get@firstgroup again at the beginning 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.

```
\def\MT@prot@addgroup{\bgroup\afterassignment\MT@prot@get@firstgroup\let\MT@temp= }
```

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

\MT@prot@get@firstgroup@tc
\MT@prot@get@firsttoken
\MT@prot@get@nexttoken

```
\def\MT@prot@get@firstgroup{\futurelet\MT@prot@next\MT@prot@get@first@group}
\def\MT@prot@get@firstgroup@tc{\futurelet\MT@prot@next\MT@prot@get@first@group@tc}
\def\MT@prot@get@firsttoken{\futurelet\MT@prot@next\MT@prot@get@first@token}
\def\MT@prot@get@nexttoken{\futurelet\MT@prot@next\MT@prot@get@next@token}
```

\MT@prot@check We map through a list of commands that should be copied into the toks. ⟨*#3*⟩ will be \relax by default, but can also indicate a replacement command.

\MT@prot@check@

```
\def\MT@prot@check#1{\MT@prot@check@#1\relax\@nil}
\def\MT@prot@check@#1#2#3\@nil{%
  \ifx\MT@prot@next#2%
    \csname MT@prot@check@#1\endcsname #3%
    \let\MT@prot@ifmacro\@gobble
    \expandafter\MT@tlist@break
  \fi
}
```

Beware that the following nomenclature is rather arcane.

\MT@prot@check@I
- This is for commands to be **I**gnored.

```
\def\MT@prot@check@I{%
  \def\MT@temp*##1{\MT@prot@get@firstgroup}%
}
```

\MT@prot@check@S • Add a **S**ingle command (without an argument).

```
\def\MT@prot@check@S{%
  \def\MT@temp*##1{\MT@toks\expandafter{\the\MT@toks##1}\MT@prot@get@firstgroup}%
}
```

\MT@prot@check@X • Add a command with **O**ne argument.

```
\def\MT@prot@check@O{%
  \def\MT@temp*##1##2{\MT@toks\expandafter{\the\MT@toks##1{##2}}\MT@prot@get@firstgroup}%
}
```

\MT@prot@check@T • Add a command with **T**wo arguments.

```
\def\MT@prot@check@T{%
  \def\MT@temp*##1##2##3{\MT@toks\expandafter{\the\MT@toks##1{##2}{##3}}\MT@prot@get@firstgroup}%
}
```

\MT@prot@check@E • This is for commands that **E**nclose their argument in something, e.g., in braces, and which we trial-typeset without any contents.

```
\def\MT@prot@check@E{%
  \the\MT@toks
  \def\MT@temp*##1{\MT@prot@l{##1}}%
}
```

\MT@prot@check@e • Same for starred commands (the main candidate here is csquotes's \enquote).

```
\def\MT@prot@check@e{%
  \the\MT@toks
  \def\MT@temp*##1{\@ifstar{\MT@prot@l{##1*}}{\MT@prot@l{##1}}}%
}
```

\MT@prot@check@eX • Here we replace the 'integrated interface' (csquotes) with the regular one.

```
\def\MT@prot@check@eX#1{%
  \the\MT@toks
  \def\MT@temp*##1{\@ifstar
    {\MT@get@prot{#1*}{left}##1*}
    {\MT@get@prot{#1}{left}##1}}%
}
```

\MT@prot@check@l
\MT@prot@check@l@ • csquotes provides a couple of commands for quotations in foreign **l**anguages (lowercase, because it may be starred), whose first argument (the language) we also have to evaluate before trial typesetting.

```
\def\MT@prot@check@l{%
  \def\MT@temp*##1{\@ifstar{\MT@prot@check@l@{##1*}}{\MT@prot@check@l@{##1}}}%
}
\def\MT@prot@check@l@#1#2{%
  \the\MT@toks
  \MT@prot@l{#1{#2}}%
}
```

\MT@prot@check@lX
\MT@prot@check@lX@ • Another macro for csquotes commands: replace integrated language-switching commands with their regular variants.

```
\def\MT@prot@check@lX#1{%
  \def\MT@temp*##1{\@ifstar
    {\def\MT@temp{##1*}\MT@prot@check@lX@{#1*}}
    {\def\MT@temp{##1}\MT@prot@check@lX@{#1}}}%
}
\def\MT@prot@check@lX@#1#2{%
  \the\MT@toks
```

```
  \MT@get@prot{#1{#2}}{left}\MT@temp{#2}%
}
```

\MT@prot@check@F

- Here we deal with **F**ont switching commands (i.e., text commands, which take an argument). We (a) remember the text command, (b) save the full text, and then (c) continue inspecting the contents of the argument. We also have to execute (and empty) \MT@toks, because it might already contain other commands. Nested text commands still don't work.

```
\def\MT@prot@check@F{%
  \ifx\MT@prot@l\MT@prot@l@tc
    \def\MT@temp*{\MT@exp@one@n\MT@prot@l{\the\MT@toks}}%
  \else
    \let\MT@prot@l\MT@prot@l@tc
    \def\MT@temp*##1##2{%
      \let\MT@maybe@textcmd##1%
      \the\MT@toks
      \MT@toks{}%
      \MT@prot@toks{##1{##2}}%
      \MT@prot@get@firstgroup@tc##2\MT@nil
    }%
  \fi
}
```

\MT@prot@check@cmds

And here's the list of commands that we can deal with.

```
\def\MT@prot@check@cmds{%
  {I\ignorespaces}{I\relax}{I\@empty}%
  {S\rmfamily}{S\sffamily}{S\ttfamily}{S\mdseries}{S\bfseries}%
  {S\upshape}{S\itshape}{S\slshape}{S\scshape}{S\em}%
  {S\normalfont}{S\selectfont}%
  {S\lsstyle}%
  {S\tiny}{S\scriptsize}{S\footnotesize}{S\small}{S\normalsize}%
  {S\large}{S\Large}{S\LARGE}{S\huge}{S\Huge}%
  {O\fontencoding}{O\fontfamily}{O\fontseries}{O\fontshape}%
  {O\microtypesetup}{O\microtypecontext}%
  {T\fontsize}%
  {F\textrm}{F\textsf}{F\texttt}{F\textnormal}%
  {F\textbf}{F\textmd}{F\textit}{F\textsl}{F\textsc}{F\textup}{F\emph}%
  {F\MakeUppercase}{F\MakeLowercase}%
}
```

LaTeX 2020/02/02 introduced some more text commands (adopted from fontaxes, which provides some more, see below).

```
\IfFormatAtLeastTF{2020/02/02}
  {\g@addto@macro\MT@prot@check@cmds{%
    {S\swshape}{S\ulcshape}{S\sscshape}{S\normalshape}%
    {F\textulc}{F\textsw}{F\textssc}%
    {O\fontseriesforce}{O\fontshapeforce}}}
  \relax
\IfFormatAtLeastTF{2022/11/01}
  {\g@addto@macro\MT@prot@check@cmds{{F\MakeTitlecase}}}\relax
```

The ltxdoc class and the doc package provide some abbreviations. Unfortunately, the \cmd command doesn't work.

```
\@ifclassloaded{ltxdoc}
  {\g@addto@macro\MT@prot@check@cmds{{E\enquote}{E\marg}{E\oarg}{E\parg}{E\cs}}}\relax
\MT@addto@setup{%
  \MT@with@package@T{doc}
    {\g@addto@macro\MT@prot@check@cmds{{E\meta}}}%
```

The additional fontaxes commands.

```
  \MT@with@package@T{fontaxes}
    {\g@addto@macro\MT@prot@check@cmds{%
```

```
      {S\txfigures}{S\lnfigures}{S\tbfigures}{S\prfigures}%
      {O\fontfigurestyle}{O\fontfigurealignment}{O\fontbasefamily}%
      {O\figureversion}%
      {F\textsw}{F\textssc}{F\textulc}%
      {F\textfigures}{F\liningfigures}{F\tabularfigures}{F\proportionalfigures}}%
      \IfFormatAtLeastTF{2020/02/02}\relax
        {\g@addto@macro\MT@prot@check@cmds{%
          {S\swshape}{S\ulcshape}{S\sscshape}%
          {F\textulc}{F\textsw}{F\textssc}}}}
```

The `nfssext-cfr` package (an extension of the `nfssext` package, which is part of Philipp Lehman's `fontinstallationguide` but was never publicised separately as far as I can tell) adds many more commands on top of the NFSS.

```
  \MT@with@package@T{nfssext-cfr}
    {\g@addto@macro\MT@prot@check@cmds{%
      {S\tistyle}{S\ltstyle}{S\ofstyle}{S\altstyle}{S\regstyle}{S\embossstyle}%
      {S\ornamentalstyle}{S\qtstyle}{S\shstyle}{S\tmstyle}{S\tvstyle}{S\swashstyle}%
      {S\lnstyle}{S\osstyle}{S\instyle}{S\sustyle}{S\lstyle}{S\ostyle}%
      {S\pstyle}{S\tstyle}{S\plstyle}{S\postyle}{S\tlstyle}{S\tostyle}%
      {S\scolshape}{S\olshape}{S\sishape}{S\ushape}{S\scushape}%
      {S\uishape}{S\rishape}{S\dfshape}{S\swstyle}%
      {S\nwwidth}{S\cdwidth}{S\ecwidth}{S\ucwidth}%
      {S\etwidth}{S\epwidth}{S\exwidth}{S\uxwidth}{S\regwidth}%
      {S\mbweight}{S\dbweight}{S\sbweight}{S\ebweight}%
      {S\ubweight}{S\lgweight}{S\elweight}{S\ulweight}%
      {F\textti}{F\textlt}{F\textof}{F\textalt}{F\textreg}{F\emboss}%
      {F\textorn}{O\ornament}{F\textqt}{F\textsh}{F\texttm}{F\texttv}{F\textswash}%
      {F\textln}{F\textos}{F\textin}{F\textsu}{F\textl}{F\texto}%
      {F\textp}{F\textt}{F\textpl}{F\textpo}{F\texttl}{F\textto}%
      {F\textol}{F\textsi}{F\textu}{F\textscu}%
      {F\textui}{F\textri}{F\textdf}%
      {F\textnw}{F\textcd}{F\textec}{F\textuc}%
      {F\textet}{F\textep}{F\textex}{F\textux}{F\textrw}%
      {F\textmb}{F\textdb}{F\textsb}{F\texteb}%
      {F\textub}{F\textlg}{F\textel}{F\textul}}%
      \IfFormatAtLeastTF{2020/02/02}\relax
        {\g@addto@macro\MT@prot@check@cmds{{S\swshape}{F\textsw}}}}
```

If `yfonts` is loaded, we add the relevant commands.

```
  \MT@with@package@T{yfonts}
    {\g@addto@macro\MT@prot@check@cmds{%
      {S\frakfamily}{S\swabfamily}{S\gothfamily}%
      {F\textfrak}{F\textswab}{F\textgoth}}}%
```

`csquotes`'s `\enquote` command. It would take precedence over the one provided by `ltxdoc`.

```
  \MT@with@package@T{csquotes}
    {\@ifclassloaded{ltxdoc}
      {\patchcmd\MT@prot@check@cmds{E\enquote}{e\enquote}\relax\relax}
      {\g@addto@macro\MT@prot@check@cmds{{e\enquote}}}%
     \g@addto@macro\MT@prot@check@cmds{{e\textquote}%
       {l\foreignquote}{l\hyphenquote}{l\foreigntextquote}{l\hyphentextquote}%
       {{eX}\textcquote\textquote}%
       {{lX}\foreigntextcquote\foreigntextquote}%
       {{lX}\hyphentextcquote\hyphentextquote}}%
}
```

`\MT@prot@get@first@group` If next char is {, start a group and try again, else continue until we find a beginning char.

```
\def\MT@prot@get@first@group{%
  \MT@prot@ifcat\bgroup{%
    \def\MT@temp*{\MT@prot@addgroup}%
  }{%
    \def\MT@temp*{\MT@prot@get@first@token}%
```

```
  }%
  \MT@temp*%
}
```

\MT@prot@get@first@group@tc The variant for text commands (in case they start with another group).

```
\def\MT@prot@get@first@group@tc{%
  \MT@prot@ifcat\bgroup{%
    \def\MT@temp*##1##2\MT@nil{\MT@ifempty{##1}\relax
          {{\MT@prot@get@firstgroup@tc##1\MT@nil}}}%
  }{%
    \def\MT@temp*{\MT@prot@get@first@token}%
  }%
  \MT@temp*%
}
```

\MT@prot@get@first@token This can be called repeatedly. We add a letter or other character, . . .

```
\def\MT@prot@get@first@token{%
  \def\MT@temp*{\MT@exp@one@n\MT@ifempty{\the\MT@toks}
      {\MT@exp@one@n\MT@ifempty{\the\MT@prot@toks}\relax{\the\MT@prot@toks\MT@gobble@to@nil}}
      {\MT@exp@one@n\MT@prot@l{\the\MT@toks}}}%
  \MT@prot@ifcat{a}{%
    \def\MT@temp*{\MT@prot@addtoken@first}%
  }{%
    \MT@prot@ifcat{!}{%
      \def\MT@temp*{\MT@prot@addtoken@first}%
    }{%
```

a space character, . . .

```
      \MT@prot@ifx\@sptoken{%
        \def\MT@temp* {\MT@prot@get@firstgroup}%
      }{%
```

commands, . . .

```
        \let\MT@prot@ifmacro\MT@prot@ifmacro@
        \MT@map@tlist@c\MT@prot@check@cmds\MT@prot@check
```

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

```
        \MT@prot@ifmacro{%
          \MT@prot@iffirstcmd\UTFviii@two@octets{%
            \def\MT@temp*##1##2{\MT@exp@one@n\MT@prot@l{\the\MT@toks##1##2}}%
          }{%
            \MT@prot@iffirstcmd\UTFviii@three@octets{%
              \def\MT@temp*##1##2##3{\MT@exp@one@n\MT@prot@l{\the\MT@toks##1##2##3}}%
            }{%
              \MT@prot@iffirstcmd\UTFviii@four@octets{%
                \def\MT@temp*##1##2##3##4{\MT@exp@one@n\MT@prot@l{\the\MT@toks##1##2##3##4}}%
              }{%
```

(this is for chars made active by `csquotes`, via `\MakeAutoQuote` or `\MakeOuterQuote`)

```
                \MT@prot@iffirstcmd\csqQQ{\def\MT@temp*##1{\MT@exp@one@n\MT@prot@l{\the\MT@toks##1}}}{%
```

or, finally, a LICR command.

```
                  \MT@prot@iflicrcmd
                }%
              }%
            }%
          }%
        }%
      }%
    }%
  }%
  \MT@temp*%
}
```

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

```
\def\MT@prot@addtoken@first#1{%
  \MT@toks\expandafter{\the\MT@toks#1}%
  \MT@prot@get@nexttoken
}
```

`\MT@prot@get@next@token` Continue if letter or other.

```
\def\MT@prot@get@next@token{%
  \def\MT@temp*{\MT@prot@addtoken@next}%
  \MT@prot@ifcat{a}\relax{%
    \MT@prot@ifcat{!}\relax{%
      \def\MT@temp*{\MT@exp@one@n\MT@prot@l{\the\MT@toks}}%
    }%
  }%
  \MT@temp*%
}
⟨/package⟩
```

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

```
⟨*pdf-|lua-|xe-⟩
\def\MT@prot@addtoken@next#1{%
  \MT@toks\expandafter{\the\MT@toks#1}%
  \setbox\MT@tempbox\hbox{%
```

We disable italic correction, which would prevent us from seeing the ligature (with text commands).

```
    \let\maybe@ic\relax
    \MT@exp@one@n\MT@maybe@textcmd{\the\MT@toks}%
⟨pdf-|xe-⟩    \relax
⟨lua-⟩  }\setbox\MT@tempbox\hbox{\unhbox\MT@tempbox
    \ifnum\lastnodetype=7 \aftergroup\@firstoftwo\else\aftergroup\@secondoftwo\fi}%
      \MT@prot@get@nexttoken
      {\MT@exp@one@n\MT@prot@l{\the\MT@toks}}%
}
⟨/pdf-|lua-|xe-⟩
```

1.2.3 Expansion

`\MT@expansion` Set up for expansion?

```
⟨*pdf-|lua-⟩
\def\MT@expansion{\MT@maybe@do{ex}}
```

`\MT@set@ex@codes@s` 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).

```
\def\MT@set@ex@codes@s{%
  \MT@if@list@exists{%
    \MT@get@ex@opt
    \let\MT@get@char@unit\relax
    \MT@reset@ef@codes
    \MT@get@inh@list
    \MT@set@inputenc{c}%
    \MT@load@list\MT@ex@c@name
    \MT@set@listname
    \MT@let@cn\@tempc{MT@ex@c@\MT@ex@c@name}%
    \expandafter\MT@set@codes\@tempc,\relax,%
    \MT@expandfont
  }\relax
}
⟨/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.

```
⟨package⟩\newif\ifMT@nonselected
⟨*pdf-|lua-⟩
\def\MT@set@ex@codes@n{%
  \MT@nonselectedtrue
  \MT@if@list@exists
    \MT@get@ex@opt
  {%
    \let\MT@stretch@  \MT@stretch
    \let\MT@shrink@   \MT@shrink
    \let\MT@step@     \MT@step
    \let\MT@auto@     \MT@auto
    \let\MT@ex@factor@\MT@ex@factor
  }%
  \MT@reset@ef@codes
  \MT@expandfont
  \MT@nonselectedfalse
}
```

\MT@set@ex@codes

Default is non-selected. It can be changed in the package options.

```
\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.

```
⟨*lua-⟩
\MT@requires@luatex3{
\MT@requires@luatex4{\let\pdffontexpand\expandglyphsinfont}\relax
\ifnum\luatexversion<79
\def\MT@expandfont{%
  \pdffontexpand\MT@font \MT@stretch@ \MT@shrink@ \MT@step@ autoexpand\relax
}
\else
\def\MT@expandfont{%
  \pdffontexpand\MT@font \MT@stretch@ \MT@shrink@ \MT@step@\relax
}
\fi
}{
⟨/lua-⟩
\def\MT@expandfont{%
  \pdffontexpand\MT@font \MT@stretch@ \MT@shrink@ \MT@step@ \MT@auto@\relax
}
⟨lua-⟩}
```

\MT@set@all@ex
\MT@reset@ef@codes@

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

```
\def\MT@set@all@ex#1{%
⟨debug⟩\MT@dinfo@nl{3}{-- ex: setting all to \number#1}%
  \MT@do@font{\efcode\MT@font\@tempcnta=#1\relax}%
}
\def\MT@reset@ef@codes@{\MT@set@all@ex\MT@ex@factor@}
```

\MT@reset@ef@codes

However, this is only necessary for pdfTEX versions prior to 1.20, or LuaTEX < 0.90 (actually, I think, 0.87).

```
⟨pdf-⟩\MT@requires@pdftex4
⟨lua-⟩\MT@requires@luatex5
{
  \def\MT@reset@ef@codes{%
```

```
    \ifnum\MT@ex@factor@=\@m \else
      \MT@reset@ef@codes@
    \fi
  }
}{
  \let\MT@reset@ef@codes\MT@reset@ef@codes@
}
```

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

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

Take an optional factor into account.

```
  \ifnum\MT@ex@factor@=\@m \else
    \MT@scale\@tempcntb \MT@ex@factor@ \@m
  \fi
  \ifnum\@tempcntb > \MT@ex@max
    \MT@warn@ex@too@large\MT@ex@max
  \else
    \ifnum\@tempcntb < \MT@ex@min
      \MT@warn@ex@too@large\MT@ex@min
    \fi
  \fi
  \efcode\MT@font\MT@char=\@tempcntb
⟨debug⟩\MT@dinfo@nl{4}{::: ef (\MT@char): \number\efcode\MT@font\MT@char: [#1]}%
```

Heirs, heirs, I love thy heirs.

```
  \MT@ifdefined@c@T\MT@ex@inh@name{%
    \MT@ifdefined@n@T{MT@inh@\MT@ex@inh@name @\MT@char @}{%
      \MT@exp@cs\MT@map@tlist@c{MT@inh@\MT@ex@inh@name @\MT@char @}\MT@set@ex@heirs
    }%
  }%
}
```

\MT@warn@ex@too@large

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

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

\MT@ex@factor@ \MT@stretch@ \MT@shrink@ \MT@step@ \MT@auto@

```
\def\MT@get@ex@opt{%
  \MT@set@listname
  \MT@ifdefined@n@TF{MT@ex@c@\MT@ex@c@name @factor}{%
    \MT@let@cn\MT@ex@factor@{MT@ex@c@\MT@ex@c@name @factor}%
    \MT@vinfo{... : Multiplying expansion factors by \number\MT@ex@factor@/1000}%
  }{%
    \let\MT@ex@factor@\MT@ex@factor
  }%
  \MT@get@ex@opt@{stretch}{Setting stretch limit to \number\MT@stretch@}%
  \MT@get@ex@opt@{shrink} {Setting shrink limit to \number\MT@shrink@}%
  \MT@get@ex@opt@{step}   {Setting expansion step to \number\MT@step@}%
⟨lua-⟩  \MT@requires@luatex3\relax{%
  \MT@get@ex@opt@{auto}{\MT@ifstreq{\MT@auto@}{autoexpand}{En}{Dis}abling automatic expansion}%
⟨lua-⟩  }%
  \MT@ifdefined@n@T{MT@ex@c@\MT@ex@c@name @preset}{%
    \MT@preset@ex
    \let\MT@reset@ef@codes\relax
  }%
}
```

\MT@get@ex@opt@

```
\def\MT@get@ex@opt@#1#2{%
```

```
    \MT@ifdefined@n@TF{MT@ex@c@\MT@ex@c@name @#1}{%
      \MT@let@nn{MT@#1@}{MT@ex@c@\MT@ex@c@name @#1}%
      \MT@vinfo{... : #2}%
    }{%
      \MT@let@nn{MT@#1@}{MT@#1}%
    }%
}
```

`\MT@set@ex@heirs`

```
\def\MT@set@ex@heirs#1{%
  \efcode\MT@font#1=\efcode\MT@font\MT@char
⟨debug⟩\MT@dinfo@nl{2}{-- heir of \MT@char: #1}%
⟨debug⟩\MT@dinfo@nl{4}{::: ef (#1) \number\efcode\MT@font\MT@char}%
}
```

`\MT@preset@ex`

```
\def\MT@preset@ex{%
  \@tempcntb=\csname MT@ex@c@\MT@ex@c@name @preset\endcsname\relax
  \MT@scale@factor
  \MT@set@all@ex\@tempcntb
}
⟨/pdf-|lua-⟩
```

1.2.4 Interword spacing (glue)

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

```
⟨*pdf-⟩
\MT@requires@pdftex6{
\def\MT@spacing{\MT@maybe@do{sp}}
```

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

```
\def\MT@set@sp@codes{%
  \MT@if@list@exists{%
    \MT@get@opt
    \MT@reset@sp@codes
    \MT@get@inh@list
    \MT@set@inputenc{c}%
    \MT@load@list\MT@sp@c@name
    \MT@set@listname
    \MT@let@cn\@tempc{MT@sp@c@\MT@sp@c@name}%
    \expandafter\MT@set@codes\@tempc,\relax,%
  }\MT@reset@sp@codes
}
```

`\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).

```
\def\MT@sp@split@val#1,#2,#3\relax{%
  \def\@tempb{#1}%
  \MT@ifempty\@tempb\relax{%
    \MT@get@space@unit2%
    \MT@scale@to@em
    \knbscode\MT@font\MT@char=\@tempcntb
⟨debug⟩\MT@dinfo@nl{4}{;;; knbs (\MT@char): \number\knbscode\MT@font\MT@char: [#1]}%
  }%
  \def\@tempb{#2}%
  \MT@ifempty\@tempb\relax{%
    \MT@get@space@unit3%
    \MT@scale@to@em
    \stbscode\MT@font\MT@char=\@tempcntb
⟨debug⟩\MT@dinfo@nl{4}{;;; stbs (\MT@char): \number\stbscode\MT@font\MT@char: [#2]}%
  }%
  \def\@tempb{#3}%
  \MT@ifempty\@tempb\relax{%
```

```
    \MT@get@space@unit4%
    \MT@scale@to@em
    \shbscode\MT@font\MT@char=\@tempcntb
⟨debug⟩\MT@dinfo@nl{4}{;;; shbs (\MT@char): \number\shbscode\MT@font\MT@char: [#3]}%
  }%
  \MT@ifdefined@c@T\MT@sp@inh@name{%
    \MT@ifdefined@n@T{MT@inh@\MT@sp@inh@name @\MT@char @}{%
      \MT@exp@cs\MT@map@tlist@c{MT@inh@\MT@sp@inh@name @\MT@char @}\MT@set@sp@heirs
    }%
  }%
}
```

\MT@set@sp@heirs

```
\def\MT@set@sp@heirs#1{%
  \knbscode\MT@font#1=\knbscode\MT@font\MT@char
  \stbscode\MT@font#1=\stbscode\MT@font\MT@char
  \shbscode\MT@font#1=\shbscode\MT@font\MT@char
⟨debug⟩\MT@dinfo@nl{2}{-- heir of \MT@char: #1}%
⟨debug⟩\MT@dinfo@nl{4}{;;; knbs/stbs/shbs (#1): \number\knbscode\MT@font\MT@char/%
⟨debug⟩        \number\stbscode\MT@font\MT@char/\number\shbscode\MT@font\MT@char}%
}
```

\MT@set@all@sp
\MT@reset@sp@codes
\MT@reset@sp@codes@

```
\def\MT@set@all@sp#1#2#3{%
⟨debug⟩\MT@dinfo@nl{3}{-- knbs/stbs/shbs: setting all to #1/#2/#3}%
  \let\MT@temp\@empty
  \MT@ifempty{#1}\relax{\g@addto@macro\MT@temp{\knbscode\MT@font\@tempcnta=#1\relax}}%
  \MT@ifempty{#2}\relax{\g@addto@macro\MT@temp{\stbscode\MT@font\@tempcnta=#2\relax}}%
  \MT@ifempty{#3}\relax{\g@addto@macro\MT@temp{\shbscode\MT@font\@tempcnta=#3\relax}}%
  \MT@do@font\MT@temp
}
\def\MT@reset@sp@codes@{\MT@set@all@sp\z@\z@\z@}
\let\MT@reset@sp@codes\relax
```

\MT@preset@sp
\MT@preset@sp@

```
\def\MT@preset@sp{%
  \expandafter\expandafter\expandafter\MT@preset@sp@
    \csname MT@sp@c@\MT@sp@c@name @preset\endcsname\@nil
}
\def\MT@preset@sp@#1,#2,#3\@nil{%
  \ifx\MT@sp@unit@\@empty
    \MT@warn@preset@towidth{sp}%
    \MT@ifempty{#1}{\let\@tempa\@empty}{\MT@preset@aux@factor{#1}\@tempa}%
    \MT@ifempty{#2}{\let\@tempc\@empty}{\MT@preset@aux@factor{#2}\@tempc}%
    \MT@ifempty{#3}{\let\@tempb\@empty}{\MT@preset@aux@factor{#3}\@tempb}%
  \else
    \MT@ifempty{#1}{\let\@tempa\@empty}{\MT@preset@aux@space2{#1}\@tempa}%
    \MT@ifempty{#2}{\let\@tempc\@empty}{\MT@preset@aux@space3{#2}\@tempc}%
    \MT@ifempty{#3}{\let\@tempb\@empty}{\MT@preset@aux@space4{#3}\@tempb}%
  \fi
  \MT@set@all@sp\@tempa\@tempc\@tempb
}
}\relax
```

1.2.5 Additional kerning

\MT@kerning

Again, only check for additional kerning for new versions of pdfTEX.

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

\MT@set@kn@codes

It's getting boring, I know.

```
\def\MT@set@kn@codes{%
  \MT@if@list@exists{%
```

```
    \MT@get@opt
    \MT@reset@kn@codes
    \MT@get@inh@list
    \MT@set@inputenc{c}%
    \MT@load@list\MT@kn@c@name
    \MT@set@listname
    \MT@let@cn\@tempc{MT@kn@c@\MT@kn@c@name}%
    \expandafter\MT@set@codes\@tempc,\relax,%
  }\MT@reset@kn@codes
}
```

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

```
\def\MT@kn@split@val#1,#2\relax{%
  \def\@tempb{#1}%
  \MT@ifempty\@tempb\relax{%
    \MT@get@space@unit2%
    \MT@scale@to@em
    \knbccode\MT@font\MT@char=\@tempcntb
⟨debug⟩\MT@dinfo@nl{4}{;;; knbc (\MT@char): \number\knbccode\MT@font\MT@char: [#1]}%
  }%
  \def\@tempb{#2}%
  \MT@ifempty\@tempb\relax{%
    \MT@get@space@unit2%
    \MT@scale@to@em
    \knaccode\MT@font\MT@char=\@tempcntb
⟨debug⟩\MT@dinfo@nl{4}{;;; knac (\MT@char): \number\knaccode\MT@font\MT@char: [#2]}%
  }%
  \MT@ifdefined@c@T\MT@kn@inh@name{%
    \MT@ifdefined@n@T{MT@inh@\MT@kn@inh@name @\MT@char @}{%
      \MT@exp@cs\MT@map@tlist@c{MT@inh@\MT@kn@inh@name @\MT@char @}\MT@set@kn@heirs
    }%
  }%
}
```

\MT@set@kn@heirs

```
\def\MT@set@kn@heirs#1{%
  \knbccode\MT@font#1=\knbccode\MT@font\MT@char
  \knaccode\MT@font#1=\knaccode\MT@font\MT@char
⟨debug⟩\MT@dinfo@nl{2}{-- heir of \MT@char: #1}%
⟨debug⟩\MT@dinfo@nl{4}{;;; knbc (#1): \number\knbccode\MT@font\MT@char/%
⟨debug⟩                               \number\knaccode\MT@font\MT@char}%
}
```

\MT@set@all@kn

\MT@reset@kn@codes
\MT@reset@kn@codes@

```
\def\MT@set@all@kn#1#2{%
⟨debug⟩\MT@dinfo@nl{3}{-- knac/knbc: setting all to #1/#2}%
  \let\MT@temp\@empty
  \MT@ifempty{#1}\relax{\g@addto@macro\MT@temp{\knbccode\MT@font\@tempcnta=#1\relax}}%
  \MT@ifempty{#2}\relax{\g@addto@macro\MT@temp{\knaccode\MT@font\@tempcnta=#2\relax}}%
  \MT@do@font\MT@temp
}
\def\MT@reset@kn@codes@{\MT@set@all@kn\z@\z@}
\let\MT@reset@kn@codes\relax
```

\MT@preset@kn

\MT@preset@kn@

```
\def\MT@preset@kn{%
  \expandafter\expandafter\expandafter\MT@preset@kn@
    \csname MT@kn@c@\MT@kn@c@name @preset\endcsname\@nil
}
\def\MT@preset@kn@#1,#2\@nil{%
  \ifx\MT@kn@unit@\@empty
    \MT@warn@preset@towidth{kn}%
    \let\MT@preset@aux\MT@preset@aux@factor
  \else
    \def\MT@preset@aux{\MT@preset@aux@space2}%
```

```
  \fi
  \MT@ifempty{#1}{\let\@tempa\@empty}{\MT@preset@aux{#1}\@tempa}%
  \MT@ifempty{#2}{\let\@tempb\@empty}{\MT@preset@aux{#2}\@tempb}%
  \MT@set@all@kn\@tempa\@tempb
}
}\relax
⟨/pdf-⟩
```

1.2.6 Tracking

This only works with pdfTEX 1.40 or LuaTEX 0.62.

```
⟨*pdf-|lua-⟩
⟨pdf-⟩\MT@requires@pdftex6
⟨lua-⟩\MT@requires@luatex3
{
```

`\MT@tracking` `\MT@tracking@` `\MT@tr@font@list`

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

```
\let\MT@tr@font@list\@empty
\def\MT@tracking@{%
  \MT@exp@one@n\MT@in@clist\MT@font\MT@tr@font@list
  \ifMT@inlist@\else
    \MT@maybe@do{tr}%
    \ifMT@do\else
      \xdef\MT@tr@font@list{\MT@tr@font@list\MT@font,}%
    \fi
  \fi
}
⟨/pdf-|lua-⟩
⟨pdf-|lua-|letterspace⟩\let\MT@tracking
⟨pdf-|lua-⟩  \MT@tracking@
⟨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).

```
⟨*pdf-|lua-|letterspace⟩
\def\MT@set@tr@codes{%
⟨*pdf-|lua-⟩
  \MT@vinfo{Tracking font `\MT@@font'\on@line}%
⟨*pdf-⟩
  \MT@requires@pdftex8\@firstofone{%
    \MT@ifdefined@n@TF{\MT@@font-fake6}{%
      \MT@exp@cs\ifx{\MT@@font-fake6}\@empty
        \MT@warning@nl{%
          Font `\MT@@font' does not specify its\MessageBreak
          \@backslashchar fontdimen 6 (width of an `em')! Therefore,\MessageBreak
          tracking will not work with this font}%
        \MT@glet@nc{\MT@@font-fake6}\relax
      \fi
    }%
  }{%
⟨/pdf-⟩
  \MT@if@list@exists
    \MT@get@tr@opt
    \relax
⟨/pdf-|lua-⟩
  \MT@ifdefined@c@TF\MT@letterspace@\relax{\let\MT@letterspace@\MT@letterspace}%
  \ifnum\MT@letterspace@=\z@
```

Zero tracking requires special treatment.

```
    \MT@set@tr@zero
```

```
2680   \else
2681 ⟨pdf-|lua-⟩    \MT@vinfo{... Tracking by \number\MT@letterspace@}%
```

Letterspacing only works in PDF mode.

```
2682     \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.

```
2683     \xdef\MT@lsfont{\csname\expandafter\string\font@name
2684                             /\number\MT@letterspace@ ls\endcsname}%
2685     \expandafter\ifx\MT@lsfont\relax
2686 ⟨debug⟩\MT@dinfo@nl{1}{... new letterspacing instance}%
```

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

```
2687       \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.

```
2688 ⟨*lua-|letterspace⟩
2689       \MT@if@luaotf@font{%
2690 ⟨lua-&debug⟩\MT@dinfo@nl{1}{... luaotf font: \MessageBreak
2691 ⟨lua-&debug⟩          \expandafter\fontname\font@name}%
2692         \global\expandafter\font\MT@lsfont=\MT@ls@fontspec@font
2693       }{%
2694 ⟨/lua-|letterspace⟩
2695 ⟨lua-&debug⟩\MT@dinfo@nl{1}{... legacy font}%
2696       \global\expandafter\letterspacefont\MT@lsfont\font@name\MT@letterspace@
2697 ⟨lua-|letterspace⟩       }%
```

Scale interword spacing (not configurable in letterspace).

```
2698 ⟨*pdf-|lua-⟩
2699       \MT@ifdefined@c@TF\MT@tr@ispace
2700         {\let\@tempa\MT@tr@ispace}%
2701         {\edef\@tempa{\MT@letterspace@*,,}}%
2702       \MT@ifdefined@c@TF\MT@tr@ospace
2703         {\edef\@tempa{\@tempa,\MT@tr@ospace}}%
2704         {\edef\@tempa{\@tempa,,,}}%
2705       \expandafter\MT@tr@set@space\@tempa,%
2706 ⟨/pdf-|lua-⟩
2707 ⟨*letterspace⟩
2708       % spacing = {<letterspace amount>*,,}
2709       \fontdimen2\MT@lsfont=\dimexpr\numexpr 1000+\MT@letterspace@\relax sp
2710                                             * \fontdimen2\MT@lsfont/1000\relax
2711 ⟨/letterspace⟩
```

Adjust outer kerning (microtype only).

```
2712 ⟨*pdf-|lua-⟩
2713       \MT@ifdefined@c@TF\MT@tr@okern{\let\@tempa\MT@tr@okern}{\def\@tempa{*,*}}%
2714       \expandafter\MT@tr@set@okern\@tempa,%
```

Disable ligatures (not configurable in letterspace).

```
2715       \MT@ifdefined@c@T\MT@tr@ligatures\MT@tr@noligatures
2716 ⟨/pdf-|lua-⟩
2717 ⟨*letterspace⟩
2718       % no ligatures = {f}
2719       \tagcode\MT@lsfont`f=\m@ne
2720 ⟨/letterspace⟩
```

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

```
⟨lua-|letterspace⟩      \MT@if@luaotf@font\relax{%
⟨debug⟩\MT@dinfo@nl{2}{... compensating for tracking (\number\MT@letterspace@)}%
      \MT@do@font{\lpcode\MT@lsfont\@tempcnta=\numexpr\MT@letterspace@/2\relax
                  \rpcode\MT@lsfont\@tempcnta=\numexpr\MT@letterspace@/2\relax}%
      \let\MT@the@pr@code\MT@the@pr@code@tr
⟨lua-|letterspace⟩     }%
    \fi
```

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

```
    \aftergroup\MT@set@lsfont
⟨pdf-|lua-⟩    \let\MT@font\MT@lsfont
⟨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`

```
    \xdef\MT@set@curr@ls{\def\noexpand\MT@curr@ls{\MT@letterspace@}}%
    \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.

```
⟨*pdf-|lua-⟩
    \MT@outer@space=\csname MT@outer@space\expandafter\string\font@name\endcsname\relax
    \xdef\MT@set@curr@os{\MT@outer@space=\the\MT@outer@space\relax}%
    \MT@tr@outer@l
⟨/pdf-|lua-⟩
```

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

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

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

```
⟨*pdf-|lua-⟩
    \else
      \MT@outer@kern=\expandafter\expandafter\expandafter\@firstoftwo
                     \csname MT@outer@kern\expandafter\string\font@name\endcsname\relax
      \ifdim\MT@outer@kern=\z@\else \MT@ls@outer@k \fi
      \MT@outer@kern=\expandafter\expandafter\expandafter\@secondoftwo
                     \csname MT@outer@kern\expandafter\string\font@name\endcsname\relax
⟨/pdf-|lua-⟩
⟨*letterspace⟩
      \xdef\MT@set@curr@ok{\MT@outer@kern=\the\MT@outer@kern\relax}%
      \MT@afteraftergroup{%
        \MT@set@curr@ok
        \noexpand\MT@ls@outer@k
      }%
⟨/letterspace⟩
    \fi
⟨*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).

```
    \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.

```
    \MT@afteraftergroup{%
      \MT@set@curr@os
```

```
      \MT@set@curr@ok
      \noexpand\MT@tr@outer@r
    }%
⟨/pdf-|lua-⟩
  \fi
⟨pdf-⟩  }%
}
```

`\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.)

```
\def\MT@afteraftergroup#1{%
⟨!letterspace⟩  \MT@maybe@gobble@with@tikz{%
    \MT@ifdefined@n@TF{MT@aftergroup@\number\currentgrouplevel}\relax{%
      \MT@exp@cs\xdef{MT@aftergroup@\number\currentgrouplevel}%
        {\MT@exp@cs\MT@glet{MT@aftergroup@\number\currentgrouplevel}\noexpand\@undefined#1}%
      \expandafter\aftergroup\expandafter\aftergroup\MT@exp@cs\aftergroup
        {MT@aftergroup@\number\currentgrouplevel}%
    }%
⟨!letterspace⟩  }%
}
⟨/pdf-|lua-|letterspace⟩
```

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

```
⟨*lua-|letterspace⟩
\def\MT@ls@fontspec@font{%
  \MT@lua{microtype.add_ls([[\MT@letterspace@]])}%
}
⟨/lua-|letterspace⟩
⟨*luafile⟩
local function add_ls(k)
  local f = tex.fontname(font.current())
  local spec,size = match(f,'^(.+)( at .+)$')
  if not spec then spec = f end
  local a,b,c = match(spec,'^([^:]+):?([^:]*):?(.*)$')
  local ls = "kernfactor=" .. k/1000 .. ';'
  microtype.sprint(a..':')
  if (a == "name" or a == "file") then
    microtype.sprint(b..':'..ls..c)
  else
    microtype.sprint(ls..b)
  end
  if size then
    microtype.sprint(size)
  end
end
microtype.add_ls = add_ls

⟨/luafile⟩
```

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

```
⟨*pdf-|lua-⟩
\def\MT@get@tr@opt{%
  \MT@set@listname
  \let\MT@tr@factor@\@m
```

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

```
  \MT@ifdefined@n@T{MT@tr@c@\MT@tr@c@name @unit}{%
    \MT@let@cn\MT@tr@unit@{MT@tr@c@\MT@tr@c@name @unit}%
    \ifdim\MT@tr@unit@=1em
      \let\MT@tr@unit@\@undefined
    \else
      \MT@get@unit\MT@tr@unit@
    \fi
```

```
  }%
  \MT@ifdefined@n@T{MT@tr@c@\MT@tr@c@name}{%
    \MT@let@cn\MT@letterspace{MT@tr@c@\MT@tr@c@name}%
    \MT@ifdefined@c@T\MT@tr@unit@{%
      \let\@tempb\MT@letterspace
      \MT@scale@to@em
      \edef\MT@letterspace{\number\@tempcntb}%
    }%
  }%
```

\MT@tr@ispace
\MT@tr@ospace

Adjust interword spacing.

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

\MT@tr@okern

Adjust outer kerning.

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

\MT@tr@ligatures

Which ligatures should we disable (empty means all, undefined none)?

```
  \MT@get@tr@opt@{noligatures} {ligatures}%
}
```

\MT@get@tr@opt@

```
\def\MT@get@tr@opt@#1#2{%
  \MT@ifdefined@n@T{MT@tr@c@\MT@tr@c@name @#1}%
    {\MT@let@nn{MT@tr@#2}{MT@tr@c@\MT@tr@c@name @#1}}%
}
⟨/pdf-|lua-⟩
```

\MT@set@lsfont

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

```
⟨*pdf-|lua-|letterspace⟩
⟨plain⟩\MT@requires@latex2{
\def\MT@set@lsfont{\MT@exp@two@c\let\font@name\MT@lsfont}
```

\lsstyle

Disable the tests whether the font should be letterspaced, then trigger the setup. Only \textls can be used in math mode (\lsstyle may be used inside another text switch, of course). Still, we have to ensure that math fonts are set up again. Setting \glb@currsize 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@currsize, fingers crossed. The overhead seems small.

```
\DeclareRobustCommand\lsstyle{%
  \not@math@alphabet\lsstyle\textls
  \let\glb@currsize\@empty
⟨pdf-|lua-⟩  \MT@maybe@gobble@with@tikz{\aftergroup\glb@settings}%
⟨pdf-|lua-⟩  \def\MT@feat{tr}%
  \let\MT@tracking\MT@set@tr@codes
  \selectfont
}
```

Now the definitions for the letterspace package with plain TEX.

```
⟨*plain⟩
}{
\def\MT@set@lsfont{\MT@lsfont}
\def\lsstyle{%
  \begingroup
  \escapechar\m@ne
  \xdef\font@name{\csname\expandafter\string\the\font\endcsname}%
  \MT@set@tr@codes
  \endgroup
}
\let\textls\@undefined
```

```
\let\lslig\@undefined
}
⟨/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.

```
\DeclareRobustCommand\lslig[1]{%
  {\MT@ifdefined@c@TF\MT@curr@ls{%
     \escapechar\m@ne
⟨plain⟩    \MT@requires@latex2{%
     \xdef\font@name{\csname\curr@fontshape/\f@size\endcsname}%
⟨plain⟩    }\relax%
     \MT@get@ls@basefont
     \MT@outer@kern=\dimexpr\MT@curr@ls sp * \fontdimen6\font@name/2000\relax
     \kern\MT@outer@kern
     \font@name #1%
     \kern\MT@outer@kern
  }{#1}}%
}
```

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

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

```
\def\MT@get@ls@basefont{%
  \xdef\MT@ls@basefont{\csname\expandafter\string\font@name @base\endcsname}%
  \expandafter\ifx\MT@ls@basefont\relax
    \MT@exp@two@c\MT@glet\MT@ls@basefont\font@name
  \else
⟨debug⟩\MT@dinfo@nl{1}{... fixing base font}%
    \MT@set@lsbasefont
  \fi
}
```

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

```
\def\MT@set@lsbasefont{\MT@exp@two@c\let\font@name\MT@ls@basefont}
\def\MT@set@tr@zero{%
⟨debug⟩\MT@dinfo@nl{1}{... zero tracking}%
  \xdef\MT@ls@basefont{\csname\expandafter\string\font@name @base\endcsname}%
  \expandafter\ifx\MT@ls@basefont\relax \else
⟨debug⟩\MT@dinfo@nl{1}{... fixing base font}%
    \aftergroup\MT@set@lsbasefont
  \fi
}
⟨/pdf-|lua-|letterspace⟩
```

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

```
⟨*pdf-|lua-⟩
⟨pdf-⟩\MT@requires@pdftex7{
  \def\MT@tr@noligatures{%
    \ifx\MT@tr@ligatures\@empty
      \MT@noligatures@\MT@lsfont\@undefined
    \else
      \MT@noligatures@\MT@lsfont\MT@tr@ligatures
    \fi
  }
⟨*pdf-⟩
}{
  \def\MT@tr@noligatures{%
    \MT@warning@nl{%
```

```
      Disabling selected ligatures is only possible since\MessageBreak
      pdftex 1.40.4. Disabling all ligatures instead}%
    \MT@glet\MT@tr@noligatures\relax
  }
}
⟨/pdf-⟩
```

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

```
\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.

```
\def\MT@tr@set@space#1,#2,#3,#4,#5,#6,{%
⟨debug⟩\MT@dinfo@nl2{... orig. space: \the\fontdimen2\MT@lsfont,
⟨debug⟩    \the\fontdimen3\MT@lsfont, \the\fontdimen4\MT@lsfont
⟨debug⟩    \MessageBreak... (#1,#2,#3) (#4,#5,#6)}%
  \let\MT@temp\@empty
  \MT@tr@set@space@{#1}{#4}{2}\@empty
  \MT@tr@set@space@{#2}{#5}{3}\@plus
  \MT@tr@set@space@{#3}{#6}{4}\@minus
  \MT@glet@nc{MT@outer@space\expandafter\string\font@name}\MT@temp
⟨debug⟩\MT@dinfo@nl2{... inner space: \the\fontdimen2\MT@lsfont,
⟨debug⟩    \the\fontdimen3\MT@lsfont, \the\fontdimen4\MT@lsfont}%
⟨debug⟩\MT@dinfo@nl2{... outer space: \MT@temp}%
}
```

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

```
\def\MT@tr@set@space@#1#2#3#4{%
  \MT@ifempty{#2}{%
    \MT@ifempty{#1}\relax{%
      \MT@tr@set@space@@{#1}{#3}{1000}%
      \fontdimen#3\MT@lsfont=\@tempdima
    }%
    \edef\MT@temp{\MT@temp#4\the\fontdimen#3\MT@lsfont}%
  }{%
    \MT@tr@set@space@@{#2}{#3}{2000}%
    \edef\MT@temp{\MT@temp#4\the\@tempdima}%
    \MT@ifempty{#1}\relax{%
      \MT@tr@set@space@@{#1}{#3}{1000}%
      \fontdimen#3\MT@lsfont=\@tempdima
    }%
  }%
}
```

\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.

```
\def\MT@tr@set@space@@#1#2#3{%
  \MT@test@ast#1*\@nil{%
    \MT@ifdefined@c@TF\MT@tr@unit@
      {\edef\@tempb{#1}\MT@scale@to@em}
      {\@tempcntb=#1\relax}%
    \@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).

```
    \ifnum#2=\tw@
      \advance\@tempdima -\dimexpr\MT@letterspace@ sp*\MT@dimen@six/#3\relax
    \fi
  }{%
    \MT@ifempty\@tempa{\let\@tempa\MT@letterspace@}\relax
    \@tempdima=\dimexpr \numexpr1000+\@tempa sp *\fontdimen#2\MT@lsfont/1000\relax
  }%
```

```
⟨debug⟩\MT@dinfo@nl3{... : font dimen #2 (#1): \the\@tempdima}%
}
```

`\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).

```
\def\MT@tr@outer@l{%
  \ifhmode
    \ifdim\lastskip>5sp
      \edef\x{\the\lastskip minus 0pt}%
      \setbox\z@\hbox{\MT@outer@space=\x}%
      \ifdim\wd\z@>\z@
⟨debug⟩\MT@dinfo2{[[[[ adjusting pre space: \the\MT@outer@space}%
        \unskip \hskip\MT@outer@space\relax
```

Disable left outer kerning.

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

The `ragged2e` package sets `\spaceskip` without glue.

```
        \ifdim\lastskip=%
            \ifnum\spacefactor<2000
              \spaceskip
            \else
              \ifdim\xspaceskip=\z@
                \dimexpr\spaceskip+\fontdimen7\font@name\relax
              \else
                \xspaceskip
              \fi
            \fi
⟨debug⟩\MT@dinfo2{[[[[ adjusting pre space (skip): \the\MT@outer@space}%
          \unskip \hskip\MT@outer@space\relax
          \let\MT@ls@outer@k\relax
        \fi
      \fi
    \fi
  \fi
}
```

`\MT@tr@outer@next` `\MT@tr@outer@r` `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`).

```
\def\MT@tr@outer@r{%
  \futurelet\MT@tr@outer@next\MT@tr@outer@r@
}
```

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

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

`\MT@tr@outer@r@`

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

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

```
  \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).

```
    \ifnum\currentgrouptype=10 \else
      \def\MT@temp*##1{\ifhmode\hskip\MT@outer@space
```

```
⟨debug⟩\MT@dinfo2{]]] adjusting post space (1): \the\MT@outer@space}%
        \fi}%
      \expandafter\ifcat\expandafter\noexpand\csname MT@tr@outer@next\endcsname\egroup
        \ifhmode\unkern\fi\egroup
        \MT@set@curr@ok \MT@set@curr@os
        \def\MT@temp*{\afterassignment\MT@tr@outer@r\let\MT@temp=}%
      \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.

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

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).

```
          \MT@if@outer@next\check@icr{%
            \def\MT@temp*{\aftergroup\MT@tr@outer@r\check@icr\let\MT@temp=}%
          }{%
            \MT@if@outer@next\@sptoken{%
              \def\MT@temp* {\ifhmode\hskip\MT@outer@space
⟨debug⟩\MT@dinfo2{]]] adjusting post space (2): \the\MT@outer@space}%
                \fi}%
            }{%
              \MT@if@outer@next~{%
                \def\MT@temp*~{\nobreak\hskip\MT@outer@space
⟨debug⟩\MT@dinfo2{]]] adjusting post space (3): \the\MT@outer@space}%
                  }%
              }{%
                \MT@if@outer@next\ \relax{%
                  \MT@if@outer@next\space\relax{%
                    \MT@if@outer@next\@xobeysp\relax{%
```

`xspace` requires special treatment.

```
                      \MT@if@outer@next\xspace{%
                        \def\MT@temp*\xspace{\MT@xspace}%
                      }{%
```

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

```
                        \def\MT@temp*{\ifdim\MT@outer@kern=\z@\else\MT@ls@outer@k
⟨debug⟩\MT@dinfo2{--- adjusting post kern: \the\MT@outer@kern}%
                          \fi}%
                        \MT@let@nc{MT@tr@outer@next}\relax
      }}}}}}}}\fi
  \fi\fi
  \MT@temp*%
}
```

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

`\MT@tr@outer@icr@`

```
\def\MT@tr@outer@icr{\afterassignment\MT@tr@outer@icr@\MT@tr@outer@r}
\def\MT@tr@outer@icr@{%
  \let\@let@token= \MT@tr@outer@next
  \maybe@ic@
}
```

`\MT@xspace` If the group is followed by `\xspace`, we first feed `\xspace` with the next token, then

`\MT@xspace@` check whether it has inserted a space. `\@let@token` might be something evil, so it should be encapsulated here.

```
\def\MT@xspace{\futurelet\@let@token\MT@xspace@}
```

```
\def\MT@xspace@{\@xspace@firsttrue\@xspace
  \ifdim\lastskip>5sp
    \unskip \hskip\MT@outer@space
  \else
    \ifdim\MT@outer@kern=\z@\else\MT@ls@outer@k \fi
  \fi
}
```

For older pdfTEX versions and LuaTEX, throw an error.

```
}{
  \DeclareRobustCommand\lsstyle{%
    \MT@error{Letterspacing only works with \MT@engine tex version
⟨pdf-⟩      1.40%
⟨lua-⟩      0.62%
      \MessageBreak or newer}
      {Upgrade \MT@engine tex, or try the `soul' package instead.}%
    \MT@glet\lsstyle\relax
  }
}
```

And for XETEX, too.

```
⟨/pdf-|lua-⟩
⟨*xe-⟩
\DeclareRobustCommand\lsstyle{%
  \MT@error{Letterspacing currently doesn't work with xetex}
           {Run pdftex or luatex, or use the `soul' package instead.}%
  \MT@glet\lsstyle\relax
}
⟨/xe-⟩
```

\textls
\MT@ls@adjust@

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

```
⟨*package|letterspace⟩
\DeclareRobustCommand\textls{%
  \@ifstar{\let\MT@ls@adjust@\MT@ls@adjust@empty\MT@textls}%
          {\let\MT@ls@adjust@\MT@ls@adjust@relax\MT@textls}%
}
```

\MT@textls
\MT@letterspace@

This is now almost LATEX's `\DeclareTextFontCommand`, with the difference that we adjust the outer spacing and kerning also for `\lsstyle`, while LATEX's text *switches* don't bother about italic correction.

```
\newcommand\MT@textls[2][]{%
  \ifmmode
    \nfss@text{\MT@ls@set@ls{#1}\lsstyle#2}%
  \else
    \hmode@bgroup
      \MT@ls@set@ls{#1}%
      \lsstyle #2%
      \expandafter
    \egroup
  \fi
}
```

\MT@ls@adjust
\MT@ls@adjust@empty
\MT@ls@adjust@relax
\MT@ls@set@ls

Set current letterspacing amount and outer kerning. This has to be done inside the same group as the letterspacing command.

```
\def\MT@ls@adjust@empty{\let\MT@ls@adjust\@empty}
\def\MT@ls@adjust@relax{\let\MT@ls@adjust\relax}
\def\MT@ls@set@ls#1{%
  \MT@ifempty{#1}%
    {\let\MT@letterspace@\@undefined}%
    {\KV@@sp@def\MT@letterspace@{#1}%
     \edef\MT@letterspace@{\number\MT@letterspace@}%
     \MT@ls@too@large\MT@letterspace@}%
```

```
  \MT@ls@adjust@
}
```

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

```
\def\MT@ls@too@large#1{%
  \ifnum#1>\MT@tr@max
    \MT@warning{Maximum for option `letterspace' is \number\MT@tr@max}%
    \edef#1{\number\MT@tr@max}%
  \else
    \ifnum#1<\MT@tr@min
      \MT@warning{Minimum for option `letterspace' is \number\MT@tr@min}%
      \edef#1{\number\MT@tr@min}%
    \fi
  \fi
}
```

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

```
\newdimen\MT@outer@kern
⟨/package|letterspace⟩
⟨*pdf-|lua-⟩
\def\MT@tr@set@okern#1,#2,{%
  \let\MT@temp\@empty
  \MT@ifempty{#1}{\MT@tr@set@okern@{*}}{\MT@tr@set@okern@{#1}}%
  \MT@ifempty{#2}{\MT@tr@set@okern@{*}}{\MT@tr@set@okern@{#2}}%
  \MT@glet@nc{MT@outer@kern\expandafter\string\font@name}\MT@temp
⟨debug⟩\MT@dinfo@nl2{... outer kerning: (#1,#2)
⟨debug⟩              = \@nameuse{MT@outer@kern\expandafter\string\font@name}}%
}
```

\MT@tr@set@okern@

```
\def\MT@tr@set@okern@#1{%
  \MT@test@ast#1*\@nil{%
    \MT@ifdefined@c@TF\MT@tr@unit@
      {\edef\@tempb{#1}\MT@scale@to@em}
      {\@tempcntb=#1\relax}%
    \@tempdima=\dimexpr \@tempcntb sp * \MT@dimen@six/1000\relax
  }{%
    \MT@ifempty\@tempa{\let\@tempa\@m}\relax
    \@tempdima=\dimexpr \numexpr\@tempa*\MT@letterspace@/1000\relax sp
                        * \fontdimen6\MT@lsfont/2000\relax
  }%
  \advance\@tempdima -\dimexpr \MT@letterspace@ sp
                               * \fontdimen6\MT@lsfont/2000\relax
  \edef\MT@temp{\MT@temp{\the\@tempdima}}%
}
⟨/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.

```
⟨*pdf-|lua-|letterspace⟩
\def\MT@ls@outer@k{%
  \ifhmode
    \ifdim\lastkern=-3sp \unkern
      \ifdim\lastkern=3sp \kern-3sp
        \expandafter\expandafter\expandafter\@gobble
      \else \unkern
        \expandafter\expandafter\expandafter\@firstofone
      \fi
    \else
      \expandafter\@firstofone
    \fi
    {\kern\MT@outer@kern\kern3sp\kern-3sp\relax}%
  \fi
```

```
}
⟨/pdf-|lua-|letterspace⟩
```

1.2.7 Disabling ligatures

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

```
⟨*pdf-|lua-⟩
⟨pdf-⟩\MT@requires@pdftex5{
\def\MT@noligatures{%
  \MT@dotrue
  \let\@tempa\MT@nl@setname
  \MT@map@clist@n{font,encoding,family,series,shape,size}{%
    \MT@ifdefined@n@TF{MT@checklist@##1}%
      {\csname MT@checklist@##1\endcsname}%
      {\MT@checklist@{##1}}%
    {nl}%
  }%
  \ifMT@do
    \MT@noligatures@\MT@font\MT@nl@ligatures
  \fi
}
```

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

```
⟨lua-⟩\MT@requires@luatex4{\let\pdfnoligatures\ignoreligaturesinfont}\relax
\def\MT@noligatures@#1#2{%
  \MT@ifdefined@c@TF#2{%
```

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

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

No 'inputenc' key.

```
      \let\MT@warn@maybe@inputenc\@empty
      \def\MT@curr@list@name{\@backslashchar DisableLigatures}%
      \MT@map@clist@c#2{%
        \KV@@sp@def\@tempa{##1}\MT@get@slot
        \ifnum\MT@char>\m@ne
          \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).

```
⟨lua-⟩          \MT@if@luaotf@font
⟨lua-⟩             {\MT@lua{microtype.noligatures([[#1]],[[\MT@char]])}}\relax
        \fi
      }%
      \MT@vinfo{... Disabling ligatures for characters: #2}%
    }{%
      \pdfnoligatures#1%
      \MT@warning{Cannot disable selected ligatures (pdftex doesn't\MessageBreak
          know \@backslashchar tagcode). Disabling all ligatures of\MessageBreak
          the font instead}%
    }%
  }{%
    \pdfnoligatures#1%
⟨lua-⟩    \MT@if@luaotf@font
⟨lua-⟩        {\MT@lua{microtype.noligatures([[#1]],"_all_")}}\relax
    \MT@vinfo{... Disabling all ligatures}%
  }%
}
⟨pdf-⟩}\relax
⟨/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@`.

```
⟨*luafile⟩
microtype.ligs = microtype.ligs or { }

local function noligatures(fontcs,liga)
  local fontcs = match(fontcs,"([^ ]+)")
  microtype.ligs[fontcs] = microtype.ligs[fontcs] or { }
  table.insert(microtype.ligs[fontcs],liga)
end
microtype.noligatures = noligatures

local function keepligature(c)
  local nodedirect = node.direct
  local getfield   = nodedirect.getfield
  local getfont    = nodedirect.getfont
  local f,ch
  if type(c) == "userdata" then -- in older luaotfload versions, c was a node
    f  = c.font
    ch = c.components.char
  else                          -- since 2.6, c is a (direct node) number
    f  = getfont(c)
    ch = getfield(getfield(c,"components"),"char")
  end
--  if ch then -- should always be true
  local ligs = microtype.ligs[match(tex.fontidentifier(f),"\\([^ ]+)")]
  if ligs then
    for _,lig in pairs(ligs) do
      if lig == "_all_" or tonumber(lig) == ch then
        return false
      end
    end
  end
  return true
--  end
end

if luaotfload and luaotfload.letterspace then
  if luaotfload.letterspace.keepligature then
    microtype.info("overwriting function `keepligature'")
  end
  luaotfload.letterspace.keepligature = keepligature
end

⟨/luafile⟩
```

1.2.8 Loading the configuration

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

```
⟨*package|show⟩
⟨package⟩\def\MT@load@list#1%
⟨show⟩\def\MTS@load@list#1%
  {\edef\@tempa{#1}%
  \MT@let@cn\@tempb{MT@\MT@feat @c@\@tempa @load}%
  \MT@ifstreq\@tempa\@tempb{%
    \MT@error{\@nameuse{MT@abbr@\MT@feat} list `\@tempa' cannot load itself}{}%
  }{%
    \ifx\@tempb\relax
⟨show⟩    :\par\medskip\leavevmode
    \else
      \MT@ifdefined@n@TF{MT@\MT@feat @c@\@tempb}{%
⟨show⟩        \MTS@printtext{, loading \texttt{\@tempb}}%
```

```
        \MT@vinfo{... : First loading \@nameuse{MT@abbr@\MT@feat} list `\@tempb'}%
        \begingroup
          \MT@load@list\@tempb
        \endgroup
        \edef\MT@curr@list@name{%
⟨package⟩                  \@nameuse{MT@abbr@\MT@feat} list \noexpand\MessageBreak
                    `\@tempb'}%
        \MT@let@cn\@tempc{MT@\MT@feat @c@\@tempb}%
        \expandafter\MT@set@codes\@tempc,\relax,%
⟨show⟩        \vrule width 4cm height .5pt \\
⟨show⟩        \MTS@printtext{End of list \texttt{\MT@curr@list@name}}%
⟨show⟩        \par\medskip\leavevmode
      }{%
        \MT@error{\@nameuse{MT@abbr@\MT@feat} list `\@tempb' undefined.\MessageBreak
                  Cannot load it from list `\@tempa'}{}%
      }%
    \fi
  }%
}
⟨/package|show⟩
```

\MT@find@file
\MT@file@list

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

```
⟨*package⟩
\let\MT@file@list\@empty
\def\MT@find@file#1{%
```

Check for existence of the file only once.

```
  \MT@in@clist{#1}\MT@file@list
  \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.

```
    \MT@begin@catcodes
      \let\MT@begin@catcodes\relax
      \let\MT@end@catcodes\relax
      \MT@xadd\MT@file@list{#1,}%
      \InputIfFileExists{\MT@cfg@prefix-#1.cfg}{%
        \edef\MT@curr@file{\MT@cfg@prefix-#1.cfg}%
        \MT@vinfo{... Loading configuration file \MT@curr@file}%
      }{%
        \MT@get@basefamily#1\@empty\@empty\@empty\@nil
        \MT@exp@one@n\MT@in@clist\@tempa\MT@file@list
        \ifMT@inlist@ \else
          \InputIfFileExists{\MT@cfg@prefix-\@tempa.cfg}{%
            \edef\MT@curr@file{\MT@cfg@prefix-\@tempa.cfg}%
            \MT@vinfo{... Loading configuration file \MT@curr@file}%
            \MT@xadd\MT@file@list{\@tempa,}%
          }{%
            \MT@vinfo{... No configuration file \MT@cfg@prefix-#1.cfg}%
          }%
        \fi
      }%
    \endgroup
  \fi
}
```

\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 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.

```
\def\MT@cfg@catcodes{%
  \makeatletter
  \catcode`\^7%
  \catcode`\ 9%
  \catcode`\^^I9%
  \catcode`\^^M9%
  \catcode`\\z@
  \catcode`\{\@ne
  \catcode`\}\tw@
  \catcode`\#6%
  \catcode`\%14%
  \MT@map@tlist@n
    {\!\"\$\&\'\(\)\*\+\,\-\.\/\:\;\<\=\>\?\[\]\_\`\|\~}%
    \@makeother
}
```

`\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.

```
\def\MT@begin@catcodes{%
  \begingroup
  \MT@cfg@catcodes
}
```

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

```
\let\MT@end@catcodes\endgroup
```

`\MT@get@basefamily` The family name might have a suffix e.g., for expert set (x), old style numbers (j) swash capitals (w) etc. We mustn't simply remove the last letter, as this would make for instance cms out of cmss *and* cmsy (OK, cmex will still become cme ...).

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

```
\def\MT@get@basefamily#1#2#3#4\@nil{%
  \ifx\@empty#4%
    \def\@tempa{#1#2#3}%
  \else
    \let\@tempa\@empty
    \edef\@tempb{#1#2#3#4}%
    \expandafter\MT@get@basefamily@\@tempb\@nil
  \fi
}
```

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

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

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

```
\def\MT@get@listname#1{%
⟨debug⟩\MT@dinfo@nl{1}{trying to find \@nameuse{MT@abbr@#1} list for font `\MT@@font'}%
  \let\MT@listname\@undefined
  \def\@tempb{#1}%
  \MT@map@tlist@c\MT@try@order\MT@get@listname@
}
\def\MT@get@listname@#1{%
  \expandafter\MT@next@listname#1%
```

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	•	-	•	-	•	-	•	-	•	-	•	-	•	-	•	-

```
  \ifx\MT@listname\@undefined \else
    \expandafter\MT@tlist@break
  \fi
}
```

\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.

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

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

```
\def\MT@next@listname#1#2#3#4{%
  \ifnum#1=\z@\MT@nofamilytrue\fi
  \edef\@tempa{\MT@encoding
/\ifnum#1=\@ne \MT@family  \fi
/\ifnum#2=\@ne \MT@series  \fi
/\ifnum#3=\@ne \MT@shape   \fi
/\ifnum#4=\@ne *\fi
               \MT@context}%
⟨debug⟩\MT@dinfo@nl{1}{trying \@tempa}%
  \MT@ifdefined@n@TF{MT@\@tempb @\@tempa}{%
    \MT@next@listname@#4%
  }{%
```

Also try with an alias family.

```
    \ifnum#1=\@ne
      \ifx\MT@familyalias\@empty \else
        \edef\@tempa{\MT@encoding
                     /\MT@familyalias
      /\ifnum#2=\@ne \MT@series\fi
      /\ifnum#3=\@ne \MT@shape\fi
      /\ifnum#4=\@ne *\fi
                      \MT@context}%
⟨debug⟩\MT@dinfo@nl{1}{(alias) \@tempa}%
        \MT@ifdefined@n@T{MT@\@tempb @\@tempa}{%
          \MT@next@listname@#4%
        }%
      \fi
    \fi
  }%
}
```

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

```
\def\MT@next@listname@#1{%
  \ifnum#1=\@ne
    \MT@exp@cs\MT@in@rlist{MT@\@tempb @\@tempa @sizes}%
    \ifMT@inlist@
      \let\MT@listname\MT@size@name
    \fi
  \else
```

```
3379     \MT@let@cn\MT@listname{MT@\@tempb @\@tempa}%
3380   \fi
3381 }
```

\MT@if@list@exists

\MT@context

```
3382 \def\MT@if@list@exists{%
3383   \MT@let@cn\MT@context{MT@\MT@feat @context}%
3384   \MT@ifstreq{@}\MT@context{\let\MT@context\@empty}\relax
3385   \MT@get@listname{\MT@feat @c}%
3386   \MT@ifdefined@c@TF\MT@listname{%
3387     \MT@edef@n{MT@\MT@feat @c@name}{\MT@listname}%
3388     \ifMT@nonselected
3389       \MT@vinfo{... Applying non-selected expansion (list `\MT@listname')}%
3390     \else
3391       \MT@vinfo{... Loading \@nameuse{MT@abbr@\MT@feat} list `\MT@listname'}%
3392     \fi
3393     \@firstoftwo
3394   }{%
```

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

```
3395     \MT@let@nc{MT@\MT@feat @c@name}\@empty
```

Don't warn if `selected=false`.

```
3396     \ifMT@nonselected
3397       \MT@vinfo{... Applying non-selected expansion (no list)}%
3398     \else
```

Tracking doesn't require a list, either.

```
3399       \MT@ifstreq\MT@feat{tr}\relax{%
3400         \MT@warning{I cannot find a \@nameuse{MT@abbr@\MT@feat} list
3401           for font\MessageBreak`\MT@@font'%
3402             \ifx\MT@context\@empty\else\space(context: `\MT@context')\fi.
3403           Switching off\MessageBreak\@nameuse{MT@abbr@\MT@feat} for this font}%
3404       }%
3405     \fi
3406     \@secondoftwo
3407   }%
3408 }
```

\MT@get@inh@list

The inheritance lists are global (no context).

\MT@context

```
3409 \def\MT@get@inh@list{%
3410   \let\MT@context\@empty
3411   \MT@get@listname{\MT@feat @inh}%
3412   \MT@ifdefined@c@TF\MT@listname{%
3413     \MT@edef@n{MT@\MT@feat @inh@name}{\MT@listname}%
3414 ⟨debug⟩\MT@dinfo@nl{1}{... Using \@nameuse{MT@abbr@\MT@feat} inheritance list
3415 ⟨debug⟩                 `\MT@listname'}%
3416     \MT@let@cn\@tempc{MT@\MT@feat @inh@\MT@listname}%
```

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

```
3417     \ifx\@tempc\@empty \else
3418 ⟨debug⟩\MT@dinfo@nl{1}{parsing inheritance list ...}%
```

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

```
3419       \begingroup
3420       \edef\MT@curr@list@name{inheritance list\noexpand\MessageBreak`\MT@listname'}%
3421       \MT@set@inputenc{inh}%
3422       \expandafter\MT@inh@do\@tempc,\relax,%
3423       \MT@glet@nc{MT@\MT@feat @inh@\MT@listname}\@empty
3424       \endgroup
3425     \fi
3426   }{%
3427     \MT@let@nc{MT@\MT@feat @inh@name}\@undefined
```

```
  }%
}
```

1.2.9 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@

```
\def\MT@get@slot{%
  \escapechar`\\
  \let\MT@char@\m@ne
  \MT@noresttrue
```

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

```
  \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.

```
  \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.

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

- OK, so it must be a macro. We do not allow random commands but only those defined in LaTeX's idiosyncratic font encoding scheme:

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

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

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

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

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

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

```
      \expandafter\MT@exp@two@c\expandafter\MT@is@char\expandafter
          \meaning\expandafter\@tempa\MT@charstring\relax\relax\relax
    \fi
  \fi

  \let\MT@char\MT@char@
  \MT@get@slot@
  \escapechar\m@ne
}
⟨/package⟩
```

\MT@get@slot@

```
⟨*pdf-|lua-|xe-⟩
\def\MT@get@slot@{%
```

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

```
⟨xe-⟩  \ifnum\XeTeXfonttype\MT@font=\z@
  \ifnum\MT@char > \m@ne
```

In LuaTEX, it may also be a glyph name, prefixed with '/'.

```
⟨*lua-⟩
    \ifnum\MT@char=47\relax
      \ifMT@norest \else
        \@tempcnta=\MT@lua{
           local glyph = microtype.name_to_slot([[\expandafter\@gobble\@tempa]],true)
           if glyph then tex.write(glyph)
           else tex.write(-1)
           end
        }\relax
        \ifnum\@tempcnta<\z@
          \MT@warn@unknown
          \let\MT@char\m@ne
        \else
          \edef\MT@char{\the\@tempcnta}%
⟨debug⟩\MT@dinfo@nl{3}{> `\the\MT@toks' is a glyph name (\the\@tempcnta)}%
        \fi
      \fi
    \else
⟨/lua-⟩
```

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

```
    \ifMT@norest \else
      \MT@warn@rest
⟨pdf-|lua-⟩      \let\MT@char\m@ne
⟨xe-⟩      \let\MT@char\@empty
    \fi
⟨lua-⟩    \fi
  \else
    \MT@warn@unknown
⟨xe-⟩    \let\MT@char\@empty
  \fi
⟨*xe-⟩
  \else
```

There are more possibilities for XETEX: It may be a Unicode codepoint (prefixed with 'U') or a glyph name (prefixed with '/').[6] We indicate glyph names to \MT@get@charwd by reversing the sign of \MT@char@.

```
    \ifnum\MT@char=47\relax
      \ifMT@norest \edef\MT@char{U47}%
      \else
        \@tempcnta=\XeTeXglyphindex"\expandafter\@gobble\@tempa"\relax
        \ifnum\@tempcnta=\z@
          \MT@warn@unknown
          \let\MT@char\@empty
        \else
          \edef\MT@char{\@tempa\space}%
          \edef\MT@char@{-\the\@tempcnta}%
⟨debug⟩\MT@dinfo@nl{3}{> `\the\MT@toks' is a glyph name (\the\@tempcnta)}%
        \fi
      \fi
```

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

```
    \else
      \ifnum\MT@char > \m@ne
        \ifMT@norest
```

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.

```
          \@tempcnta=\XeTeXcharglyph\MT@char\relax
          \ifnum\@tempcnta=\z@
            \MT@info@missing@char
            \let\MT@char\@empty
          \else
⟨debug⟩\MT@dinfo@nl{3}{> (glyph number: \the\@tempcnta,
⟨debug⟩                   glyph name:   \XeTeXglyphname\MT@font\@tempcnta)}%
            \edef\MT@char{U\MT@char}%
          \fi
        \else
          \MT@warn@rest
          \let\MT@char\@empty
        \fi
      \else
        \MT@warn@unknown
        \let\MT@char\@empty
      \fi
    \fi
  \fi
⟨/xe-⟩
}
⟨/pdf-|lua-|xe-⟩
```

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

```
⟨*luafile⟩
if luaotfload and luaotfload.aux and luaotfload.aux.slot_of_name then
  local slot_of_name = luaotfload.aux.slot_of_name
  microtype.name_to_slot = function(name, unsafe)
    local n = slot_of_name(font.current(), name, unsafe)
    if not n then return -1 end
    if n > 1114111 then return -1 end
    return math.tointeger(n)
  end
else
  -- we dig into internal structure (should be avoided)
  local function name_to_slot(name, unsafe)
    if fonts then
      local unicodes
      if fonts.ids then       -- legacy luaotfload
        local tfmdata = fonts.ids[font.current()]
        if not tfmdata then return end
        unicodes = tfmdata.shared.otfdata.luatex.unicodes
      else                    -- new location
        local tfmdata = fonts.hashes.identifiers[font.current()]
        if not tfmdata then return end
        unicodes = tfmdata.resources.unicodes
      end
      local unicode = unicodes[name]
      if unicode then -- does the 'or' branch actually exist?
        return type(unicode) == "number" and unicode or unicode[1]
      end
    end
```

```
  end
  microtype.name_to_slot = name_to_slot
end

⟨/luafile⟩
```

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

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

`\MT@max@slot`

```
⟨*pdf-|lua-|xe-⟩
\def\MT@max@char
⟨pdf-⟩  {127 }
⟨lua-|xe-⟩  {1114111 }
\def\MT@max@slot
⟨pdf-⟩  {255 }
⟨lua-|xe-⟩  {1114111 }
⟨/pdf-|lua-|xe-⟩
```

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

```
⟨*package⟩
\newif\ifMT@norest

\def\MT@is@letter#1#2\relax{%
  \ifcat a\noexpand#1\relax
    \edef\MT@char@{\number`#1}%
    \ifx\\#2\\%
⟨debug⟩\MT@dinfo@nl{3}{> `\the\MT@toks' is a letter (\MT@char@)}%
    \else
      \MT@norestfalse
    \fi
  \else
    \ifcat !\noexpand#1\relax
      \edef\MT@char@{\number`#1}%
⟨debug⟩\MT@dinfo@nl{3}{> `\the\MT@toks' is a character (\MT@char@)}%
      \ifx\\#2\\%
        \ifnum\MT@char@ > \MT@max@char \MT@warn@ascii \fi
      \else
        \MT@norestfalse
        \expandafter\MT@is@number#1#2\relax\relax
      \fi
    \fi
  \fi
}
```

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

```
\def\MT@is@number#1#2#3\relax{%
  \ifx\relax#3\relax \else
    \ifx\relax#2\relax \else
      \MT@noresttrue
      \if#1"\relax
        \def\x{\uppercase{\edef\MT@char@{\number#1#2#3}}}\x
⟨debug⟩\MT@dinfo@nl{3}{> ... a hexadecimal number: \MT@char@}%
      \else
        \if#1'\relax
          \def\MT@char@{\number#1#2#3}%
⟨debug⟩\MT@dinfo@nl{3}{> ... an octal number: \MT@char@}%
        \else
          \MT@ifint{#1#2#3}{%
            \def\MT@char@{\number#1#2#3}%
⟨debug⟩\MT@dinfo@nl{3}{> ... a decimal number: \MT@char@}%
          }\MT@norestfalse
        \fi
```

```
      \fi
      \ifnum\MT@char@ > \MT@max@slot
        \MT@warn@number@too@large{\noexpand#1\noexpand#2\noexpand#3}%
        \let\MT@char@\m@ne
      \fi
    \fi
  \fi
}
```

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

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

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

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

Unicode handling has changed again with LaTeX 2019/10/01.

```
      \let\UTF@two@octets@noexpand\@empty
      \let\UTF@three@octets@noexpand\@empty
      \let\UTF@four@octets@noexpand\@empty
```

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

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

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

```
      \MT@ifdefined@c@T\PrerenderUnicode
        {\PrerenderUnicode{\@tempa}\let\unicode@charfilter\@firstofone}%
      \MT@is@active@hook{#1}%
```

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

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

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

```
        \MT@toks={\the\MT@toks\space(=
                  \expandafter\expandafter\expandafter\@empty\@tempa)}%
      }%
    \x
  \fi
}
```

\MT@is@active@hook Test for these packages only once (requires `etoolbox`).

```
\let\MT@is@active@hook\@gobble
^^Q\@gobble
{\catcode`\#=12
\MT@addto@setup{%
```

If a char has been made active by `listings`'s `\lstMakeShortInline`, we need to retrieve the original meaning, or else make sure that we're seeing a non-active char.

```
  \MT@with@package@T{listings}{%
    \apptocmd\MT@is@active@hook{%
      \MT@ifdefined@n@T{lst@ShortInlineOldCatcode\string#1}{%
```

```
        \catcode`#1=\csname lst@ShortInlineOldCatcode\string#1\endcsname\relax
        \ifnum\catcode`#1=\active
          \begingroup
            \catcode`\~\active \lccode`\~`#1%
            \lowercase{\endgroup
              \MT@let@cn~{lst@ShortInlineOldMeaning\string#1}}%
        \else
          \def\@tempa{#1}%
        \fi
      }%
    }{}{}%
  }%
```

Same for `\MakeShortVerb` of `doc/shortvrb` (and implicitly `memoir`).

```
  \MT@if@false
  \MT@with@package@T{doc}\MT@if@true
  \MT@with@package@T{shortvrb}\MT@if@true
  \ifMT@if@\expandafter\@firstofone\else\expandafter\@gobble\fi{%
    \apptocmd\MT@is@active@hook{%
      \MT@ifdefined@n@T{cc\string#1}{%
        \catcode`#1=\csname cc\string#1\endcsname\relax
        \ifnum\catcode`#1=\active
          \begingroup
            \catcode`\~\active \lccode`\~`#1%
            \lowercase{\endgroup
              \MT@let@cn~{ac\string#1}}%
        \else
          \def\@tempa{#1}%
        \fi
      }%
    }{}{}%
  }%
}}
```

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

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

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

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

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

```
  \expandafter\expandafter\expandafter
    \MT@is@opt@char\MT@char\iffontchar\char\else\fi\relax
  \expandafter\MT@exp@two@c\expandafter\MT@is@char\expandafter
    \meaning\expandafter\MT@char\MT@charstring\relax\relax\relax
  \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.

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

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

```
      \expandafter\expandafter\expandafter\MT@is@letter\MT@char\relax\relax
```

```
    \fi
  \fi
}
```

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

```
\def\MT@is@opt@char#1\iffontchar#2\char#3\else#4\fi\relax{%
  \MT@ifempty{#1}{%
    \iffontchar#2%
      \MT@exp@cs\chardef{\MT@encoding\MT@detokenize@c\@tempa}=#3\relax
    \fi
  }\relax
}
```

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

\MT@charstring

```
\begingroup
  \catcode`\/=\z@
  /MT@map@tlist@n{/\CHARLEX}/@makeother
  /lowercase{%
    /def/x{/endgroup
      /def/MT@charstring{\CHAR"}%
      /def/MT@is@char##1\CHAR"##2##3##4/relax{%
        /ifx/relax##4/relax
          /ifMT@xunicode
            /expandafter/MT@is@charx/MT@strip@prefix##1>/relax\CHAR "%
              /relax/relax/relax/relax/relax
          /fi
        /else
          /ifx/relax##1/relax
            /if##3\/relax
              /edef/MT@char@{/number"##2}%
              /MT@ifstreq/MT@charstring{##3##4}/relax/MT@norestfalse
            /else
              /edef/MT@char@{/number"##2##3}%
              /MT@ifstreq/MT@charstring{##4}/relax
                {/MT@is@xchar##2##3|##4\CHAR"/relax}%
            /fi
⟨debug⟩     /MT@dinfo@nl{3}{> `/the/MT@toks' is a \char (/MT@char@)}%
          /fi
        /fi
      }%
```

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

```
      /def/MT@is@xchar##1|##2\CHAR"##3##4/relax{%
        /MT@ifstreq/MT@charstring{##3##4}%
          {/edef/MT@char@{/number"##1##2}}/MT@norestfalse
      }%
```

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

\MT@strip@prefix

\MT@is@charx

```
      /def/MT@charxstring{\CHAR "}%
      /def/MT@strip@prefix##1>##2/relax{##2}%
      /def/MT@is@charx##1\CHAR "##2##3##4##5##6/relax{%
        /ifx/relax##1/relax
          /ifx/relax##6/relax/else
            /edef/MT@char@{/number"##2##3##4##5}%
            /MT@ifstreq{\RELAX >\CHAR "}{##6}/relax/MT@norestfalse
⟨debug⟩     /MT@dinfo@nl{3}{> `/the/MT@toks' is a xunicode \char (/MT@char@)}%
          /fi
        /fi
      }%
    }%
  }
/x
```

\MT@is@tlig This might have to change again with the next LaTeX release, ... or so I feared, but it still seems to be fine.

```
\def\MT@is@tlig#1#2\relax{%
  \ifx\remove@tlig#1%
⟨debug⟩    \MT@dinfo@nl{3}{> `\the\MT@toks' (removing remove@tlig)}%
    \MT@remove@tlig
  \fi
}
```

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

```
\def\MT@remove@tlig{%
  \expandafter\MT@exp@two@c\expandafter\MT@is@number
  \expandafter\@secondoftwo\MT@char\relax\relax
}
```

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

```
\def\MT@is@composite#1#2\relax{%
  \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 `\string`ifying it. Thus, we will die gracefully even on wrong Unicode input without `utf8`.

```
    \expandafter\def\expandafter\MT@char\expandafter{\csname\expandafter
                    \string\csname\MT@encoding\endcsname
                    \MT@detokenize@n{#1}-\MT@detokenize@n{#2}\endcsname}%
```

In 2017, 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):

```
    \ifx\UnicodeEncodingName\@undefined\else
      \expandafter\expandafter\expandafter
        \MT@is@uni@comp\MT@char\iffontchar\else\fi\relax
    \fi
    \expandafter\expandafter\expandafter\MT@is@letter\MT@char\relax\relax
```

Again, `xunicode`.

```
    \ifnum\MT@char@ < \z@
      \ifMT@xunicode
        \edef\MT@char{\MT@exp@two@c\MT@strip@prefix\meaning\MT@char>\relax}%
        \expandafter\MT@exp@two@c\expandafter\MT@is@charx\expandafter
            \MT@char\MT@charxstring\relax\relax\relax\relax\relax
      \fi
    \fi
  \fi
}
```

\MT@is@uni@comp Helper for `\DeclareUnicodeComposite`.

```
\def\MT@is@uni@comp#1\iffontchar#2\else#3\fi\relax{%
  \ifx\\#1\\\edef\MT@char{\iffontchar#2\fi}\fi
}
```

[What about math? Well, for a moment the following looked like a solution, with `\mt@is@mathchar` defined accordingly, analogous to `\MT@is@char` above, to pick up the last two tokens (the `\meaning` of a `\mathchardef`'ed command expands to its hexadecimal notation):

```
\def\MT@is@mathchar#1{%
  \if\relax\noexpand#1% it's a macro
    \let\x#1%
  \else % it's a character
```

```
    \mathchardef\x=\mathcode`#1\relax
  \fi
  \expandafter\MT@exp@two@c\expandafter\mt@is@mathchar\expandafter
    \meaning\expandafter\x\mt@mathcharstring\relax\relax\relax
}
```

However, the problem is that \mathcodes and \mathchardefs have global scope. Therefore, if they are changed by a package that loads different math fonts, there is no guarantee whatsoever that things will still be correct (e.g., the minus in cmsy when the euler package is loaded). So, no way to go, unfortunately.]

Some warning messages, for performance reasons separated here.

\MT@curr@list@name The type and name of the current list, defined at various places.

\MT@set@listname
```
\def\MT@set@listname{%
  \edef\MT@curr@list@name{\@nameuse{MT@abbr@\MT@feat} list\noexpand\MessageBreak
    `\@nameuse{MT@\MT@feat @c@name}'}%
}
```

\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.

```
\def\MT@warn@ascii{%
  \MT@warning@nl{Character `\the\MT@toks' (= \MT@char@)
    is outside of ASCII range.\MessageBreak
    You must load the `inputenc' package before using\MessageBreak
    8-bit characters in \MT@curr@list@name}%
}
```

\MT@warn@number@too@large Number too large.

```
\def\MT@warn@number@too@large#1{%
  \MT@warning@nl{%
    Number #1 in encoding `\MT@encoding' too large!\MessageBreak
    Ignoring it in \MT@curr@list@name}%
}
```

\MT@warn@rest Not all of the string has been parsed.

```
\def\MT@warn@rest{%
  \MT@warning@nl{%
    Unknown slot number of character\MessageBreak`\the\MT@toks'%
    \MT@warn@maybe@inputenc\MessageBreak
    in font encoding `\MT@encoding'.\MessageBreak
    Make sure it's a single character\MessageBreak
    (or a number) in \MT@curr@list@name}%
}
```

\MT@warn@unknown No idea what went wrong.

```
\def\MT@warn@unknown{%
  \MT@warning@nl{%
    Unknown slot number of character\MessageBreak`\the\MT@toks'%
    \MT@warn@maybe@inputenc\MessageBreak
    in font encoding `\MT@encoding' in \MT@curr@list@name}%
}
```

\MT@warn@maybe@inputenc In case an input encoding had been requested.

```
\def\MT@warn@maybe@inputenc{%
  \MT@ifdefined@n@T
     {MT@\MT@feat @\MT@cat @\csname MT@\MT@feat @\MT@cat @name\endcsname @inputenc}%
    { (input encoding `\@nameuse
     {MT@\MT@feat @\MT@cat @\csname MT@\MT@feat @\MT@cat @name\endcsname @inputenc}')}%
}
```

1.2.10 Hook into LaTeX's font selection

We append \MT@setupfont to \pickup@font, which is called by LaTeX every time a font is selected. We then check whether we've already seen this font, and if not, set it up for micro-typography. This ensures that we will catch all fonts, and that we will not set up fonts more than once. The whole package really hangs on this command.

In contrast to the pdfcprot package, it is not necessary to declare in advance which fonts should benefit from micro-typographic treatment. Also, only those fonts that are actually being used will be set up.

For my reference:

- \pickup@font is called by \selectfont, \wrong@fontshape, or \getanddefine@fonts (for math).
- \pickup@font calls \define@newfont.
- \define@newfont may call (inside a group!)
  - \wrong@fontshape, which in turn will call \pickup@font, and thus \define@newfont again, or
  - \extract@font.
- \get@external@font is called by \extract@font, by itself, and by the substitution macros.

Up to version 1.3 of this package, we were using \define@newfont as the hook, which is only called for *new* fonts, and therefore seemed the natural choice. However, this meant that we had to take special care to catch all fonts: we additionally had to set up the default font, the error font (if it wasn't the default font), we had to check for some packages that might have been loaded before microtype and were loading fonts, e.g., jurabib, ledmac, pifont (loaded by hyperref), tipa, and probably many more. Furthermore, we had to include a hack for the IEEEtran class which loads all fonts in the class file itself (to fine tune inter-word spacing), and the memoir class, too. To cut this short: it seemed to get out of hand, and I decided that it would be better to use \pickup@font and decide for ourselves whether we've already seen that font. I hope the overhead isn't too large.

\MT@font@list We use a comma separated list.

\MT@font
```
\let\MT@font@list\@empty
\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.

```
⟨/package⟩
⟨*package|letterspace⟩
⟨plain⟩\MT@requires@latex2{
\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.

```
⟨package⟩  \MT@with@package@T{luatexja}{\MT@warn@unknown@once{luatexja}}%
```

```
3813 ⟨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.

```
3814  \@ifpackageloaded{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.

```
3815    \@ifpackageloaded{xeCJK}{\@firstofone}{%
3816      \@ifpackagelater{CJK}{2006/10/17}% 4.7.0
3817        {\def\MT@orig@pickupfont{\CJK@ifundefined\CJK@plane}}%
3818        {\def\MT@orig@pickupfont{\@ifundefined{CJK@plane}}}%
3819      \g@addto@macro\MT@orig@pickupfont
3820        {{\expandafter\ifx\font@name\relax\define@newfont\fi}}%
```

CJKutf8 redefines \pickup@font once more (recent versions, in PDF mode, as determined by ifpdf, which CJKutf8 loads).

```
3821      \@ifpackageloaded{CJKutf8}%
3822        {\@ifpackagelater{CJKutf8}{2008/05/22}% 4.8.0
3823          {\ifpdf\expandafter\@secondoftwo\else\expandafter\@firstoftwo\fi}%
3824          {\@firstoftwo}}%
3825        {\@firstoftwo}%
3826      {\g@addto@macro\MT@orig@pickupfont{%
3827        {\expandafter\ifx\csname\curr@fontshape/\f@size/\CJK@plane\endcsname\relax
3828           \define@newfont\else\xdef\font@name{%
3829             \csname \curr@fontshape/\f@size/\CJK@plane\endcsname}\fi}}}%
3830      {\g@addto@macro\MT@orig@pickupfont{%
3831        {\expandafter\ifx\csname \curr@fontshape/\f@size/\CJK@plane\endcsname\relax
3832           \define@newfont\def\CJK@temp{v}%
3833           \ifx\CJK@temp\CJK@plane
3834             \expandafter\ifx\csname CJK@cmap@\f@family\CJK@plane\endcsname\relax
3835             \else\csname CJK@cmap@\f@family\CJK@plane\endcsname\fi
3836           \else \CJK@addcmap\CJK@plane \fi
3837         \else\xdef\font@name{%
3838           \csname \curr@fontshape/\f@size/\CJK@plane\endcsname}\fi}}}%
3839      \@gobble
3840    }%
3841  }{\@firstofone}%
```

This is the normal LaTeX definition.

```
3842  {\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.

```
3843  \ifx\pickup@font\MT@orig@pickupfont \else
3844    \MT@warning@nl{%
3845      Command \string\pickup@font\space is not defined as expected.%
3846      \MessageBreak Patching it anyway. Some things may break%
3847 ⟨*package⟩
3848      .\MessageBreak Double-check whether micro-typography is indeed%
3849      \MessageBreak applied to the document.%
3850      \MessageBreak (Hint: Turn on `verbose' mode)%
3851 ⟨/package⟩
3852    }%
3853  \fi
```

\pickup@font Then we append our stuff. Everything is done inside a group.

```
3854  \g@addto@macro\pickup@font{\begingroup}%
```

If the `trace` package is loaded, we turn off tracing of `microtype`'s setup, which is extremely noisy.

```
  \MT@with@package@T{trace}{\g@addto@macro\pickup@font{\conditionally@traceoff}}%
  \g@addto@macro\pickup@font{%
      \escapechar\m@ne
⟨*package⟩
⟨debug⟩       \global\MT@inannottrue
⟨debug⟩       \MT@glet\MT@pdf@annot\@empty
⟨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.

```
      \MT@let@cn\MT@font{MT@subst@\expandafter\string\font@name}%
      \ifx\MT@font\relax
        \let\MT@font\font@name
      \else
        \ifx\MT@font\font@name \else
⟨debug⟩   \MT@addto@annot{= substituted with \MT@@font}%
            \MT@register@subst@font
        \fi
      \fi
      \MT@setupfont
⟨/package⟩
⟨letterspace⟩       \MT@tracking
    \endgroup
  }%
⟨*package⟩
```

`\MT@pickupfont` `\MT@MT@pickupfont` `\MT@ltx@pickupfont`

Remember the patched command, because we may have to disable ourselves in certain situations.

```
  \let\MT@pickupfont\pickup@font
  \def\MT@MT@pickupfont {\let\pickup@font\MT@pickupfont}%
  \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.

```
  \g@addto@macro\do@subst@correction
    {\edef\MT@font{\csname\curr@fontshape/\f@size\endcsname}%
     \MT@glet@nc{MT@subst@\expandafter\string\font@name}\MT@font}%
```

`\add@accent` `\MT@orig@add@accent`

Inside `\add@accent`, we have to disable `microtype`'s setup, since the grouping in the patched `\pickup@font` would break the accent if different fonts are used for the base character and the accent. Fortunately, LaTeX takes care that the fonts used for the `\accent` are already set up, so that we cannot be overlooking them.

```
  \let\MT@orig@add@accent\add@accent
  \def\add@accent#1#2{%
    \MT@ltx@pickupfont
    \MT@orig@add@accent{#1}{#2}%
    \MT@MT@pickupfont
  }%
⟨/package⟩
}
⟨plain⟩}\relax
⟨/package|letterspace⟩
⟨*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.

```
\def\MT@check@font{\MT@exp@one@n\MT@in@clist\MT@font\MT@font@list}
```

\MT@register@font Register the current font.

```
\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.

```
\def\MT@register@subst@font{%
  \MT@exp@one@n\MT@in@clist\font@name\MT@font@list
  \ifMT@inlist@\else
    \xdef\MT@font@list{\MT@font@list\font@name,}%
    \expandafter\MT@rem@from@clist\MT@font\MT@font@list
  \fi
}
⟨/package⟩
```

1.2.11 Context-sensitive setup

Here are the variants for context-sensitive setup.

\MT@active@features The activated features are stored in a command. We always allow contexts for tracking, because \textls may be used without activating the feature.

```
⟨*pdf-|lua-|xe-⟩
⟨pdf-⟩\MT@requires@pdftex6
⟨lua-⟩\MT@requires@luatex3
⟨pdf-|lua-⟩  {\def\MT@active@features{,tr}}{%
⟨pdf-|lua-⟩    \let\MT@active@features\@empty
⟨pdf-|lua-⟩  }
⟨/pdf-|lua-|xe-⟩
```

\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.

```
⟨*package⟩
\def\MT@check@font@cx{%
  \MT@if@true
  \MT@map@clist@c\MT@active@features{%
    \expandafter\MT@exp@one@n\expandafter\MT@in@clist\expandafter\MT@font
      \csname MT@##1@\csname MT@##1@context\endcsname font@list\endcsname
    \ifMT@inlist@
      \MT@let@nc{MT@\@nameuse{MT@abbr@##1}}\relax
    \else
      \MT@if@false
    \fi
  }%
  \ifMT@if@ \MT@inlist@true \else \MT@inlist@false \fi
}
```

\MT@register@subst@font@cx Add the substituted font to each feature list and possibly remove substitute font.

```
\def\MT@register@subst@font@cx{%
  \MT@map@clist@c\MT@active@features{%
    \expandafter\MT@exp@one@n\expandafter\MT@in@clist\expandafter\font@name
      \csname MT@##1@\csname MT@##1@context\endcsname font@list\endcsname
    \ifMT@inlist@ \else
      \MT@exp@cs\MT@xadd
        {MT@##1@\csname MT@##1@context\endcsname font@list}%
        {\font@name,}%
```

```
      \expandafter\MT@exp@one@n\expandafter\MT@rem@from@clist\expandafter\MT@font
         \csname MT@##1@\csname MT@##1@context\endcsname font@list\endcsname
    \fi
  }%
}
```

\MT@register@font@cx For each feature, add the current font to the list, unless we didn't set it up.

```
\def\MT@register@font@cx{%
  \MT@map@clist@c\MT@active@features{%
    \MT@exp@cs\ifx{MT@\@nameuse{MT@abbr@##1}}\relax\else
      \MT@exp@cs\MT@xadd
        {MT@##1@\csname MT@##1@context\endcsname font@list}%
        {\MT@font,}%
      \def\@tempa{##1}%
      \MT@exp@cs\MT@map@tlist@c{MT@##1@doc@contexts}\MT@maybe@rem@from@list
    \fi
  }%
}
```

\MT@maybe@rem@from@list Recurse through all context font lists of the document and remove the font, unless it's the current context.

```
\def\MT@maybe@rem@from@list#1{%
  \MT@ifstreq{\@tempa/#1}{\@tempa/\csname MT@\@tempa @context\endcsname}\relax{%
    \expandafter\MT@exp@one@n\expandafter\MT@rem@from@clist\expandafter
       \MT@font \csname MT@\@tempa @#1font@list\endcsname
  }%
}
```

\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.

```
\def\microtypecontext{\MT@begin@catcodes\MT@microtypecontext}
\def\MT@microtypecontext#1{\MT@end@catcodes\MT@addto@setup{\microtypecontext{#1}}}
\MT@addto@setup{%
  \DeclareRobustCommand\microtypecontext{%
    \MT@begin@catcodes
    \MT@microtypecontext
  }%
  \def\MT@microtypecontext#1{%
    \MT@end@catcodes
    \MT@setup@contexts
    \let\MT@reset@context\relax
```

We need to ensure that math fonts are set up anew.

```
    \MT@glet\glb@currsize\@empty
    \setkeys{MTC}{#1}%
    \selectfont
    \MT@reset@context
  }%
}
```

\textmicrotypecontext This is just a wrapper around \microtypecontext.

\MT@textmicrotypecontext
\MT@text@microtypecontext

```
\DeclareRobustCommand\textmicrotypecontext{\MT@begin@catcodes\MT@textmicrotypecontext}
\def\MT@textmicrotypecontext#1{\MT@end@catcodes\MT@text@microtypecontext{#1}}
\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.

\MT@reset@context@

```
\def\MT@reset@context@{%
  \MT@vinfo{<<< Resetting contexts\on@line
⟨debug⟩  \MessageBreak= \MT@pr@context/\MT@ex@context
⟨debug⟩                /\MT@tr@context/\MT@kn@context/\MT@sp@context
```

```
  }%
  \selectfont
}
```

\MT@setup@contexts

The first time `\microtypecontext` is called, we initialise the context lists and redefine the commands used in `\pickup@font`.

```
\def\MT@setup@contexts{%
  \MT@map@clist@c\MT@active@features
    {\MT@glet@nc{MT@##1@@font@list}\MT@font@list}%
  \MT@glet\MT@check@font\MT@check@font@cx
  \MT@glet\MT@register@font\MT@register@font@cx
  \MT@glet\MT@register@subst@font\MT@register@subst@font@cx
  \MT@glet\MT@setup@contexts\relax
}
```

Define context keys.

```
\MT@map@clist@c\MT@features@long{%
  \define@key{MTC}{#1}[]{%
    \edef\@tempb{\@nameuse{MT@rbba@#1}}%
    \MT@exp@one@n\MT@in@clist\@tempb\MT@active@features
    \ifMT@inlist@
```

Using an empty context is only asking for trouble, therefore we choose the '@' instead (hoping for the LaTeX users' natural awe of this character).

```
      \MT@ifempty{##1}{\def\MT@val{@}}{\def\MT@val{##1}}%
      \MT@exp@cs\ifx{MT@\@tempb @context}\MT@val
⟨debug⟩\MT@dinfo{1}{>>> no change of #1 context: `\MT@val'}%
      \else
        \MT@vinfo{>>> Changing #1 context to `\MT@val'\MessageBreak\on@line
⟨debug⟩           \space(previous: `\@nameuse{MT@\@tempb @context}')%
                  }%
        \def\MT@reset@context{\aftergroup\MT@reset@context@}%
```

The next time we see the font, we have to reset *all* factors.

```
        \MT@glet@nn{MT@reset@\@tempb @codes}{MT@reset@\@tempb @codes@}%
```

We must also keep track of all contexts in the document.

```
        \expandafter\MT@exp@one@n\expandafter\MT@in@tlist\expandafter
          \MT@val \csname MT@\@tempb @doc@contexts\endcsname
        \ifMT@inlist@ \else
          \MT@exp@cs\MT@xadd{MT@\@tempb @doc@contexts}{{\MT@val}}%
⟨debug⟩  \MT@dinfo{1}{||| added #1 context: \@nameuse{MT@\@tempb @doc@contexts}}%
        \fi
        \MT@edef@n{MT@\@tempb @context}{\MT@val}%
      \fi
    \fi
  }%
}
```

We also allow the `activate` shortcut.

```
\define@key{MTC}{activate}[]{%
  \setkeys{MTC}{protrusion={#1}}%
  \setkeys{MTC}{expansion={#1}}%
}
```

\MT@pr@context
\MT@ex@context
\MT@tr@context
\MT@sp@context
\MT@kn@context
\MT@pr@doc@contexts
\MT@ex@doc@contexts
\MT@tr@doc@contexts
\MT@sp@doc@contexts
\MT@kn@doc@contexts
\MT@extra@context

Initialise the contexts.

```
\MT@exp@one@n\MT@map@clist@n{\MT@features,nl}{%
  \MT@def@n{MT@#1@context}{@}%
  \MT@def@n{MT@#1@doc@contexts}{{@}}%
}
\let\MT@extra@context\@empty
```

1.3 Configuration

1.3.1 Font sets

\DeclareMicrotypeSet
\DeclareMicrotypeSet*

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.

```
\def\DeclareMicrotypeSet{%
  \MT@begin@catcodes
  \@ifstar
    \MT@DeclareSetAndUseIt
    \MT@DeclareSet
}
```

\MT@DeclareSet

```
\newcommand\MT@DeclareSet[3][]{%
  \MT@ifempty{#1}{%
    \MT@map@clist@c\MT@features{\begingroup\MT@declare@sets{##1}{#2}{#3}\endgroup}%
  }{%
    \MT@map@clist@n{#1}{\begingroup
      \MT@ifempty{##1}\relax{%
        \MT@is@feature{##1}{set declaration `#2'}{%
          \MT@exp@one@n\MT@declare@sets
            {\csname MT@rbba@##1\endcsname}{#2}{#3}%
        }%
      }%
    \endgroup}%
  }%
  \MT@end@catcodes
}
```

\MT@DeclareSetAndUseIt

```
\newcommand\MT@DeclareSetAndUseIt[3][]{%
  \MT@DeclareSet[#1]{#2}{#3}%
  \UseMicrotypeSet[#1]{#2}%
}
```

\MT@curr@set@name

We need to remember the name of the set currently being declared.

```
\let\MT@curr@set@name\@empty
```

\MT@declare@sets

Define the current set name and parse the keys.

```
\def\MT@declare@sets#1#2#3{%
  \def\MT@curr@set@name{#2}%
  \MT@ifdefined@n@T{MT@#1@set@@\MT@curr@set@name}{%
    \MT@warning{Redefining \@nameuse{MT@abbr@#1} set `\MT@curr@set@name'}%
    \MT@map@clist@n{font,encoding,family,series,shape,size}{%
      \MT@glet@nc{MT@#1list@##1@\MT@curr@set@name}\@undefined
    }%
  }%
  \MT@glet@nc{MT@#1@set@@\MT@curr@set@name}\@empty
⟨debug⟩\MT@dinfo{1}{declaring \@nameuse{MT@abbr@#1} set `\MT@curr@set@name'}%
  \setkeys{MT@#1@set}{#3}%
}
```

\MT@define@set@key@

⟨*#1*⟩ = font axis, ⟨*#2*⟩ = feature.

```
\def\MT@define@set@key@#1#2{%
  \define@key{MT@#2@set}{#1}[]{%
    \MT@glet@nc{MT@#2list@#1@\MT@curr@set@name}\@empty
    \MT@map@clist@n{##1}{%
      \KV@@sp@def\MT@val{####1}%
      \MT@get@highlevel{#1}%
```

We do not add the expanded value to the list ...

```
      \MT@exp@two@n\g@addto@macro
        {\csname MT@#2list@#1@\MT@curr@set@name\expandafter\endcsname}%
        {\MT@val,}%
    }%
```

... but keep in mind that the list has to be expanded at the end of the preamble.

```
    \expandafter\g@addto@macro\expandafter\MT@font@sets
      \csname MT@#2list@#1@\MT@curr@set@name\endcsname
⟨debug⟩\MT@dinfo@nl{1}{-- #1: \@nameuse{MT@#2list@#1@\MT@curr@set@name}}%
  }%
}
```

`\MT@get@highlevel` Saying, for instance, '`family=rm*`' or '`shape=bf*`' will expand to `\rmdefault` resp. `\bfdefault`.

```
\def\MT@get@highlevel#1{%
  \expandafter\MT@test@ast\MT@val*\@nil\relax{%
```

And '`family = *`' will become `\familydefault`.

```
    \MT@ifempty\@tempa{\def\@tempa{#1}}\relax
```

Test whether the command is actually defined.

```
    \MT@ifdefined@n@TF{\@tempa default}%
      {\edef\MT@val{\MT@exp@cs\noexpand{\@tempa default}}}%
      {\MT@warning{`\@backslashchar\@tempa default' is not a defined command.\MessageBreak
                   Ignoring `#1 = {\@tempa*}' in font set\MessageBreak`\MT@curr@set@name'}%
       \let\MT@val\@empty}%
```

In contrast to earlier versions, these values will not be expanded immediately, but at the end of the preamble.

```
  }%
}
```

`\MT@test@ast` It the last character is an asterisk, execute the second argument, otherwise the first one.

```
\def\MT@test@ast#1*#2\@nil{%
  \def\@tempa{#1}%
  \MT@ifempty{#2}%
}
```

`\MT@font@sets` `\MT@fix@font@set` Fully expand the font specification and fix catcodes for all font sets. Also remove `fontspec`'s counters.

```
\let\MT@font@sets\@empty
\def\MT@fix@font@set#1{%
  \MT@ifdefined@c@T{#1}{%
    \xdef#1{#1}%
    \ifMT@fontspec
      \xdef#1{\expandafter\MT@scrubfeatures#1()\relax}%
    \fi
    \global\@onelevel@sanitize#1%
  }%
}
```

`\MT@define@set@key@size` `size` requires special treatment.

```
\def\MT@define@set@key@size#1{%
  \define@key{MT@#1@set}{size}[]{%
    \MT@map@clist@n{##1}{%
      \def\MT@val{####1}%
      \expandafter\MT@get@range\MT@val--\@nil
      \ifx\MT@val\relax \else
        \MT@exp@cs\MT@xadd
          {MT@#1list@size@\MT@curr@set@name}%
          {{{\MT@lower}{\MT@upper}\relax}}%
      \fi
```

```
    }%
⟨debug⟩\MT@dinfo@nl{1}{-- size: \@nameuse{MT@#1list@size@\MT@curr@set@name}}%
  }%
}
```

Font sizes may also be specified as ranges. This has been requested by Andreas Bühmann, 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`

```
\def\MT@get@range#1-#2-#3\@nil{%
  \MT@ifempty{#1}{%
    \MT@ifempty{#2}{%
      \let\MT@val\relax
    }{%
      \def\MT@lower{0}%
      \def\MT@val{#2}%
      \MT@get@size
      \edef\MT@upper{\MT@val}%
    }%
  }{%
    \def\MT@val{#1}%
    \MT@get@size
    \ifx\MT@val\relax \else
      \edef\MT@lower{\MT@val}%
      \MT@ifempty{#2}{%
        \MT@ifempty{#3}%
          {\def\MT@upper{-1}}%
```

2048 pt is TEX's maximum font size.

```
          {\def\MT@upper{2048}}%
      }{%
        \def\MT@val{#2}%
        \MT@get@size
        \ifx\MT@val\relax \else
          \MT@ifdim\MT@lower>\MT@val{%
            \MT@error{%
              Invalid size range (\MT@lower\space > \MT@val) in font set
              `\MT@curr@set@name'.\MessageBreak Swapping sizes}{}%
            \edef\MT@upper{\MT@lower}%
            \edef\MT@lower{\MT@val}%
          }{%
            \edef\MT@upper{\MT@val}%
          }%
          \MT@ifdim\MT@lower=\MT@upper
            {\def\MT@upper{-1}}%
            \relax
        \fi
      }%
    \fi
  }%
}
```

`\MT@get@size` Translate a size selection command and normalise it.

```
\def\MT@get@size{%
```

A single star would mean `\sizedefault`, which doesn't exist, so we define it to be `\normalsize`.

```
  \if*\MT@val\relax
    \def\@tempa{\normalsize}%
  \else
```

```
    \MT@let@cn\@tempa{\MT@val}%
  \fi
  \ifx\@tempa\relax\else
    \MT@get@size@
  \fi
```

Test whether we finally got a number or dimension so that we can strip the 'pt' (`\@defaultunits` and `\strip@pt` are kernel macros).

```
  \MT@ifdimen\MT@val{%
    \@defaultunits\@tempdima\MT@val pt\relax\@nnil
    \edef\MT@val{\strip@pt\@tempdima}%
  }{%
    \MT@warning{Could not parse font size `\MT@val'\MessageBreak
                in font set `\MT@curr@set@name'}%
    \let\MT@val\relax
  }%
}
```

`\MT@get@size@` `\MT@get@size@@`

The `relsize` solution of parsing `\@setfontsize` does not work with the AMS 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).

```
\def\MT@get@size@@{%
  \begingroup
    \def\set@fontsize##1##2##3##4\@nil{\endgroup\def\MT@val{##2}}%
    \@tempa\@nil
}
```

The `svjour3` class defines the size commands using conditionals; using e-TEX primitives, we close any leftovers here.

```
^^X\@ifclassloaded{svjour3}{%
^^X  \def\MT@get@size@{%
^^X    \@tempcnta=\currentiflevel
^^X    \MT@get@size@@
^^X    \MT@loop
^^X      \ifnum\numexpr\currentiflevel-1>\@tempcnta
^^X      \csname fi\endcsname
^^X    \MT@repeat
^^X  }%
^^X}{%
  \let\MT@get@size@\MT@get@size@@
^^X}
```

`\MT@define@set@key@font`

```
\def\MT@define@set@key@font#1{%
  \define@key{MT@#1@set}{font}[]{%
    \MT@glet@nc{MT@#1list@font@\MT@curr@set@name}\@empty
    \MT@map@clist@n{##1}{%
      \def\MT@val{####1}%
      \MT@ifstreq\MT@val*{\def\MT@val{*/*/*/*/*}}\relax
      \expandafter\MT@get@font\MT@val/////\@nil
      \MT@exp@two@n\g@addto@macro
        {\csname MT@#1list@font@\MT@curr@set@name\expandafter\endcsname}%
        {\MT@val,}%
    }%
    \expandafter\g@addto@macro\expandafter\MT@font@sets
      \csname MT@#1list@font@\MT@curr@set@name\endcsname
⟨debug⟩\MT@dinfo@nl{1}{-- font: \@nameuse{MT@#1list@font@\MT@curr@set@name}}%
  }%
}
```

`\MT@get@font`

Translate any asterisks.

```
\def\MT@get@font#1/#2/#3/#4/#5/#6\@nil{%
```

```
  \MT@get@font@{#1}{#2}{#3}{#4}{#5}{0}%
  \ifx\MT@val\relax\def\MT@val{0}\fi
  \expandafter\g@addto@macro\expandafter\@tempb\expandafter{\MT@val}%
  \let\MT@val\@tempb
}
```

`\MT@get@font@` Helper macro, also used by `\MT@get@font@and@size`.

```
\def\MT@get@font@#1#2#3#4#5#6{%
  \let\@tempb\@empty
  \def\MT@temp{#1/#2/#3/#4/#5}%
  \MT@get@axis{encoding}{#1}%
  \MT@get@axis{family}  {#2}%
  \MT@get@axis{series}  {#3}%
  \MT@get@axis{shape}   {#4}%
  \ifnum#6>\z@\edef\@tempb{\@tempb*}\fi
  \MT@ifempty{#5}{%
    \MT@warn@axis@empty{size}{\string\normalsize}%
    \def\MT@val{*}%
  }{%
    \def\MT@val{#5}%
  }%
  \MT@get@size
}
```

`\MT@get@axis`

```
\def\MT@get@axis#1#2{%
  \def\MT@val{#2}%
  \MT@get@highlevel{#1}%
  \MT@ifempty\MT@val{%
    \MT@warn@axis@empty{#1}{\csname #1default\endcsname}%
    \expandafter\def\expandafter\MT@val\expandafter{\csname #1default\endcsname}%
  }\relax
  \expandafter\g@addto@macro\expandafter\@tempb\expandafter{\MT@val/}%
}
```

`\MT@warn@axis@empty`

```
\def\MT@warn@axis@empty#1#2{%
  \MT@warning{#1 axis is empty in font specification\MessageBreak
    `\MT@temp'. Using `#2' instead}%
}
```

We can finally assemble all pieces to define `\DeclareMicrotypeSet`'s keys. They are also used for `\DisableLigatures`.

```
\MT@exp@one@n\MT@map@clist@n{\MT@features,nl}{%
  \MT@define@set@key@{encoding}{#1}%
  \MT@define@set@key@{family}  {#1}%
  \MT@define@set@key@{series}  {#1}%
  \MT@define@set@key@{shape}   {#1}%
  \MT@define@set@key@size      {#1}%
  \MT@define@set@key@font      {#1}%
}
```

`\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.

```
\def\UseMicrotypeSet{%
  \MT@begin@catcodes
  \MT@UseMicrotypeSet
}
```

`\MT@UseMicrotypeSet`

```
\newcommand*\MT@UseMicrotypeSet[2][]{%
  \MT@ifempty{#1}{%
    \MT@map@clist@c\MT@features{\begingroup\MT@use@set{##1}{#2}\endgroup}%
  }{%
```

```
    \MT@map@clist@n{#1}{\begingroup
      \MT@ifempty{##1}\relax{%
        \MT@is@feature{##1}{activation of set `#2'}{%
          \MT@exp@one@n\MT@use@set
            {\csname MT@rbba@##1\endcsname}{#2}%
        }%
      }%
    \endgroup}%
  }%
  \MT@end@catcodes
}
```

\MT@pr@setname
\MT@ex@setname
\MT@tr@setname
\MT@sp@setname
\MT@kn@setname
\MT@use@set

Only use sets that have been declared.

```
\def\MT@use@set#1#2{%
  \MT@ifdefined@n@TF{MT@#1@set@@#2}{%
    \MT@xdef@n{MT@#1@setname}{#2}%
  }{%
    \MT@ifdefined@n@TF{MT@#1@setname}\relax{%
      \MT@xdef@n{MT@#1@setname}{\@nameuse{MT@default@#1@set}}%
    }%
    \MT@error{%
      The \@nameuse{MT@abbr@#1} set `#2' is undeclared.\MessageBreak
      Using set `\@nameuse{MT@#1@setname}' instead}{}%
  }%
}
```

\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.

```
\def\DeclareMicrotypeSetDefault{%
  \MT@begin@catcodes
  \MT@DeclareMicrotypeSetDefault
}
```

\MT@DeclareMicrotypeSetDefault

```
\newcommand*\MT@DeclareMicrotypeSetDefault[2][]{%
  \MT@ifempty{#1}{%
    \MT@map@clist@c\MT@features{\begingroup\MT@set@default@set{##1}{#2}\endgroup}%
  }{%
    \MT@map@clist@n{#1}{\begingroup
      \MT@ifempty{##1}\relax{%
        \MT@is@feature{##1}{declaration of default set `#2'}{%
          \MT@exp@one@n\MT@set@default@set
            {\csname MT@rbba@##1\endcsname}{#2}%
        }%
      }%
    \endgroup}%
  }%
  \MT@end@catcodes
}
```

\MT@default@pr@set
\MT@default@ex@set
\MT@default@tr@set
\MT@default@sp@set
\MT@default@kn@set
\MT@set@default@set

```
\def\MT@set@default@set#1#2{%
  \MT@ifdefined@n@TF{MT@#1@set@@#2}{%
⟨debug⟩\MT@dinfo{1}{declaring default \@nameuse{MT@abbr@#1} set `#2'}%
    \MT@xdef@n{MT@default@#1@set}{#2}%
  }{%
    \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@n{MT@default@#1@set}{all}%
  }%
}
```

1.3.2 Variants and aliases

\DeclareMicrotypeVariants
\MT@variants

Specify suffixes for variants (see `fontname/variants.map`). The starred version appends to the list.

```
\let\MT@variants\@empty
\def\DeclareMicrotypeVariants{%
  \MT@begin@catcodes
  \@ifstar
    \MT@DeclareVariants
    {\let\MT@variants\@empty\MT@DeclareVariants}%
}
```

\MT@DeclareVariants

```
\def\MT@DeclareVariants#1{%
  \MT@map@clist@n{#1}{%
    \def\@tempa{##1}%
    \@onelevel@sanitize\@tempa
    \xdef\MT@variants{\MT@variants{\@tempa}}%
  }%
  \MT@end@catcodes
}
```

\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.

```
\def\DeclareMicrotypeAlias{%
  \MT@begin@catcodes
  \MT@DeclareMicrotypeAlias
}
```

\MT@DeclareMicrotypeAlias

```
\newcommand*\MT@DeclareMicrotypeAlias[2]{%
  \def\@tempb{#2}%
  \@onelevel@sanitize\@tempb
  \MT@ifdefined@n@T{MT@#1@alias}{%
    \MT@warning{Alias font family `\@tempb' will override
      alias `\@nameuse{MT@#1@alias}'\MessageBreak
      for font family `#1'}}%
  \MT@xdef@n{MT@#1@alias}{\@tempb}%
```

If we encounter this command while a font is being set up, we also set the alias for the current font so that if `\DeclareMicrotypeAlias` has been issued inside a configuration file, the configuration file for the alias font will be loaded, too.

```
  \MT@ifdefined@c@T\MT@family{%
⟨debug⟩\MT@dinfo{1}{Activating alias font `\@tempb' for `\MT@family'}%
    \MT@glet\MT@familyalias\@tempb
  }%
  \MT@end@catcodes
}
```

1.3.3 Configuration file management

\LoadMicrotypeFile

May be used to load a configuration file manually.

```
\def\LoadMicrotypeFile#1{%
  \edef\@tempa{\zap@space#1 \@empty}%
  \@onelevel@sanitize\@tempa
  \MT@exp@one@n\MT@in@clist\@tempa\MT@file@list
  \ifMT@inlist@
    \MT@vinfo{... Configuration file \MT@cfg@prefix-\@tempa.cfg already loaded}%
  \else
    \MT@xadd\MT@file@list{\@tempa,}%
    \MT@begin@catcodes
    \InputIfFileExists{\MT@cfg@prefix-\@tempa.cfg}{%
```

```
      \edef\MT@curr@file{\MT@cfg@prefix-\@tempa.cfg}%
      \MT@vinfo{... Loading configuration file \MT@curr@file}%
    }{%
      \MT@warning{Configuration file \MT@cfg@prefix-\@tempa.cfg\MessageBreak
                  does not exist}%
    }%
    \MT@end@catcodes
  \fi
}
```

\MT@cfg@prefix
\DeclareMicrotypeFilePrefix

The configuration files' prefix may be customised.

```
\def\MT@cfg@prefix{mt}
\def\DeclareMicrotypeFilePrefix#1{%
  \def\MT@cfg@prefix{#1}%
}
⟨/package⟩
```

1.3.4 Disabling ligatures

\DisableLigatures
\MT@DisableLigatures
\MT@nl@setname
\MT@nl@ligatures

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`'.

The optional argument may be used to disable selected ligatures only.

```
⟨*pdf-|lua-⟩
⟨pdf-⟩\MT@requires@pdftex5{
\def\DisableLigatures{%
  \MT@begin@catcodes
  \MT@DisableLigatures
}
\newcommand*\MT@DisableLigatures[2][]{%
  \MT@ifempty{#1}\relax{\gdef\MT@nl@ligatures{#1}}%
  \xdef\MT@active@features{\MT@active@features,nl}%
  \global\MT@noligaturestrue
  \MT@declare@sets{nl}{no ligatures}{#2}%
  \gdef\MT@nl@setname{no ligatures}%
  \MT@end@catcodes
}
⟨pdf-⟩}{
⟨/pdf-|lua-⟩
```

If pdfTEX is too old, we throw an error.

```
⟨*pdf-|xe-⟩
\renewcommand*\DisableLigatures[2][]{%
  \MT@error{Disabling ligatures of a font is only possible\MessageBreak
    with pdftex version 1.30 or newer.\MessageBreak
    Ignoring \@backslashchar DisableLigatures}{%
⟨pdf-⟩    Upgrade
⟨xe-⟩    Use
    pdftex.}%
}
⟨pdf-⟩}
⟨/pdf-|xe-⟩
```

1.3.5 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.

```
⟨*package⟩
\def\DeclareMicrotypeBabelHook#1#2{%
  \MT@map@clist@n{#1}{%
    \KV@@sp@def\@tempa{##1}%
    \MT@gdef@n{MT@babel@\@tempa}{#2}%
  }%
```

```
}
```

1.3.6 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).

```
\def\SetProtrusion{%
  \MT@begin@catcodes
  \MT@SetProtrusion
}
```

\MT@SetProtrusion We want the catcodes to be correct even if this is called in the preamble.

\MT@pr@c@name
\MT@extra@context
\MT@permutelist

```
\newcommand*\MT@SetProtrusion[3][]{%
  \let\MT@extra@context\@empty
```

Parse the optional first argument. We first have to know the name before we can deal with the extra options.

```
  \MT@set@named@keys{MT@pr@c}{#1}%
⟨debug⟩\MT@dinfo{1}{creating protrusion list `\MT@pr@c@name'}%
  \def\MT@permutelist{pr@c}%
  \setkeys{MT@cfg}{#2}%
```

We have parsed the second argument, and can now define macros for all permutations of the font attributes to point to \MT@pr@c@⟨*name*⟩, ...

```
  \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.

```
  \MT@gdef@n{MT@pr@c@\MT@pr@c@name}{#3}%
  \MT@end@catcodes
}
⟨/package⟩
```

\SetExpansion \SetExpansion only differs in that it allows some extra options (`stretch`, `shrink`, `step`, `auto`).

```
⟨*pdf-|lua-⟩
\def\SetExpansion{%
  \MT@begin@catcodes
  \MT@SetExpansion
}
```

\MT@SetExpansion

\MT@ex@c@name
\MT@extra@context
\MT@permutelist

```
\newcommand*\MT@SetExpansion[3][]{%
  \let\MT@extra@context\@empty
  \MT@set@named@keys{MT@ex@c}{#1}%
  \MT@ifdefined@n@T{MT@ex@c@\MT@ex@c@name @factor}{%
    \ifnum\csname MT@ex@c@\MT@ex@c@name @factor\endcsname > \@m
      \MT@warning@nl{Expansion factor \number\@nameuse{MT@ex@c@\MT@ex@c@name @factor}
        too large in list\MessageBreak `\MT@ex@c@name'. Setting it to the
        maximum of 1000}%
      \MT@glet@nc{MT@ex@c@\MT@ex@c@name @factor}\@m
    \fi
  }%
⟨debug⟩\MT@dinfo{1}{creating expansion list `\MT@ex@c@name'}%
  \def\MT@permutelist{ex@c}%
  \setkeys{MT@cfg}{#2}%
  \MT@permute
```

```
4436   \MT@gdef@n{MT@ex@c@\MT@ex@c@name}{#3}%
4437   \MT@end@catcodes
4438 }
```

\SetTracking

```
4439 \def\SetTracking{%
4440   \MT@begin@catcodes
4441   \MT@SetTracking
4442 }
```

\MT@SetTracking

Third argument may be empty.

```
4443 \newcommand*\MT@SetTracking[3][]{%
4444   \let\MT@extra@context\@empty
4445   \MT@set@named@keys{MT@tr@c}{#1}%
4446 ⟨debug⟩\MT@dinfo{1}{creating tracking list `\MT@tr@c@name'}%
4447   \def\MT@permutelist{tr@c}%
4448   \setkeys{MT@cfg}{#2}%
4449   \MT@permute
4450   \KV@@sp@def\@tempa{#3}%
4451   \MT@ifempty\@tempa\relax{%
4452     \MT@ifint\@tempa
4453       {\MT@xdef@n{MT@tr@c@\MT@tr@c@name}{\@tempa}}%
4454       {\MT@warning{Value `\@tempa' is not a number in\MessageBreak
4455                    tracking set `\MT@curr@set@name'}}}%
4456   \MT@end@catcodes
4457 }
4458 ⟨/pdf-|lua-⟩
```

\SetExtraSpacing

```
4459 ⟨*pdf-⟩
4460 \def\SetExtraSpacing{%
4461   \MT@begin@catcodes
4462   \MT@SetExtraSpacing
4463 }
```

\MT@SetExtraSpacing

\MT@sp@c@name
\MT@extra@context
\MT@permutelist

```
4464 \newcommand*\MT@SetExtraSpacing[3][]{%
4465   \let\MT@extra@context\@empty
4466   \MT@set@named@keys{MT@sp@c}{#1}%
4467 ⟨debug⟩\MT@dinfo{1}{creating spacing list `\MT@sp@c@name'}%
4468   \def\MT@permutelist{sp@c}%
4469   \setkeys{MT@cfg}{#2}%
4470   \MT@permute
4471   \MT@gdef@n{MT@sp@c@\MT@sp@c@name}{#3}%
4472   \MT@end@catcodes
4473 }
```

\SetExtraKerning

```
4474 \def\SetExtraKerning{%
4475   \MT@begin@catcodes
4476   \MT@SetExtraKerning
4477 }
```

\MT@SetExtraKerning

\MT@kn@c@name
\MT@extra@context
\MT@permutelist

```
4478 \newcommand*\MT@SetExtraKerning[3][]{%
4479   \let\MT@extra@context\@empty
4480   \MT@set@named@keys{MT@kn@c}{#1}%
4481 ⟨debug⟩\MT@dinfo{1}{creating kerning list `\MT@kn@c@name'}%
4482   \def\MT@permutelist{kn@c}%
4483   \setkeys{MT@cfg}{#2}%
4484   \MT@permute
4485   \MT@gdef@n{MT@kn@c@\MT@kn@c@name}{#3}%
4486   \MT@end@catcodes
4487 }
4488 ⟨/pdf-⟩
```

\MT@set@named@keys
\MT@options

We first set the name (if specified), then remove it from the list, and set the remaining keys.

```
⟨*package⟩
\def\MT@set@named@keys#1#2{%
  \def\x##1name=##2,##3\@nil{%
    \setkeys{#1}{name=##2}%
    \gdef\MT@options{##1##3}%
    \MT@rem@from@clist{name=}\MT@options
  }%
  \x#2,name=,\@nil
  \@expandtwoargs\setkeys{#1}\MT@options
}
```

\MT@define@code@key

Define the keys for the configuration lists (which are setting the codes, in pdfTEX speak).

```
\def\MT@define@code@key#1#2{%
  \define@key{MT@#2}{#1}[]{%
    \@tempcnta=\@ne
    \MT@map@clist@n{##1}{%
      \KV@@sp@def\MT@val{####1}%
```

Here, too, we allow for something like 'bf*'. It will be expanded immediately.

```
      \MT@get@highlevel{#1}%
      \MT@edef@n{MT@temp#1\the\@tempcnta}{\MT@val}%
      \advance\@tempcnta \@ne
    }%
  }%
}
```

\MT@define@code@key@family

Remove fontspec's internal feature counter.

```
\def\MT@define@code@key@family#1{%
  \define@key{MT@#1}{family}[]{%
    \@tempcnta=\@ne
    \MT@map@clist@n{##1}{%
      \KV@@sp@def\MT@val{####1}%
      \MT@get@highlevel{family}%
      \ifMT@fontspec
        \edef\x{\edef\noexpand\MT@val{\noexpand\MT@scrubfeature\MT@val()\relax}}\x
      \fi
      \MT@edef@n{MT@tempfamily\the\@tempcnta}{\MT@val}%
      \advance\@tempcnta \@ne
    }%
  }%
}
```

\MT@define@code@key@size

\MT@tempsize must be in a \csname, so that it is at least \relax, not undefined.

```
\def\MT@define@code@key@size#1{%
  \define@key{MT@#1}{size}[]{%
    \MT@map@clist@n{##1}{%
      \KV@@sp@def\MT@val{####1}%
      \expandafter\MT@get@range\MT@val--\@nil
      \ifx\MT@val\relax \else
        \MT@exp@cs\MT@xadd{MT@tempsize}%
           {{{\MT@lower}{\MT@upper}{\MT@curr@set@name}}}%
      \fi
    }%
  }%
}
```

\MT@define@code@key@font

```
\def\MT@define@code@key@font#1{%
  \define@key{MT@#1}{font}[]{%
    \MT@map@clist@n{##1}{%
      \KV@@sp@def\MT@val{####1}%
```

```
      \MT@ifstreq\MT@val*{\def\MT@val{*/*/*/*/*}}\relax
      \expandafter\MT@get@font@and@size\MT@val/////\@nil
      \ifMT@fontspec
        \edef\@tempb{\expandafter\MT@scrubfeatures\@tempb()\relax}%
      \fi
      \MT@xdef@n{MT@\MT@permutelist @\@tempb\MT@extra@context}%
        {\csname MT@\MT@permutelist @name\endcsname}%
⟨debug⟩\MT@dinfo@nl{1}{initialising: use list for font \@tempb=\MT@val
⟨debug⟩                \ifx\MT@extra@context\@empty\else\MessageBreak
⟨debug⟩                  (context: \MT@extra@context)\fi}%
      \MT@exp@cs\MT@xaddb
        {MT@\MT@permutelist @\@tempb\MT@extra@context @sizes}%
        {{{\MT@val}{\m@ne}{\MT@curr@set@name}}}%
    }%
  }%
}
```

`\MT@get@font@and@size` Translate any asterisks and split off the size.

```
\def\MT@get@font@and@size#1/#2/#3/#4/#5/#6\@nil{%
  \MT@get@font@{#1}{#2}{#3}{#4}{#5}{1}%
}
\MT@define@code@key{encoding}{cfg}
\MT@define@code@key@family   {cfg}
\MT@define@code@key{series}  {cfg}
\MT@define@code@key{shape}   {cfg}
\MT@define@code@key@size     {cfg}
\MT@define@code@key@font     {cfg}
```

`\MT@define@opt@key`

```
\def\MT@define@opt@key#1#2{%
  \define@key{MT@#1@c}{#2}[]{\MT@ifempty{##1}\relax{%
    \MT@xdef@n{MT@#1@c@\MT@curr@set@name @#2}{##1}}}%
}
```

`\MT@listname@count` The options in the optional first argument.

```
\newcount\MT@listname@count
\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`).

```
  \define@key{MT@#1@c}{name}[]{%
    \MT@ifempty{##1}{%
      \MT@ifdefined@n@TF{MT@#1@c@\MT@curr@file/\the\inputlineno}{%
        \global\advance\MT@listname@count\@ne
        \MT@edef@n{MT@#1@c@name}{\MT@curr@file/\the\inputlineno
                                 (\number\MT@listname@count)}%
      }{%
        \MT@edef@n{MT@#1@c@name}{\MT@curr@file/\the\inputlineno}%
      }%
    }{%
      \MT@edef@n{MT@#1@c@name}{##1}%
      \MT@ifdefined@n@T{MT@#1@c@\csname MT@#1@c@name\endcsname}{%
        \MT@warning{Redefining \@nameuse{MT@abbr@#1} list `\@nameuse{MT@#1@c@name}'}%
      }%
    }%
    \MT@let@cn\MT@curr@set@name{MT@#1@c@name}%
  }%
  \MT@define@opt@key{#1}{load}%
  \MT@define@opt@key{#1}{factor}%
  \MT@define@opt@key{#1}{preset}%
  \MT@define@opt@key{#1}{inputenc}%
```

Only one context is allowed. This might change in the future.

```
  \define@key{MT@#1@c}{context}[]{\MT@ifempty{##1}\relax{\def\MT@extra@context{##1}}}%
}
⟨/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.

```
⟨*pdf-|lua-⟩
⟨pdf-⟩\MT@requires@pdftex7{
  \define@key{MT@ex@c}{context}[]{%
    \MT@ifempty{#1}\relax{%
      \MT@glet\MT@copy@font\MT@copy@font@
      \def\MT@extra@context{#1}%
    }%
  }
  \MT@addto@setup{%
    \define@key{MT@ex@c}{context}[]{%
      \ifx\MT@copy@font\MT@copy@font@
        \MT@ifempty{#1}\relax{\def\MT@extra@context{#1}}%
      \else
        \MT@error{\MT@MT\space isn't set up for expansion contexts.\MessageBreak
           Ignoring `context' key\on@line}%
          {Either move the settings inside the preamble,\MessageBreak
           or load the package with the `copyfonts' option.}%
      \fi
    }%
  }
```

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.

```
  \define@key{MT@pr@c}{context}[]{%
    \MT@ifempty{#1}\relax{%
      \MT@glet\MT@copy@font\MT@copy@font@
      \def\MT@extra@context{#1}%
    }%
  }
  \MT@addto@setup{%
    \define@key{MT@pr@c}{context}[]{%
      \MT@ifempty{#1}\relax{\def\MT@extra@context{#1}}%
      \ifx\MT@copy@font\MT@copy@font@\else
        \MT@warning@nl{If protrusion contexts don't work as expected,
          \MessageBreak load the package with the `copyfonts' option}%
      \fi
    }%
  }
⟨/pdf-|lua-⟩
⟨*pdf-⟩
}{
  \define@key{MT@ex@c}{context}[]{%
    \MT@error{Expansion contexts only work with pdftex 1.40.4\MessageBreak
       or later. Ignoring `context' key\on@line}%
      {Upgrade pdftex.}%
  }
⟨/pdf-⟩
⟨*pdf-|xe-⟩
  \define@key{MT@pr@c}{context}[]{%
    \MT@error{Protrusion contexts only work with pdftex
⟨pdf-⟩       1.40.4\MessageBreak or later.
⟨xe-⟩      \MessageBreak or luatex.
```

```
        Ignoring `context' key\on@line}%
⟨pdf-⟩      {Upgrade pdftex.}%
⟨xe-⟩       {Use pdftex or luatex.}%
  }
⟨/pdf-|xe-⟩
⟨pdf-⟩}
```

\MT@warn@nodim

```
⟨*package⟩
\def\MT@warn@nodim#1{%
  \MT@warning{`\@tempa' is not a dimension.\MessageBreak
              Ignoring it and setting values relative to\MessageBreak #1}%
}
```

Protrusion codes may be relative to character width, or to any dimension.

```
\define@key{MT@pr@c}{unit}[character]{%
  \MT@glet@nc{MT@pr@c@\MT@curr@set@name @unit}\@empty
  \def\@tempa{#1}%
  \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.

```
    \MT@ifdimen\@tempa
      {\MT@glet@nc{MT@pr@c@\MT@curr@set@name @unit}\@tempa}%
      {\MT@warn@nodim{character widths}}%
  }%
}
⟨/package⟩
```

Tracking may only be relative to a dimension.

```
⟨*pdf-|lua-⟩
\define@key{MT@tr@c}{unit}[1em]{%
  \MT@glet@nc{MT@tr@c@\MT@curr@set@name @unit}\@empty
  \def\@tempa{#1}%
  \MT@ifdimen\@tempa
    {\MT@glet@nc{MT@tr@c@\MT@curr@set@name @unit}\@tempa}%
    {\MT@warn@nodim{1em}%
     \MT@gdef@n{MT@tr@c@\MT@curr@set@name @unit}{1em}}%
}
⟨/pdf-|lua-⟩
```

Spacing and kerning codes may additionally be relative to space dimensions.

```
⟨*pdf-⟩
\MT@map@clist@n{sp,kn}{%
  \define@key{MT@#1@c}{unit}[space]{%
    \MT@glet@nc{MT@#1@c@\MT@curr@set@name @unit}\@empty
    \def\@tempa{##1}%
    \MT@ifstreq\@tempa{character}\relax{%
      \MT@glet@nc{MT@#1@c@\MT@curr@set@name @unit}\m@ne
      \MT@ifstreq\@tempa{space}\relax{%
        \MT@ifdimen\@tempa
          {\MT@glet@nc{MT@#1@c@\MT@curr@set@name @unit}\@tempa}%
          {\MT@warn@nodim{width of space}}%
      }%
    }%
  }%
}
⟨/pdf-⟩
```

The first argument to `\SetExpansion` accepts some more options.

```
⟨*pdf-|lua-⟩
\MT@map@clist@n{stretch,shrink,step}{%
  \define@key{MT@ex@c}{#1}[]{%
    \MT@ifempty{##1}\relax{%
      \MT@ifint{##1}{%
```

A space terminates the number.

```
        \MT@gdef@n{MT@ex@c@\MT@curr@set@name @#1}{##1 }%
      }{%
        \MT@warning{%
          Value `##1' for option `#1' is not a number.\MessageBreak
          Ignoring it}%
      }%
    }%
  }%
}
\define@key{MT@ex@c}{auto}[true]{%
  \def\@tempa{#1}%
  \csname if\@tempa\endcsname
```

Don't use `autoexpand` for pdfTEX version older than 1.20.

```
⟨pdf-⟩    \MT@requires@pdftex4%
⟨lua-⟩    \MT@requires@luatex3\relax
      {\MT@gdef@n{MT@ex@c@\MT@curr@set@name @auto}{autoexpand}}%
⟨pdf-⟩      {\MT@warning{pdftex too old for automatic font expansion}}%
  \else
⟨pdf-⟩    \MT@requires@pdftex4%
⟨*lua-⟩
    \MT@requires@luatex3{%
      \MT@warning{Non-automatic font expansion doesn't work with\MessageBreak
                  luatex}}%
⟨/lua-⟩
      {\MT@glet@nc{MT@ex@c@\MT@curr@set@name @auto}\@empty}%
⟨pdf-⟩      \relax
  \fi
}
```

Tracking: Interword spacing and outer kerning. The variant with space just in case `\SetTracking` is called inside an argument (e.g., to `\IfFileExists`).

```
\MT@define@opt@key{tr}{spacing}
\MT@define@opt@key{tr}{outerspacing}
\MT@define@opt@key{tr}{outerkerning}
```

Which ligatures should be disabled?

```
\define@key{MT@tr@c}{noligatures}[]%
  {\MT@xdef@n{MT@tr@c@\MT@curr@set@name @noligatures}{#1}}
\define@key{MT@tr@c}{outer spacing}[]{\setkeys{MT@tr@c}{outerspacing={#1}}}
\define@key{MT@tr@c}{outer kerning}[]{\setkeys{MT@tr@c}{outerkerning={#1}}}
\define@key{MT@tr@c}{no ligatures}[]{\setkeys{MT@tr@c}{noligatures={#1}}}
⟨/pdf-|lua-⟩
```

1.3.7 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`
`\MT@extra@inputenc`

The optional argument may be used to restrict the list to some features, and to specify an input encoding.

```
⟨*package⟩
\renewcommand*\DeclareCharacterInheritance[1][]{%
  \let\MT@extra@context\@empty
  \let\MT@extra@inputenc\@undefined
  \let\MT@inh@feat\@empty
  \setkeys{MT@inh@}{#1}%
```

```
  \MT@begin@catcodes
  \MT@set@inh@list
}
```

`\MT@set@inh@list` No need to create an inheritance list for tracking.

```
\def\MT@set@inh@list#1#2{%
  \MT@ifempty\MT@inh@feat{%
    \MT@map@clist@c\MT@features{\begingroup
      \MT@ifstreq{##1}{tr}\relax{\MT@declare@char@inh{##1}{#1}{#2}}%
    \endgroup}%
  }{%
    \MT@map@clist@c\MT@inh@feat{\begingroup
      \KV@@sp@def\@tempa{##1}%
      \MT@ifempty\@tempa\relax{%
        \edef\@tempa{\csname MT@rbba@\@tempa\endcsname}%
        \MT@ifstreq\@tempa{tr}\relax{%
          \MT@exp@one@n\MT@declare@char@inh{\@tempa}{#1}{#2}}}%
    \endgroup}%
  }%
  \MT@end@catcodes
}
```

The keys for the optional argument.

```
\MT@map@clist@c\MT@features@long{%
  \define@key{MT@inh@}{#1}[]{\edef\MT@inh@feat{\MT@inh@feat#1,}}}
\define@key{MT@inh@}{inputenc}{\def\MT@extra@inputenc{#1}}
```

`\MT@declare@char@inh` The lists cannot be given a name by the user.

```
\def\MT@declare@char@inh#1#2#3{%
  \MT@edef@n{MT@#1@inh@name}%
    {\MT@curr@file/\the\inputlineno (\@nameuse{MT@abbr@#1})}%
  \MT@let@cn\MT@curr@set@name{MT@#1@inh@name}%
  \MT@ifdefined@c@T\MT@extra@inputenc{%
    \MT@xdef@n{MT@#1@inh@\MT@curr@set@name @inputenc}{\MT@extra@inputenc}}%
⟨debug⟩\MT@dinfo{1}{creating inheritance list `\@nameuse{MT@#1@inh@name}'}%
  \MT@gdef@n{MT@#1@inh@\csname MT@#1@inh@name\endcsname}{#3}%
  \def\MT@permutelist{#1@inh}%
  \setkeys{MT@inh}{#2}%
  \MT@permute
}
```

Parse the second argument. `\DeclareCharacterInheritance` may also be set up for various combinations. We can reuse the key setup from the configuration lists (`\Set...`).

```
\MT@define@code@key{encoding}{inh}
\MT@define@code@key@family   {inh}
\MT@define@code@key{series}  {inh}
\MT@define@code@key{shape}   {inh}
\MT@define@code@key@size     {inh}
\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`).

```
\def\MT@inh@do#1,{%
  \ifx\relax#1\@empty \else
    \MT@inh@split #1==\relax
    \expandafter\MT@inh@do
  \fi
}
```

\MT@inh@split Only gather the inheriting characters here. Their codes will actually be set in \MT@set@⟨*feature*⟩@codes.

```
⟨/package⟩
⟨*pdf-|lua-|xe-⟩
\def\MT@inh@split#1=#2=#3\relax{%
  \def\@tempa{#1}%
  \ifx\@tempa\@empty \else
    \expandafter\MT@has@inh@prefix\@tempa()\relax\@nil
    \MT@get@slot
⟨pdf-|lua-⟩    \ifnum\MT@char > \m@ne
⟨xe-⟩    \ifx\MT@char\@empty\else
      \let\MT@val\MT@char
      \MT@map@clist@n{#2}{%
        \def\@tempa{##1}%
        \ifx\@tempa\@empty \else
          \MT@get@slot
⟨pdf-|lua-⟩          \ifnum\MT@char > \m@ne
⟨xe-⟩          \ifx\MT@char\@empty\else
            \ifx\MT@inh@prefix\@empty
              \MT@exp@cs\MT@xadd{MT@inh@\MT@listname @\MT@val @}{{\MT@char}}%
            \else
              \MT@exp@cs\MT@xadd{MT@inh@\MT@listname @prefixes}%
                  {{{\MT@val}{\MT@char}\MT@inh@prefix@}}%
            \fi
          \fi
        \fi
      }%
⟨debug⟩\MT@dinfo@nl{2}{children of #1 (\MT@val):
⟨debug⟩    \@nameuse{MT@inh@\MT@listname @\ifx\MT@inh@prefix\@empty\MT@val @\else prefixes\fi}}%
    \fi
  \fi
}
⟨/pdf-|lua-|xe-⟩
```

\MT@inh@prefix If the inheriting character is preceded by (⟨*prefix*⟩), where ⟨*prefix*⟩ is one of `l`, `r` or `lr`, this has a special meaning for protrusion. For the other features, we ignore these settings.

\MT@has@inh@prefix

```
⟨*package⟩
\def\MT@has@inh@prefix#1(#2)#3#4\@nil{%
  \let\MT@temp\relax
  \ifx\relax#3%
    \def\@tempa{#1#2}%
    \let\MT@inh@prefix\@empty
  \else
    \MT@ifstreq{\MT@feat}{pr}{%
      \MT@ifstreq{#2}{l}{\def\MT@inh@prefix@{{1000}{0}}\@firstoftwo}{%
        \MT@ifstreq{#2}{r}{\def\MT@inh@prefix@{{0}{1000}}\@firstoftwo}{%
          \MT@ifstreq{#2}{lr}{\def\MT@inh@prefix@{{500}{500}}\@firstoftwo}{%
            \MT@warning@nl{`#2' is not a valid prefix in inheritance list%
              \MessageBreak\MT@listname. Ignoring it}%
            \@secondoftwo}}}%
      {\def\@tempa{#3}%
       \def\MT@inh@prefix{#2}%
       \@gobble}%
      {\@firstofone}%
    }{\@firstofone}%
   {\let\MT@char\m@ne
    \let\MT@temp\@gobble
   }%
  \fi
  \MT@temp
}
```

1.3.8 Permutation

\MT@permute
\MT@permute@
\MT@permute@@
\MT@permute@@@
\MT@permute@@@@

Calling \MT@permute will define commands for all permutations of the specified font attributes of the form \MT@⟨*list type*⟩@/⟨*encoding*⟩/⟨*family*⟩/⟨*series*⟩/⟨*shape*⟩/⟨|*⟩ to be the expansion of \MT@⟨*list type*⟩@name, i.e., the name of the currently defined list. Size ranges are held in a separate macro called \MT@⟨*list type*⟩@/⟨*font axes*⟩@sizes, 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:

```
\MT@gdef@n{MT@pr@c@U/euroitc///}{euroitc}
\MT@gdef@n{MT@pr@c@U/euroitcs///}{euroitc}
\MT@gdef@n{MT@pr@c@U/euroitc//it/}{euroitci}
\MT@gdef@n{MT@pr@c@U/euroitcs//it/}{euroitci}
\MT@gdef@n{MT@pr@c@euroitc}{E={100,50}}
\MT@gdef@n{MT@pr@c@euroitci}{E={100,}}
\def\MT@permute{%
  \let\MT@cnt@encoding\@ne
  \MT@permute@
```

Undefine commands for the next round.

```
  \MT@map@tlist@n{{encoding}{family}{series}{shape}}\MT@permute@reset
  \MT@glet\MT@tempsize\@undefined
}
\def\MT@permute@{%
  \let\MT@cnt@family\@ne
  \MT@permute@@
  \MT@increment\MT@cnt@encoding
  \MT@ifdefined@n@T{MT@tempencoding\MT@cnt@encoding}%
    \MT@permute@
}
\def\MT@permute@@{%
  \let\MT@cnt@series\@ne
  \MT@permute@@@
  \MT@increment\MT@cnt@family
  \MT@ifdefined@n@T{MT@tempfamily\MT@cnt@family}%
    \MT@permute@@
}
\def\MT@permute@@@{%
  \let\MT@cnt@shape\@ne
  \MT@permute@@@@
  \MT@increment\MT@cnt@series
  \MT@ifdefined@n@T{MT@tempseries\MT@cnt@series}%
    \MT@permute@@@
}
\def\MT@permute@@@@{%
  \MT@permute@@@@@
  \MT@increment\MT@cnt@shape
  \MT@ifdefined@n@T{MT@tempshape\MT@cnt@shape}%
    \MT@permute@@@@
}
```

\MT@permute@@@@@

In order to save some memory, we can ignore unused encodings (inside the document).

```
\def\MT@permute@@@@@{%
```

```
  \MT@permute@define{encoding}%
  \ifMT@document
    \ifx\MT@tempencoding\@empty \else
      \MT@ifdefined@n@TF{T@\MT@tempencoding}\relax
        {\expandafter\expandafter\expandafter\@gobble}%
    \fi
  \fi
  \MT@permute@@@@@@
}
```

`\MT@permute@@@@@@`

```
\def\MT@permute@@@@@@{%
  \MT@permute@define{family}%
  \MT@permute@define{series}%
  \MT@permute@define{shape}%
  \edef\@tempa{\MT@tempencoding
               /\MT@tempfamily
               /\MT@tempseries
               /\MT@tempshape
               /\MT@ifdefined@c@T\MT@tempsize *}%
```

Some sanity checks: an encoding must be specified (unless nothing else is).

```
  \MT@ifstreq\@tempa{////}\relax{%
    \ifx\MT@tempencoding\@empty
      \MT@warning{%
        You have to specify an encoding for\MessageBreak
        \@nameuse{MT@abbr@\MT@permutelist} list
        `\@nameuse{MT@\MT@permutelist @name}'.\MessageBreak
        Ignoring it}%
    \else
      \MT@ifdefined@c@TF\MT@tempsize{%
```

Add the list of ranges to the beginning of the current combination, after checking for conflicts.

```
        \MT@ifdefined@n@T{MT@\MT@permutelist @\@tempa\MT@extra@context @sizes}{%
          \MT@map@tlist@c\MT@tempsize\MT@check@rlist
        }%
        \MT@exp@cs\MT@xaddb
          {MT@\MT@permutelist @\@tempa\MT@extra@context @sizes}%
          \MT@tempsize
⟨debug⟩\MT@dinfo@nl{1}{initialising: use list for font \@tempa,\MessageBreak
⟨debug⟩         sizes: \csname MT@\MT@permutelist @\@tempa\MT@extra@context
⟨debug⟩                          @sizes\endcsname}%
      }{%
```

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.

```
        \MT@ifdefined@n@T{MT@\MT@permutelist @\@tempa\MT@extra@context}{%
          \MT@ifstreq{\csname MT@\MT@permutelist @\@tempa\MT@extra@context\endcsname}%
             {\csname MT@\MT@permutelist @\csname MT@\MT@permutelist @name\endcsname @load\endcsname}%
              \relax{%
            \MT@warning{\@nameuse{MT@abbr@\MT@permutelist} list
              `\@nameuse{MT@\MT@permutelist @name}' will\MessageBreak override
              list `\@nameuse{MT@\MT@permutelist @\@tempa\MT@extra@context}'
              for \MessageBreak font `\@tempa'}%
          }%
        }%
⟨debug⟩\MT@dinfo@nl{1}{initialising: use list for font \@tempa
⟨debug⟩                \ifx\MT@extra@context\@empty\else\MessageBreak
⟨debug⟩                  (context: \MT@extra@context)\fi}%
      }%
      \MT@xdef@n{MT@\MT@permutelist @\@tempa\MT@extra@context}%
          {\csname MT@\MT@permutelist @name\endcsname}%
    \fi
  }%
```

```
}
```

\MT@permute@define Define the commands.

```
\def\MT@permute@define#1{%
  \@tempcnta=\csname MT@cnt@#1\endcsname\relax
  \MT@ifdefined@n@TF{MT@temp#1\the\@tempcnta}%
    {\MT@edef@n{MT@temp#1}{\csname MT@temp#1\the\@tempcnta\endcsname}}%
    {\MT@let@nc{MT@temp#1}\@empty}%
}
```

\MT@permute@reset Reset the commands.

```
\def\MT@permute@reset#1{%
  \@tempcnta=\@ne
  \MT@loop
    \MT@let@nc{MT@temp#1\the\@tempcnta}\@undefined
    \advance\@tempcnta\@ne
    \MT@ifdefined@n@TF{MT@temp#1\the\@tempcnta}%
      \iftrue
      \iffalse
  \MT@repeat
}
```

\MT@check@rlist For every new range item in \MT@tempsize, check whether it overlaps with ranges in the existing list.

```
\def\MT@check@rlist#1{\expandafter\MT@check@rlist@ #1}
```

\MT@check@rlist@ Define the current new range and ...

```
\def\MT@check@rlist@#1#2#3{%
  \def\@tempb{#1}%
  \def\@tempc{#2}%
  \MT@if@false
  \MT@exp@cs\MT@map@tlist@c
    {MT@\MT@permutelist @\@tempa\MT@extra@context @sizes}%
    \MT@check@range
}
```

\MT@check@range ... recurse through the list of existing ranges.

```
\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.

```
\def\MT@check@range@#1#2#3{%
  \MT@ifdim{#2}=\m@ne{%
    \MT@ifdim\@tempc=\m@ne{%
```

- Both items are simple sizes.

```
      \MT@ifdim\@tempb={#1}\MT@if@true\relax
    }{%
```

- Item in list is a simple size, new item is a range.

```
      \MT@ifdim\@tempb>{#1}\relax{%
        \MT@ifdim\@tempc>{#1}{%
          \MT@if@true
          \edef\@tempb{#1 (with range: \@tempb\space to \@tempc)}%
        }\relax
      }%
    }%
  }{%
    \MT@ifdim\@tempc=\m@ne{%
```

- Item in list is a range, new item is a simple size.

```
      \MT@ifdim\@tempb<{#2}{%
```

```
        \MT@ifdim\@tempb<{#1}\relax\MT@if@true
      }\relax
    }{%
```

- Both items are ranges.

```
      \MT@ifdim\@tempb<{#2}{%
        \MT@ifdim\@tempc>{#1}{%
          \MT@if@true
          \edef\@tempb{#1 to #2 (with range: \@tempb\space to \@tempc)}%
        }\relax
      }\relax
    }%
  }%
  \ifMT@if@
    \MT@ifstreq{#3}%
        {\csname MT@\MT@permutelist @\csname MT@\MT@permutelist @name\endcsname @load\endcsname}%
        \relax{%
      \MT@warning{\@nameuse{MT@abbr@\MT@permutelist} list
        `\@nameuse{MT@\MT@permutelist @name}' will override\MessageBreak
        list `#3' for font \@tempa,\MessageBreak size \@tempb}%
    }%
```

If we've already found a conflict with this item, we can skip the rest of the list.

```
    \expandafter\MT@tlist@break
  \fi
}
```

1.4 Package options

1.4.1 Declaring the options

`\ifMT@opt@expansion` `\ifMT@opt@auto` `\ifMT@opt@DVI`

Keep track of whether the user explicitly set these options.

```
\newif\ifMT@opt@expansion
\newif\ifMT@opt@auto
\newif\ifMT@opt@DVI
```

`\MT@optwarn@admissible`

Some warnings.

```
\def\MT@optwarn@admissible#1#2{%
  \MT@warning@nl{`#1' is not an admissible value for option\MessageBreak
                 `#2'. Assuming `false'}%
}
```

`\MT@optwarn@nan`

```
⟨/package⟩
⟨*package|letterspace⟩
⟨plain⟩\MT@requires@latex1{
\def\MT@optwarn@nan#1#2{%
  \MT@warning@nl{Value `#1' for option `#2' is not a\MessageBreak number.
                 Using default value of \number\@nameuse{MT@#2@default}}%
}
⟨plain⟩}\relax
⟨/package|letterspace⟩
⟨*package⟩
```

`\MT@opt@def@set`

```
\def\MT@opt@def@set#1{%
  \MT@ifdefined@n@TF{MT@\@tempb @set@@\MT@val}{%
    \MT@xdef@n{MT@\@tempb @setname}{\MT@val}%
  }{%
    \MT@xdef@n{MT@\@tempb @setname}{\@nameuse{MT@default@\@tempb @set}}%
    \MT@warning@nl{The #1 set `\MT@val' is undeclared.\MessageBreak
                   Using set `\@nameuse{MT@\@tempb @setname}' instead}%
```

```
  }%
}
```

`expansion` and `protrusion` may be `true`, `false`, `compatibility`, `nocompatibility` and/or a ⟨*set name*⟩.

```
\MT@map@clist@n{protrusion,expansion}{%
  \define@key{MT}{#1}[true]{%
    \csname MT@opt@#1true\endcsname
    \MT@map@clist@n{##1}{%
      \KV@@sp@def\MT@val{####1}%
      \MT@ifempty\MT@val\relax{%
        \csname MT@#1true\endcsname
        \edef\@tempb{\csname MT@rbba@#1\endcsname}%
        \MT@ifstreq\MT@val{true}\relax
        {%
          \MT@ifstreq\MT@val{false}{%
            \csname MT@#1false\endcsname
          }{%
            \MT@ifstreq\MT@val{compatibility}{%
              \MT@let@nc{MT@\@tempb @level}\@ne
            }{%
              \MT@ifstreq\MT@val{nocompatibility}{%
                \MT@let@nc{MT@\@tempb @level}\tw@
              }{%
```

If everything failed, it should be a set name.

```
                \MT@opt@def@set{#1}%
              }%
            }%
          }%
        }%
      }%
    }%
  }%
}
```

`activate` is a shortcut for `protrusion` and `expansion`.

```
\define@key{MT}{activate}[true]{%
   \setkeys{MT}{protrusion={#1}}%
   \setkeys{MT}{expansion={#1}}%
}
```

`spacing`, `kerning` and `tracking` do not have a compatibility level.

```
\MT@map@clist@n{spacing,kerning,tracking}{%
  \define@key{MT}{#1}[true]{%
    \MT@map@clist@n{##1}{%
      \KV@@sp@def\MT@val{####1}%
      \MT@ifempty\MT@val\relax{%
        \csname MT@#1true\endcsname
        \MT@ifstreq\MT@val{true}\relax
        {%
          \MT@ifstreq\MT@val{false}{%
            \csname MT@#1false\endcsname
          }{%
            \edef\@tempb{\csname MT@rbba@#1\endcsname}%
            \MT@opt@def@set{#1}%
          }%
        }%
      }%
    }%
  }%
}
```

`\MT@def@bool@opt` The `true`/`false` options: `draft` (may be inherited from the class options), `auto`,

`selected`, `babel`, `DVIoutput`, `defersetup`, `copyfonts`.

```
\def\MT@def@bool@opt#1#2{%
  \define@key{MT}{#1}[true]{%
    \def\@tempa{##1}%
    \MT@ifstreq\@tempa{true}\relax{%
      \MT@ifstreq\@tempa{false}\relax{%
        \MT@optwarn@admissible{##1}{#1}%
        \def\@tempa{false}%
      }%
    }%
    #2%
  }%
}
```

Boolean options that only set the switch.

```
\MT@map@clist@n{draft,selected,babel}{%
  \MT@def@bool@opt{#1}{\csname MT@#1\@tempa\endcsname}}
\MT@def@bool@opt{auto}{\csname MT@auto\@tempa\endcsname \MT@opt@autotrue}
```

The `DVIoutput` option will change `\pdfoutput` immediately to minimise the risk of confusing other packages.

```
⟨/package⟩
⟨*pdf-|lua-|xe-⟩
⟨lua-⟩\MT@requires@luatex4{\let\pdfoutput\outputmode}\relax
\MT@def@bool@opt{DVIoutput}{%
  \csname if\@tempa\endcsname
⟨*pdf-|lua-⟩
    \ifnum\pdfoutput>\z@ \MT@opt@DVItrue \fi
    \pdfoutput\z@
  \else
    \ifnum\pdfoutput<\@ne \MT@opt@DVItrue \fi
    \pdfoutput\@ne
⟨/pdf-|lua-⟩
⟨xe-⟩    \MT@warning@nl{Ignoring `DVIoutput' option}%
  \fi
}
⟨/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.

```
⟨*package⟩
\MT@def@bool@opt{defersetup}{%
  \csname if\@tempa\endcsname \else
    \AtEndOfPackage{%
      \MT@setup@
      \let\MT@setup@\@empty
      \let\MT@addto@setup\@firstofone
    }%
  \fi
}
⟨/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.

```
⟨*pdf-|lua-⟩
⟨pdf-⟩\MT@requires@pdftex7{
```

```
  \MT@def@bool@opt{copyfonts}{%
    \csname if\@tempa\endcsname
      \MT@glet\MT@copy@font\MT@copy@font@
    \else
      \MT@glet\MT@copy@font\relax
    \fi
  }
⟨pdf-⟩}{
⟨/pdf-|lua-⟩
⟨*pdf-|xe-⟩
  \MT@def@bool@opt{copyfonts}{%
    \csname if\@tempa\endcsname
      \MT@error
⟨pdf-⟩        {The pdftex version you are using is too old\MessageBreak
⟨pdf-⟩        to use the `copyfonts' option}{Upgrade pdftex.}%
⟨xe-⟩        {The `copyfonts' option does not work with xetex}
⟨xe-⟩        {Use pdftex or luatex instead.}%
    \fi
  }
⟨pdf-⟩}
⟨/pdf-|xe-⟩
```

`final` is the opposite to `draft`. It's only kept for backwards compatibility.

```
⟨*package⟩
\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.

```
\define@key{MT}{disable}[true]{%
  \def\@tempa{#1}%
  \MT@ifstreq\@tempa{true}\MT@disabletrue{%
    \MT@ifstreq\@tempa{ifdraft}{\ifMT@draft\MT@disabletrue\fi}{%
      \MT@ifstreq\@tempa{false}\relax{%
        \MT@optwarn@admissible{#1}{disable}%
      }%
    }%
  }%
}
```

For `verbose` output, we redefine `\MT@vinfo`.

```
\define@key{MT}{verbose}[true]{%
  \let\MT@vinfo\MT@info@nl
  \def\@tempa{#1}%
  \MT@ifstreq\@tempa{true}\relax{%
```

Take problems seriously.

```
    \MT@ifstreq\@tempa{errors}{%
      \let\MT@warning   \MT@warn@err
      \let\MT@warning@nl\MT@warn@err
    }{%
      \let\MT@vinfo\@gobble
```

Cast warnings to the winds.

```
      \MT@ifstreq\@tempa{silent}{%
        \let\MT@warning   \MT@info
        \let\MT@warning@nl\MT@info@nl
      }{%
        \MT@ifstreq\@tempa{false}\relax{\MT@optwarn@admissible{#1}{verbose}}%
      }%
    }%
  }%
}
⟨/package⟩
```

Options with numerical keys: `factor`, `stretch`, `shrink`, `step`, `letterspace`.

```
⟨*package|letterspace⟩
⟨plain⟩\MT@requires@latex1{
\MT@map@clist@n{%
⟨package⟩     stretch,shrink,step,%
    letterspace}{%
  \define@key{MT}{#1}[\csname MT@#1@default\endcsname]{%
    \def\@tempa{##1 }%
```

No nonsense in `\MT@factor` et al.? A space terminates the number.

```
    \MT@ifint\@tempa
      {\MT@edef@n{MT@#1}{\@tempa}}%
      {\MT@optwarn@nan{##1}{#1}}%
  }%
}
⟨plain⟩}\relax
⟨/package|letterspace⟩
```

`factor` will define the protrusion factor only.

```
⟨*package⟩
\define@key{MT}{factor}[\MT@factor@default]{%
  \def\@tempa{#1 }%
  \MT@ifint\@tempa
    {\edef\MT@pr@factor{\@tempa}}
    {\MT@optwarn@nan{#1}{factor}}%
}
```

Unit for protrusion codes.

```
\define@key{MT}{unit}[character]{%
  \def\@tempa{#1}%
  \MT@ifstreq\@tempa{character}\relax{%
    \MT@ifdimen\@tempa
      {\let\MT@pr@unit\@tempa}%
      {\MT@warning@nl{`\@tempa' is not a dimension.\MessageBreak
              Ignoring it and setting values relative to\MessageBreak
              character widths}}%
  }%
}
```

`\MT@patches@list` `\MT@nopatches@list`

The `patch` and `nopatch` options. Remember chosen option for later (`\relax` means 'all', `\@empty` means 'none').

```
\let\MT@patches@list\relax
\let\MT@nopatches@list\@empty

\define@key{MT}{patch}[all]{%
  \def\@tempa{#1}%
  \MT@ifstreq\@tempa{all}
    \relax
    {\MT@ifstreq\@tempa{none}
      {\let\MT@patches@list\@empty}
      {\def\MT@patches@list{#1}}}%
}
\define@key{MT}{nopatch}[all]{%
  \def\@tempa{#1}%
  \MT@ifstreq\@tempa{all}
    {\let\MT@nopatches@list\relax}
    {\MT@ifstreq\@tempa{none}
      \relax
      {\def\MT@nopatches@list{#1}}}%
}
```

We can only apply the patches AtBeginDocument.

```
\MT@addto@setup{%
  \ifx\MT@patches@list\relax
    \let\MT@patches@list\MT@patches@def
  \fi
```

```
  \ifx\MT@nopatches@list\@empty\else
    \ifx\MT@nopatches@list\relax
      \let\MT@nopatches@list\MT@patches@def
    \fi
    \MT@map@clist@c\MT@nopatches@list{%
      \MT@rem@from@clist{#1}\MT@patches@list}%
  \fi
  \ifx\MT@patches@list\@empty\else
^^X    \MT@map@clist@c\MT@patches@list{\MT@apply@patch{#1}}%
^^Q    \MT@warning@nl{Patches require the etex extensions. Ignoring them}%
  \fi
}
```

1.4.2 Loading the definition file

Load the engine-specific code (as strewn across this file).

```
\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 TEX systems have switched to the pdfTEX engine even for DVI output, so that the user might not even be aware of the fact that she's running pdfTEX.)

```
\MT@protrusiontrue
⟨/package⟩
⟨*pdf-|lua-⟩
\ifnum\pdfoutput<\@ne \else
```

Also, we only enable expansion by default if pdfTEX can expand the fonts automatically.

```
⟨pdf-⟩  \MT@requires@pdftex4{
⟨pdf-⟩    \MT@expansiontrue
⟨pdf-⟩    \MT@autotrue
⟨pdf-⟩  }\relax
\fi
⟨lua-⟩\MT@autotrue
⟨/pdf-|lua-⟩
```

\MT@config@file
\MT@get@config

The main configuration file will be loaded before processing the package options. However, the `config` option must of course be evaluated beforehand. We also have to define a no-op for the regular option processing later.

```
⟨*package⟩
\define@key{MT}{config}[]{\relax}
\def\MT@get@config#1config=#2,#3\@nil{%
  \MT@ifempty{#2}%
    {\def\MT@config@file{\MT@MT.cfg}}%
    {\def\MT@config@file{#2.cfg}}%
}
\expandafter\expandafter\expandafter\MT@get@config
  \csname opt@\@currname.\@currext\endcsname,config=,\@nil
```

Load the file.

```
\IfFileExists{\MT@config@file}{%
  \MT@info@nl{Loading configuration file \MT@config@file}%
  \MT@begin@catcodes
    \let\MT@begin@catcodes\relax
    \let\MT@end@catcodes\relax
    \let\MT@curr@file\MT@config@file
```

```
    \input{\MT@config@file}%
  \endgroup
}{\MT@warning@nl{%
    Could not find configuration file `\MT@config@file'!\MessageBreak
    This will almost certainly cause undesired results.\MessageBreak
    Please fix your installation}%
}
```

\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).

```
\def\MT@check@active@set#1{%
  \MT@ifdefined@n@TF{MT@#1@setname}{%
    \MT@info@nl{Using \@nameuse{MT@abbr@#1} set `\@nameuse{MT@#1@setname}'}%
  }{%
    \MT@ifdefined@n@TF{MT@default@#1@set}{%
      \MT@glet@nn{MT@#1@setname}{MT@default@#1@set}%
      \MT@info@nl{Using default \@nameuse{MT@abbr@#1} set `\@nameuse{MT@#1@setname}'}%
    }{%
```

If no default font set has been declared in the main configuration file, we use the (empty, non-existent) set '@', and issue a warning.

```
      \MT@gdef@n{MT@#1@setname}{@}%
      \MT@warning@nl{No \@nameuse{MT@abbr@#1} set chosen, no default set declared.
                     \MessageBreak Using empty set}%
    }%
  }%
}
```

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.

```
\MT@ifdefined@c@T\MicroType@Hook{\MT@error{%
  Command \@backslashchar MicroType@Hook is deprecated.\MessageBreak
  Use \@backslashchar Microtype@Hook instead}
  {You might want to inform the font package authors.}\MicroType@Hook}
\MT@ifdefined@c@T\Microtype@Hook\Microtype@Hook
```

1.4.5 Changing options later

\microtypesetup
\MT@define@optionX

Inside the preamble, `\microtypesetup` accepts the same options as the package (unless `defersetup=false`). In the document body, it accepts the options: `protrusion`, `expansion`, `activate`, `tracking`, `spacing` and `kerning` (but specifying font sets is not allowed), and `patch` and `nopatch`.

```
\def\microtypesetup{\setkeys{MT}}
\MT@addto@setup{\def\microtypesetup#1{\setkeys{MTX}{#1}\selectfont}}
⟨/package⟩
⟨*pdf-|lua-|xe-⟩
\def\MT@define@optionX#1#2{%
  \define@key{MTX}{#1}[true]{%
    \edef\@tempb{\csname MT@rbba@#1\endcsname}%
    \MT@map@clist@n{##1}{%
      \KV@@sp@def\MT@val{####1}%
      \MT@ifempty\MT@val\relax{%
        \@tempcnta=\m@ne
        \MT@ifstreq\MT@val{true}{%
```

Enabling micro-typography in the middle of the document is not allowed if it has been disabled in the package options since fonts might already have been loaded and hence wouldn't be set up.

```
          \MT@checksetup{#1}{%
            \@tempcnta=\csname MT@\@tempb @level\endcsname
            \MT@vinfo{Enabling #1
                    (level \number\csname MT@\@tempb @level\endcsname)\on@line}%
          }%
        }{%
          \MT@ifstreq\MT@val{false}{%
            \@tempcnta=\z@
            \MT@vinfo{Disabling #1\on@line}%
          }{%
            \MT@ifstreq\MT@val{compatibility}{%
              \MT@checksetup{#1}{%
                \@tempcnta=\@ne
                \MT@let@nc{MT@\@tempb @level}\@ne
                \MT@vinfo{Setting #1 to level 1\on@line}%
              }%
            }{%
              \MT@ifstreq\MT@val{nocompatibility}{%
                \MT@checksetup{#1}{%
                  \@tempcnta=\tw@
                  \MT@let@nc{MT@\@tempb @level}\tw@
                  \MT@vinfo{Setting #1 to level 2\on@line}%
                }%
              }{\MT@error{Value `\MT@val' for key `#1' not recognised}
                         {Use any of `true', `false', `compatibility' or
                          `nocompatibility'.}%
              }%
            }%
          }%
        }%
        \ifnum\@tempcnta>\m@ne
          #2\@tempcnta\relax
        \fi
      }%
    }%
  }%
}
```

\MT@checksetup

Test whether the feature wasn't disabled in the package options.

```
\def\MT@checksetup#1{%
  \csname ifMT@#1\endcsname
```

```
    \expandafter\@firstofone
  \else
    \MT@error{You cannot enable #1 if it was disabled\MessageBreak
              in the package options}{Load microtype with #1 enabled.}%
    \expandafter\@gobble
  \fi
}
\MT@define@optionX{protrusion}\MT@protrudechars
⟨/pdf-|lua-|xe-⟩
⟨*pdf-|lua-⟩
\MT@define@optionX{expansion}\MT@adjustspacing
```

\MT@protrudechars

\MT@adjustspacing

```
⟨*lua-⟩
\MT@requires@luatex4{
  \let\pdfprotrudechars\protrudechars
  \let\pdfadjustspacing\adjustspacing
}\relax
⟨/lua-⟩
\let\MT@protrudechars\pdfprotrudechars
\let\MT@adjustspacing\pdfadjustspacing
⟨/pdf-|lua-⟩
⟨*xe-⟩
\let\MT@protrudechars\XeTeXprotrudechars
\define@key{MTX}{expansion}[true]{\MT@warning{Ignoring expansion setup}}
⟨/xe-⟩
```

\MT@define@optionX@

The same for `tracking`, `spacing` and `kerning`, which do not have a `compatibility` level.

```
⟨*pdf-|lua-⟩
⟨pdf-⟩\MT@requires@pdftex6{
⟨lua-⟩\MT@requires@luatex3{
  \def\MT@define@optionX@#1#2{%
    \define@key{MTX}{#1}[true]{%
      \MT@map@clist@n{##1}{%
        \KV@@sp@def\MT@val{####1}%
        \MT@ifempty\MT@val\relax{%
          \@tempcnta=\m@ne
          \MT@ifstreq\MT@val{true}{%
            \MT@checksetup{#1}{%
              \@tempcnta=\@ne
              \MT@vinfo{Enabling #1\on@line}%
            }%
          }{%
            \MT@ifstreq\MT@val{false}{%
              \@tempcnta=\z@
              \MT@vinfo{Disabling #1\on@line}%
            }{\MT@error{Value `\MT@val' for key `#1' not recognised}
                       {Use either `true' or `false'}%
            }%
          }%
          \ifnum\@tempcnta>\m@ne
            #2\relax
          \fi
        }%
      }%
    }%
  }
```

We cannot simply let `\MT@tracking` relax, since this may select the already letter-spaced font instance.

```
  \MT@define@optionX@{tracking}{\ifnum\@tempcnta=\z@ \let\MT@tracking\MT@set@tr@zero
                                \else \let\MT@tracking\MT@tracking@ \fi}
⟨pdf-⟩  \MT@define@optionX@{spacing}{\pdfadjustinterwordglue\@tempcnta}
```

```
⟨pdf-⟩  \MT@define@optionX@{kerning}{\pdfprependkern\@tempcnta
⟨pdf-⟩                              \pdfappendkern\@tempcnta}
}{
⟨/pdf-|lua-⟩
⟨*pdf-|lua-|xe-⟩
```

Disable for older pdfTEX versions and for XETEX and LuaTEX.

```
\define@key{MTX}{tracking}[true]{\MT@warning{Ignoring tracking setup}}
⟨lua-⟩}
\define@key{MTX}{kerning}[true]{\MT@warning{Ignoring kerning setup}}
\define@key{MTX}{spacing}[true]{\MT@warning{Ignoring spacing setup}}
⟨pdf-⟩}
\define@key{MTX}{activate}[true]{%
  \setkeys{MTX}{protrusion={#1}}%
⟨pdf-|lua-⟩  \setkeys{MTX}{expansion={#1}}%
}
⟨/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.

```
⟨*package⟩
\let\MT@saved@setupfont\MT@setupfont
\define@key{MTX}{deactivate}[]{%
  \MT@info{Deactivate `\MT@MT' package}%
  \let\MT@setupfont\relax
}
\define@key{MTX}{reactivate}[]{%
  \MT@info{Reactivate `\MT@MT' package}%
  \let\MT@setupfont\MT@saved@setupfont
}
```

Apply or revert patches.

```
\define@key{MTX}{patch}[all]{%
  \def\@tempa{#1}%
  \MT@ifstreq\@tempa{all}
    {\let\@tempa\MT@patches@def}
    {\MT@ifstreq\@tempa{none}
      {\let\@tempa\@empty}
      \relax}%
  \ifx\@tempa\@empty\else
^^X    \MT@map@clist@c\@tempa{\MT@apply@patch{##1}}%
^^Q    \MT@warning@nl{Patches require the etex extensions. Ignoring them}%
  \fi
}
\define@key{MTX}{nopatch}[all]{%
  \def\@tempa{#1}%
  \MT@ifstreq\@tempa{all}
    {\let\@tempa\MT@patches@def}
    {\MT@ifstreq\@tempa{none}
      {\let\@tempa\@empty}
      \relax}%
  \ifx\@tempa\@empty\else
^^X    \MT@map@clist@c\@tempa{\MT@undo@patch{##1}}%
  \fi
}
⟨/package⟩
```

1.4.6 Processing the options

`\MT@ProcessOptionsWithKV` Parse options.

```
⟨*package|letterspace⟩
⟨plain⟩\MT@requires@latex1{
\def\MT@ProcessOptionsWithKV#1{%
  \let\@tempc\relax
  \let\MT@temp\@empty
⟨plain⟩  \MT@requires@latex2{
    \MT@map@clist@c\@classoptionslist{%
      \def\CurrentOption{##1}%
      \MT@ifdefined@n@T{KV@#1@\expandafter\MT@getkey\CurrentOption=\@nil}{%
        \edef\MT@temp{\MT@temp,\CurrentOption,}%
        \@expandtwoargs\@removeelement\CurrentOption
          \@unusedoptionlist\@unusedoptionlist
      }%
    }%
    \edef\MT@temp{\noexpand\setkeys{#1}%
                  {\MT@temp\@ptionlist{\@currname.\@currext}}}%
```

eplain can handle package options.

```
⟨*plain⟩
  }{\edef\MT@temp{\noexpand\setkeys{#1}%
                  {\csname usepkg@options@\usepkg@pkg\endcsname}}}
⟨/plain⟩
  \MT@temp
  \MT@clear@options
}
```

\MT@getkey For key=val in class options.

```
\def\MT@getkey#1=#2\@nil{#1}

\MT@ProcessOptionsWithKV{MT}
⟨plain⟩}\relax
⟨/package|letterspace⟩
⟨*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).

```
\MT@addto@setup{%
\ifMT@disable
```

We disable most of what we've just defined in the 5475 lines above if we are running in disable (aka. draft) mode.

```
  \MT@warning@nl{The `disable' option is in effect.\MessageBreak
                 Disabling all micro-typographic extensions.\MessageBreak
                 This might lead to different line and page breaks}%
  \let\MT@setupfont\relax
  \renewcommand*\LoadMicrotypeFile[1]{}%
  \renewcommand*\microtypesetup[1]{}%
  \renewcommand*\microtypecontext[1]{}%
  \renewcommand*\lsstyle{}%
\else
  \MT@setup@PDF
  \MT@setup@copies
```

Fix the font sets.

```
  \MT@map@tlist@c\MT@font@sets\MT@fix@font@set
  \MT@setup@protrusion
  \MT@setup@expansion
  \MT@setup@tracking
  \MT@setup@warntracking
  \MT@setup@spacing
  \MT@setup@kerning
  \MT@setup@noligatures
}
⟨/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!

```
⟨*pdf-|lua-⟩
\def\MT@setup@PDF{%
  \MT@info@nl{Generating \ifnum\pdfoutput<\@ne DVI \else PDF \fi output%
              \ifMT@opt@DVI\space (changed by \MT@MT)\fi}%
}
```

\MT@setup@copies Working on font copies?

```
\def\MT@setup@copies{%
  \ifx\MT@copy@font\relax\else \MT@info@nl{Using font copies for contexts}\fi
}
⟨/pdf-|lua-⟩
⟨*xe-⟩
\let\MT@setup@PDF\relax
\let\MT@setup@copies\relax
⟨/xe-⟩
```

\MT@setup@protrusion Protrusion.

```
⟨*pdf-|lua-|xe-⟩
\def\MT@setup@protrusion{%
  \ifMT@protrusion
    \edef\MT@active@features{\MT@active@features,pr}%
    \MT@protrudechars\MT@pr@level
    \MT@info@nl{Character protrusion enabled (level \number\MT@pr@level)%
      \ifnum\MT@pr@factor=\MT@factor@default \else,\MessageBreak
        factor: \number\MT@pr@factor\fi
      \ifx\MT@pr@unit\@empty \else,\MessageBreak unit: \MT@pr@unit\fi}%
    \MT@check@active@set{pr}%
  \else
    \let\MT@protrusion\relax
    \MT@info@nl{No character protrusion}%
  \fi
}
⟨/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.

```
⟨*pdf-|lua-⟩
\def\MT@setup@expansion{%
  \ifnum\pdfoutput<\@ne
    \ifMT@opt@expansion
⟨*lua-⟩
      \ifMT@expansion
        \MT@requires@luatex3{%
          \MT@warning@nl{Font expansion doesn't work properly with luatex in\MessageBreak
             DVI mode: the glyphs won't be actually transformed,\MessageBreak
             but will only be shifted. You might want to use\MessageBreak
             pdflatex instead. I'll continue anyway ..}%
          %\MT@expansionfalse
        }\relax
      \fi
```

```
5540 ⟨/lua-⟩
5541     \else
5542       \MT@expansionfalse
5543     \fi
5544   \fi
5545   \ifMT@expansion
```

Set up the values for font expansion: if `stretch` has not been specified, we take the default value of 20.

```
5546     \ifnum\MT@stretch=\m@ne
5547       \let\MT@stretch\MT@stretch@default
5548     \fi
```

If `shrink` has not been specified, it will inherit the value from `stretch`.

```
5549     \ifnum\MT@shrink=\m@ne
5550       \let\MT@shrink\MT@stretch
5551     \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.

```
5552     \ifnum\MT@step=\m@ne
5553 ⟨pdf-⟩     \MT@requires@pdftex6{%
5554       \def\MT@step{1 }%
5555 ⟨*pdf-⟩
5556     }{%
5557       \ifnum\MT@stretch>\MT@shrink
5558         \ifnum\MT@shrink=\z@
5559           \@tempcnta=\MT@stretch
5560         \else
5561           \@tempcnta=\MT@shrink
5562         \fi
5563       \else
5564         \ifnum\MT@stretch=\z@
5565           \@tempcnta=\MT@shrink
5566         \else
5567           \@tempcnta=\MT@stretch
5568         \fi
5569       \fi
5570       \divide\@tempcnta 5\relax
5571       \ifnum\@tempcnta=\z@ \@tempcnta=\@ne \fi
5572       \edef\MT@step{\number\@tempcnta\space}%
5573     }%
5574 ⟨/pdf-⟩
5575     \fi
5576     \ifnum\MT@step=\z@
5577       \MT@warning@nl{The expansion step cannot be set to zero.\MessageBreak
5578           Setting it to one}%
5579       \def\MT@step{1 }%
5580     \fi
```

`\MT@auto` Automatic expansion of the font? This new feature of pdfTEX 1.20 makes the *fiz* 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.

```
5581     \let\MT@auto\@empty
5582     \ifMT@auto
```

We turn off automatic expansion if output mode is DVI.

```
⟨*pdf-⟩
      \MT@requires@pdftex4{%
        \ifnum\pdfoutput<\@ne
          \ifMT@opt@auto
            \MT@error{%
              Automatic font expansion only works for PDF output.\MessageBreak
              However, you are creating a DVI file}
             {If you have created expanded fonts instances, remove `auto' from%
              \MessageBreak the package options. Otherwise, you have to switch
              off expansion\MessageBreak completely.}%
          \fi
          \MT@autofalse
        \else
          \def\MT@auto{autoexpand}%
        \fi
```

Also, if pdfTEX is too old.

```
      }{%
        \MT@error{%
          The pdftex version you are using is too old for\MessageBreak
          automatic font expansion}%
         {If you have created expanded fonts instances, remove `auto' from\MessageBreak
          the package options. Otherwise, you have to switch off expansion\MessageBreak
          completely, or upgrade pdftex to version 1.20 or newer.}%
        \MT@autofalse
        \def\MT@auto{1000 }%
      }%
⟨/pdf-⟩
⟨lua-⟩      \MT@requires@luatex3\relax{\def\MT@auto{autoexpand}}%
    \else
⟨*pdf-⟩
```

No automatic expansion.

```
      \MT@requires@pdftex4\relax{%
        \def\MT@auto{1000 }%
      }%
⟨/pdf-⟩
⟨*lua-⟩
      \MT@requires@luatex3{%
        \ifMT@opt@auto
          \MT@error{Non-automatic font expansion does not work with\MessageBreak
                    luatex}{Remove `auto=false' from the package options, or use pdftex.}%
          \MT@autotrue
        \fi
      }\relax
⟨/lua-⟩
    \fi
```

Choose the appropriate macro for selected expansion.

```
    \ifMT@selected
      \let\MT@set@ex@codes\MT@set@ex@codes@s
    \else
      \let\MT@set@ex@codes\MT@set@ex@codes@n
    \fi
```

Filter out `stretch=0,shrink=0`, since it would result in a pdfTEX error.

```
    \ifnum\MT@stretch=\z@
      \ifnum\MT@shrink=\z@
        \MT@warning@nl{%
          Both the stretch and shrink limit are set to zero.\MessageBreak
          Disabling font expansion}%
        \MT@expansionfalse
      \fi
    \fi
```

```
  \fi
  \ifMT@expansion
    \edef\MT@active@features{\MT@active@features,ex}%
    \MT@adjustspacing\MT@ex@level
    \MT@info@nl{\ifMT@auto A\else Non-a\fi utomatic font expansion enabled
                (level \number\MT@ex@level),\MessageBreak
                stretch: \number\MT@stretch, shrink: \number\MT@shrink,
                step: \number\MT@step, \ifMT@selected\else non-\fi selected}%
```

\MT@check@step Check whether `stretch` and `shrink` are multiples of `step`.

```
    \def\MT@check@step##1{%
      \@tempcnta=\csname MT@##1\endcsname
      \divide\@tempcnta \MT@step
      \multiply\@tempcnta \MT@step
      \ifnum\@tempcnta=\csname MT@##1\endcsname\else
        \MT@warning@nl{The ##1 amount is not a multiple of step.\MessageBreak
                       The effective maximum ##1 is \the\@tempcnta\space
                       (step \number\MT@step)}%
      \fi
    }%
    \MT@check@step{stretch}%
    \MT@check@step{shrink}%
    \MT@check@active@set{ex}%
```

\showhyphens Inside `\showhyphens`, font expansion should be disabled. (Since 2017/01/10, the LaTeX format contains a different version for XeTeX, but since expansion doesn't work with XeTeX, we don't have to bother.) Since 2019/10/01, the command is robust.

```
    \MT@ifdefined@n@TF{showhyphens }{%
      \def\MT@temp##1##2{%
        \MT@exp@cs\CheckCommand{showhyphens }[1]{##1}%
        \DeclareRobustCommand\showhyphens[1]{##2}}%
    }{%
      \def\MT@temp##1##2{%
        \CheckCommand*\showhyphens[1]{##1}%
        \gdef\showhyphens####1{##2}}%
    }%
    \MT@temp
       {\setbox0\vbox{\color@begingroup
        \everypar{}\parfillskip\z@skip
        \hsize\maxdimen\normalfont\pretolerance\m@ne\tolerance\m@ne
        \hbadness\z@\showboxdepth\z@\ ##1\color@endgroup}}
       {\setbox0\vbox{\color@begingroup\pdfadjustspacing\z@
        \everypar{}\parfillskip\z@skip
        \hsize\maxdimen\normalfont\pretolerance\m@ne\tolerance\m@ne
        \hbadness\z@\showboxdepth\z@\ ##1\color@endgroup}}%
  \else
    \let\MT@expansion\relax
    \MT@info@nl{No font expansion}%
  \fi
}
⟨/pdf-|lua-⟩
⟨*xe-⟩
\def\MT@setup@expansion{%
  \ifMT@expansion
    \ifMT@opt@expansion
      \MT@error{Font expansion does not work with xetex}
               {Use pdftex or luatex instead.}%
    \fi
  \fi
}
⟨/xe-⟩
```

\MT@setup@tracking Tracking, spacing and kerning.

```
⟨*pdf-|lua-⟩
⟨pdf-⟩\MT@requires@pdftex6{%
⟨lua-⟩\MT@requires@luatex3{%
  \def\MT@setup@tracking{%
    \ifMT@tracking
      \MT@info@nl{Tracking enabled}%
      \MT@check@active@set{tr}%
```

Enable protrusion for compensation at the line edges.

```
      \ifMT@protrusion\else\MT@protrudechars\@ne\fi
    \else
      \let\MT@tracking\relax
      \MT@info@nl{No adjustment of tracking}%
    \fi
  }
⟨/pdf-|lua-⟩
```

\MT@setup@spacing

```
⟨*pdf-⟩
  \def\MT@setup@spacing{%
    \ifMT@spacing
      \edef\MT@active@features{\MT@active@features,sp}%
      \pdfadjustinterwordglue\@ne
      \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.

```
      \MT@with@package@T{ragged2e}{%
        \MT@warning@nl{You are using the `ragged2e' package.\MessageBreak
          Adjustment of interword spacing may lead to\MessageBreak
          undesired results when used with `ragged2e'.\MessageBreak
          In this case, disable the `spacing' option}%
      }%
      \MT@check@active@set{sp}%
    \else
      \let\MT@spacing\relax
      \MT@info@nl{No adjustment of interword spacing}%
    \fi
  }
```

\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. [7]

```
  \def\MT@setup@spacing@check{%
    \ifMT@spacing
      \ifMT@babel \else
        \ifnum\sfcode`\. > 1500
          \MT@ifstreq\MT@sp@context{nonfrench}\relax{%
            \MT@warning@nl{%
              \@backslashchar nonfrenchspacing is active. Adjustment of\MessageBreak
              interword spacing will disable it. You might want\MessageBreak
              to add `\@backslashchar microtypecontext{spacing=nonfrench}'\MessageBreak
              to your preamble}%
          }%
        \fi
      \fi
    \fi
  }
```

\MT@setup@kerning

```
  \def\MT@setup@kerning{%
```

7 Cf. the c.t.t. thread '\frenchspacing with AMS packages and babel', started by Philipp Lehman on 16 August 2005, MID: ddtbajrob1@online.de

```
    \ifMT@kerning
      \edef\MT@active@features{\MT@active@features,kn}%
      \pdfprependkern\@ne
      \pdfappendkern\@ne
      \MT@info@nl{Adjustment of character kerning enabled}%
      \MT@check@active@set{kn}%
    \else
      \let\MT@kerning\relax
      \MT@info@nl{No adjustment of character kerning}%
    \fi
  }
⟨/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.

```
⟨pdf-|lua-⟩}{
⟨*lua-⟩
  \def\MT@setup@tracking{%
    \ifMT@tracking
      \MT@error{The tracking feature only works with luatex 0.62\MessageBreak
        or newer. Switching it off}{Upgrade luatex.}%
      \MT@trackingfalse
      \MT@let@nc{MT@tracking}\relax
    \else
      \MT@info@nl{No adjustment of tracking (luatex too old)}%
    \fi
  }
}
⟨/lua-⟩
⟨*pdf-|lua-|xe-⟩
  \def\MT@error@doesnt@work#1{%
    \csname ifMT@#1\endcsname
      \MT@error{The #1 feature only works with pdftex 1.40\MessageBreak
        or newer. Switching it off}
⟨pdf-⟩        {Upgrade pdftex.}%
⟨lua-|xe-⟩        {Use pdftex instead.}%
      \csname MT@#1false\endcsname
      \MT@let@nc{MT@#1}\relax
    \else
      \MT@info@nl{No adjustment of #1%
⟨pdf-⟩      \space(pdftex too old)%
      }%
    \fi
  }
⟨pdf-|xe-⟩  \def\MT@setup@tracking{\MT@error@doesnt@work{tracking}}
  \def\MT@setup@kerning {\MT@error@doesnt@work{kerning}}
  \def\MT@setup@spacing {\MT@error@doesnt@work{spacing}}
⟨pdf-⟩}
⟨/pdf-|lua-|xe-⟩
```

`\MT@setup@warntracking`

```
⟨letterspace⟩\MT@addto@setup
⟨pdf-|lua-⟩\def\MT@setup@warntracking
```

`\MT@warn@tracking@DVI` With pdfTEX, we issue a warning, when letterspacing in DVI mode, since it will probably not work. We also switch on protrusion if it isn't already, to compensate for the letterspacing kerns.

```
⟨*pdf-|lua-|letterspace⟩
{%
⟨*pdf-|letterspace⟩
  \ifnum\pdfoutput<\@ne
    \def\MT@warn@tracking@DVI{%
⟨letterspace⟩      \MT@pdf@or@lua{%
      \MT@warning@nl{%
```

```
          You are using tracking/letterspacing in DVI mode.\MessageBreak
          This will probably not work, unless the post-\MessageBreak
          processing program (dvips, dvipdfm(x), ...) is\MessageBreak
          able to create the virtual fonts on the fly}%
⟨letterspace⟩      }\relax
      \MT@glet\MT@warn@tracking@DVI\relax
    }%
  \else
⟨/pdf-|letterspace⟩
    \def\MT@warn@tracking@DVI{%
      \ifnum\pdfprotrudechars<\@ne \global\pdfprotrudechars\@ne \fi
      \MT@glet\MT@warn@tracking@DVI\relax
    }%
⟨pdf-|letterspace⟩  \fi
  \ifnum\MT@letterspace=\m@ne
    \let\MT@letterspace\MT@letterspace@default
  \else
    \MT@ls@too@large\MT@letterspace
  \fi
}
⟨/pdf-|lua-|letterspace⟩
⟨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.

```
⟨*pdf-|lua-⟩
\def\MT@setup@noligatures{%
⟨pdf-⟩  \MT@requires@pdftex5{%
    \ifMT@noligatures \else
      \let\MT@noligatures\relax
    \fi
⟨pdf-⟩  }\relax
}
⟨/pdf-|lua-⟩
⟨xe-⟩\let\MT@setup@noligatures\relax
```

Remove the leading comma in `\MT@active@features`, and set the document switch to true.

```
⟨*package⟩
\MT@addto@setup{%
  \ifx\MT@active@features\@empty \else
    \edef\MT@active@features{\expandafter\@gobble\MT@active@features}%
  \fi
  \MT@documenttrue
}
```

`\MT@set@babel@context` Interaction with `babel`.

```
\def\MT@set@babel@context#1{%
  \MT@ifdefined@n@TF{MT@babel@#1}{%
    \MT@vinfo{*** Changing to language context `#1'\MessageBreak\on@line}%
    \expandafter\MT@exp@one@n\expandafter\microtypecontext
      \csname MT@babel@#1\endcsname
  }{%
    \microtypecontext{protrusion=,expansion=,spacing=,kerning=}%
  }%
}
```

`\MT@shorthandoff` Active characters can only be switched off if `babel` isn't loaded after `microtype`.

```
\@ifpackageloaded{babel}{
  \def\MT@shorthandoff#1#2{%
    \MT@info@nl{Switching off #1 babel's active characters (#2)}%
    \shorthandoff{#2}}
}{
  \def\MT@shorthandoff#1#2{%
```

```
    \MT@error{You must load `babel' before `\MT@MT'}
             {Otherwise, `\MT@MT' cannot switch off #1 babel's\MessageBreak
              active characters.}}
}
```

We patch babel's language switching commands to enable language-dependent setup.

```
\MT@addto@setup{%
  \ifMT@babel
    \@ifpackageloaded{babel}{%
      \MT@info@nl{Redefining babel's language switching commands}%
      \let\MT@orig@select@language\select@language
      \def\select@language#1{%
        \MT@orig@select@language{#1}%
        \MT@set@babel@context{#1}%
      }%
      \let\MT@orig@foreign@language\foreign@language
      \def\foreign@language#1{%
        \MT@orig@foreign@language{#1}%
        \MT@set@babel@context{#1}%
      }%
      \ifMT@kerning
```

Disable French babel's active characters.

```
        \MT@if@false
        \MT@with@babel@and@T{french}  \MT@if@true
        \MT@with@babel@and@T{frenchb} \MT@if@true
        \MT@with@babel@and@T{francais}\MT@if@true
        \MT@with@babel@and@T{canadien}\MT@if@true
        \MT@with@babel@and@T{acadian} \MT@if@true
        \ifMT@if@\MT@shorthandoff{French}{:;!?}\fi
```

Disable Turkish babel's active characters.

```
        \MT@if@false
        \MT@with@babel@and@T{turkish} \MT@if@true
        \ifMT@if@\MT@shorthandoff{Turkish}{:!=}\fi
      \fi
```

In case babel was loaded before microtype:

```
      \MT@set@babel@context\languagename
```

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...

```
    }{%
      \@ifpackageloaded{polyglossia}{%
        \MT@info@nl{Registering with polyglossia's language switching hook}%
        \gappto\polyglossia@language@switched{%
          \MT@set@babel@context{\languagename}%
        }%
        \MT@set@babel@context\languagename
      }{%
        \MT@warning@nl{%
          You did not load the babel or the polyglossia package.\MessageBreak
          The `babel' option won't have any effect}%
      }%
    }%
  \fi
}
```

Now we close the \fi from \ifMT@disable.

```
\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.

```
  \selectfont}
```

`\MT@curr@file` This is the current file (hopefully with the correct extension).

```
\edef\MT@curr@file{\jobname.tex}
⟨/package⟩
```

Finally, execute the setup macro at the end of the preamble, and empty it (the `combine` class calls it repeatedly).

```
⟨*package|letterspace⟩
⟨plain⟩\MT@requires@latex1{
\AtBeginDocument{\MT@setup@ \MT@glet\MT@setup@\@empty}
⟨plain⟩}\relax
⟨/package|letterspace⟩
```

Must come at the very, very end.

```
⟨package⟩\MT@ifdefined@c@T\MT@setup@spacing@check
⟨package⟩  {\AtBeginDocument{\MT@setup@spacing@check}}
```

Restore catcodes.

```
⟨package|letterspace⟩\MT@restore@catcodes
```

That was that.

2 Configuration files

Let's now write the font configuration files.

```
⟨*config⟩
```

2.1 Font sets

We first declare some sets in the main configuration file.

```
⟨*m-t⟩
%%% ----------------------------------------------------------------------
%%% FONT SETS

\DeclareMicrotypeSet{all}
   { }

\DeclareMicrotypeSet{allmath}
   { encoding = {OT1,T1,T2A,LY1,OT4,QX,T5,EU1,EU2,TU,TS1,OML,OMS,U} }
\DeclareMicrotypeSet{alltext}
   { encoding = {OT1,T1,T2A,LY1,OT4,QX,T5,TS1,EU1,EU2,TU} }

\DeclareMicrotypeSet{allmath-nott}
   { encoding = {OT1,T1,T2A,LY1,OT4,QX,T5,EU1,EU2,TU,TS1,OML,OMS,U},
     family   = {rm*,sf*}
   }
\DeclareMicrotypeSet{alltext-nott}
   { encoding = {OT1,T1,T2A,LY1,OT4,QX,T5,TS1,EU1,EU2,TU},
     family   = {rm*,sf*}
   }

\DeclareMicrotypeSet{basicmath}
   { encoding = {OT1,T1,T2A,LY1,OT4,QX,T5,EU1,EU2,TU,OML,OMS},
     family   = {rm*,sf*},
     series   = {md*},
     size     = {normalsize,footnotesize,small,large}
   }
\DeclareMicrotypeSet{basictext}
   { encoding = {OT1,T1,T2A,LY1,OT4,QX,T5,EU1,EU2,TU},
     family   = {rm*,sf*},
     series   = {md*},
     size     = {normalsize,footnotesize,small,large}
   }

\DeclareMicrotypeSet{smallcaps}
   { encoding = {OT1,T1,T2A,LY1,OT4,QX,T5,TS1,EU1,EU2,TU},
     shape    = {sc*,si,scit}
   }

\DeclareMicrotypeSet{footnotesize}
   { encoding = {OT1,T1,T2A,LY1,OT4,QX,T5,TS1,EU1,EU2,TU},
     size     = {-small}
   }
\DeclareMicrotypeSet{scriptsize}
   { encoding = {OT1,T1,T2A,LY1,OT4,QX,T5,TS1,EU1,EU2,TU},
```

```
    size     = {-footnotesize}
  }

\DeclareMicrotypeSet{normalfont}
  { font = */*/*/*/* }

```

The default sets.

```
%%% ------------------------------------------------------------------------
%%% DEFAULT SETS

\DeclareMicrotypeSetDefault[protrusion]{alltext}
\DeclareMicrotypeSetDefault[expansion] {alltext-nott}
\DeclareMicrotypeSetDefault[spacing]   {alltext-nott}
\DeclareMicrotypeSetDefault[kerning]   {alltext}
\DeclareMicrotypeSetDefault[tracking]  {smallcaps}

```

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.

```
%%% ------------------------------------------------------------------------
%%% FONT VARIANTS AND ALIASES

\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 XeTeX and LuaTeX in the LaTeX format is TU, even if `fontspec` is not loaded.

```

\MT@if@false
\ifx\UnicodeEncodingName\@undefined\else
  \MT@ifstreq{\encodingdefault}{\UnicodeEncodingName}\MT@if@true\relax
\fi
\ifMT@fontspec\MT@if@true\fi
\ifMT@if@
%% -- Computer/Latin Modern Roman
\DeclareMicrotypeAlias{lmr}{Latin Modern Roman}
  \else
\DeclareMicrotypeAlias{lmr}{cmr}           % lmodern
\fi
```

The Latin Modern fonts, the virtual fonts from the `ae` and `zefonts` and the `eco` and `hfoldsty` packages (oldstyle numerals), as well as `mlmodern`, 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.

```
\DeclareMicrotypeAlias{lmsy}{cmsy}         %   "
\DeclareMicrotypeAlias{lmm} {cmm}          %   "
\DeclareMicrotypeAlias{aer} {cmr}          % ae
\DeclareMicrotypeAlias{zer} {cmr}          % zefonts
```

```
\DeclareMicrotypeAlias{cmor}{cmr}          % eco
\DeclareMicrotypeAlias{hfor}{cmr}          % hfoldsty
\DeclareMicrotypeAlias{mlmr}{cmr}          % mlmodern
\DeclareMicrotypeAlias{mlmsy}{cmsy}        %   "
\DeclareMicrotypeAlias{mlmm} {cmm}         %   "
```

Another, new Computer Modern extension. The `newcomputermodern` package loads it by file name.

```
\DeclareMicrotypeAlias{NewCM10-Book.otf}   {New Computer Modern}
\DeclareMicrotypeAlias{NewCM10-Regular.otf}{New Computer Modern}
```

CMU Serif can use the settings from New Computer Modern too.

```
\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`).

```
%% -- Palatino
\DeclareMicrotypeAlias{pxr} {ppl}          % pxfonts
\DeclareMicrotypeAlias{qpl} {ppl}          % TeX Gyre Pagella (formerly: qfonts/QuasiPalatino)
```

The 'FPL Neu' fonts, a 're-implementation' of Palatino.

```
\DeclareMicrotypeAlias{fp9x}{pplx}         % FPL Neu
\DeclareMicrotypeAlias{fp9j}{pplj}         %    "
```

The `newpx` package, a replacement for `pxfonts`.

```
\DeclareMicrotypeAlias{zpllf}{pplx}        % newpxtext
\DeclareMicrotypeAlias{zplosf}{pplj}       %    "
\DeclareMicrotypeAlias{zpltlf}{pplx}       %    "
\DeclareMicrotypeAlias{zpltosf}{pplj}      %    "
```

The `domitian` package.

```
\DeclareMicrotypeAlias{Domitian-TLF} {pplx}% domitian
\DeclareMicrotypeAlias{Domitian-TOsF}{pplj}%    "
```

The OpenType versions:

```
\DeclareMicrotypeAlias{Palatino Linotype}{Palatino}
\DeclareMicrotypeAlias{Palatino LT Std}  {Palatino}
\DeclareMicrotypeAlias{TeX Gyre Pagella} {Palatino}
\DeclareMicrotypeAlias{Domitian}         {Palatino}
\DeclareMicrotypeAlias{Asana Math}       {Palatino}
%% -- Times New Roman
\DeclareMicrotypeAlias{txr}{ptm}           % txfonts
```

The `newtx` package, a replacement for `txfonts`.

```
\DeclareMicrotypeAlias{ntxlf}  {ptmx}      % newtxtext
\DeclareMicrotypeAlias{ntxtlf} {ptmx}      %    "
\DeclareMicrotypeAlias{ntxosf} {ptmj}      %    "
\DeclareMicrotypeAlias{ntxtosf}{ptmj}      %    "
```

The `tempora` package.

```
\DeclareMicrotypeAlias{Tempora-TLF} {ptmx} % tempora
\DeclareMicrotypeAlias{Tempora-TOsF}{ptmj} %    "
\DeclareMicrotypeAlias{qtm}{ptm}           % TeX Gyre Termes (formerly: qfonts/QuasiTimes)
```

The `step` package.

```
\DeclareMicrotypeAlias{STEP-TLF} {ptmx}    % step
\DeclareMicrotypeAlias{STEP-TOsF}{ptmj}    %   "
```

The `stix`, `stix2` and `stickstoo` packages (the latter two have departed a bit from being a Times clone, but still seem close enough).

```
\DeclareMicrotypeAlias{stix} {ptm}         % stix
\DeclareMicrotypeAlias{stix2}{ptm}         % stix2
\DeclareMicrotypeAlias{SticksTooText-LF}  {ptmx}
\DeclareMicrotypeAlias{SticksTooText-TLF} {ptmx}
```

```
\DeclareMicrotypeAlias{SticksTooText-OsF} {ptmj}
\DeclareMicrotypeAlias{SticksTooText-TOsF}{ptmj}
```

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`).

```
%% -- Charter
\DeclareMicrotypeAlias{chr}{bch}          % CH Math
```

The `XCharter` package extends the Charter fonts.

```
\DeclareMicrotypeAlias{XCharter-TLF} {bch} % XCharter
\DeclareMicrotypeAlias{XCharter-TOsF}{bch} %    "
```

The `mathdesign` package provides math fonts matching Bitstream Charter and URW Garamond.

```
\DeclareMicrotypeAlias{mdbch}{bch}        % mathdesign/Charter
%% -- Garamond
\DeclareMicrotypeAlias{mdugm}{ugm}        % mathdesign/URW Garamond
```

The `garamondx` package, an extension of URW Garamond, providing small caps and oldstyle figures.

```
\DeclareMicrotypeAlias{zgmx}{ugm}         % garamondx
\DeclareMicrotypeAlias{zgmj}{ugm}         %    "
\DeclareMicrotypeAlias{zgmI}{ugm}         %    "
\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.

```
\DeclareMicrotypeAlias{pad} {EBGaramond-LF}% Adobe Garamond
\DeclareMicrotypeAlias{padx}{EBGaramond-TLF}%   "
\DeclareMicrotypeAlias{padj}{EBGaramond-TOsF}%  "
%% --
```

URW Letter Gothic is similar enough to Bitstream Letter Gothic to share the configuration.

```
\DeclareMicrotypeAlias{ulg}{blg}          % URW LetterGothic -> Bitstream LetterGothic12Pitch
```

The `eulervm` package virtually extends the Euler fonts.

```
\DeclareMicrotypeAlias{zeur}{eur}         % Euler VM
\DeclareMicrotypeAlias{zeus}{eus}         %    "
```

Euro symbol fonts, to save some files.

```
\DeclareMicrotypeAlias{zpeus}   {zpeu}    % Adobe Euro sans -> serif
\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.

```
\DeclareMicrotypeAlias{Lato}              {TU-basic}
\DeclareMicrotypeAlias{Lato-Regular}      {TU-basic}
\DeclareMicrotypeAlias{Fontin}            {TU-basic}
\DeclareMicrotypeAlias{Fontin-Regular}    {TU-basic}
\DeclareMicrotypeAlias{Bergamo Std}       {TU-basic}
```

The `fontawesome` and `fontawesome5` packages are aliased to empty settings (see 3.1.6 and 3.2.6).

```
\DeclareMicrotypeAlias{FontAwesome}       {TU-empty} % fontawesome
\DeclareMicrotypeAlias{fontawesomefree}   {TU-empty} % fontawesome5
\DeclareMicrotypeAlias{fontawesomepro}    {TU-empty}
\DeclareMicrotypeAlias{fontawesomebrands}{TU-empty}
```

2.3 Interaction with babel

Contexts that are to be set when switching to a language.

```
%%% ------------------------------------------------------------------------
%%% INTERACTION WITH THE `babel' PACKAGE

\DeclareMicrotypeBabelHook
   {english,UKenglish,british,USenglish,american}
   {kerning=, spacing=nonfrench}

\DeclareMicrotypeBabelHook
   {french,francais,acadian,canadien}
   {kerning=french, spacing=}

\DeclareMicrotypeBabelHook
   {turkish}
   {kerning=turkish, spacing=}

```

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 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 XeTeX or 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.

```
⟨/m-t⟩
⟨*m-t|ebg|zpeu|mvs⟩
```

```
%%% ------------------------------------------------------------------------
%%% CHARACTER INHERITANCE

⟨/m-t|ebg|zpeu|mvs⟩
⟨*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.

```
\DeclareCharacterInheritance
   { encoding = OT1 }
   { f = {011}, % ff
     i = {\i},
     j = {\j},
     O = {\O},
     o = {\o}
   }

```

2.5.2 T1

Candidates here: 028 (‘fi’), 029 (‘fl’), 030 (‘ffi’), 031 (‘ffl’), 156 (‘IJ’ ligature, since LaTeX 2005/12/01 accessible as `\IJ`), 188 (‘ij’, `\ij`), Æ, æ, Œ, œ.

```
\DeclareCharacterInheritance
   { encoding = T1 }
   { A = {\`A,\'A,\^A,\~A,\"A,\r A,\k A,\u A},
     a = {\`a,\'a,\^a,\~a,\"a,\r a,\k a,\u a},
     C = {\'C,\c C,\v C},
     c = {\'c,\c c,\v c},
     D = {\v D,\DH},
     d = {\v d,\dj},
     E = {\`E,\'E,\^E,\"E,\k E,\v E},
     e = {\`e,\'e,\^e,\"e,\k e,\v e},
     f = {027}, % ff
     G = {\u G},
     g = {\u g},
     I = {\`I,\'I,\^I,\"I,\.I},
     i = {\`i,\'i,\^i,\"i,\i},
     j = {\j},
     L = {\L,\'L,\v L},
     l = {\l,\'l,\v l},
     N = {\'N,\~N,\v N},
     n = {\'n,\~n,\v n},
     O = {\O,\`O,\'O,\^O,\~O,\"O,\H O},
     o = {\o,\`o,\'o,\^o,\~o,\"o,\H o},
     R = {\'R,\v R},
     r = {\'r,\v r},
     S = {\'S,\c S,\v S,\SS},
     s = {\'s,\c s,\v s},
     T = {\c T,\v T},
     t = {\c t,\v t},
     U = {\`U,\'U,\^U,\"U,\H U,\r U},
     u = {\`u,\'u,\^u,\"u,\H u,\r u},
     Y = {\'Y,\"Y},
     y = {\'y,\"y},
     Z = {\'Z,\.Z,\v Z},
     z = {\'z,\.z,\v z}
```

The ‘soft hyphen’ often has reduced right side bearing so that it may already be protruded, hence no inheritance.

```
%    - = {127},
```

```
6132    }
6133
```

2.5.3 LY1

More characters: 008 (‘fl’), 012 (‘fi’), 014 (‘ffi’), 015 (‘ffl’), Æ, æ, Œ, œ.

```
6134 \DeclareCharacterInheritance
6135    { encoding = LY1 }
6136    { A = {\`A,\'A,\^A,\~A,\"A,\r A},
6137      a = {\`a,\'a,\^a,\~a,\"a,\r a},
6138      C = {\c C},
6139      c = {\c c},
6140      D = {\DH},
6141      E = {\`E,\'E,\^E,\"E},
6142      e = {\`e,\'e,\^e,\"e},
6143      f = {011}, % ff
6144      I = {\`I,\'I,\^I,\"I},
6145      i = {\`i,\'i,\^i,\"i,\i},
6146      L = {\L},
6147      l = {\l},
6148      N = {\~N},
6149      n = {\~n},
6150      O = {\`O,\'O,\^O,\~O,\"O,\O},
6151      o = {\`o,\'o,\^o,\~o,\"o,\o},
6152      S = {\v S},
6153      s = {\v s},
6154      U = {\`U,\'U,\^U,\"U},
6155      u = {\`u,\'u,\^u,\"u},
6156      Y = {\'Y,\"Y},
6157      y = {\'y,\"y},
6158      Z = {\v Z},
6159      z = {\v z}
6160    }
6161
```

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.

```
6162 \DeclareCharacterInheritance
6163    { encoding = OT4 }
6164    { A = {\k A},
6165      a = {\k a},
6166      C = {\'C},
6167      c = {\'c},
6168      E = {\k E},
6169      e = {\k e},
6170      f = {011}, % ff
6171      i = {\i},
6172      j = {\j},
6173      L = {\L},
6174      l = {\l},
6175      N = {\'N},
6176      n = {\'n},
6177      O = {\O,\'O},
6178      o = {\o,\'o},
6179      S = {\'S},
6180      s = {\'s},
6181      Z = {\'Z,\.Z},
6182      z = {\'z,\.z},
6183      \textquotedblleft = "FF
6184    }
6185
```

2.5.5 QX

The Central European QX encoding.[8] Ligatures: 009 (‘fk’), 012 (‘fi’), 013 (‘fl’), 014 (‘ffi’), 015 (‘ffl’), Æ, æ, Œ, œ.

```
\DeclareCharacterInheritance
   { encoding = QX }
   { A = {\`A,\'A,\^A,\~A,\"A,\k A,\AA},
     a = {\`a,\'a,\^a,\~a,\"a,\k a,\aa},
     C = {\'C,\c C},
     c = {\'c,\c c},
     D = {\DH},
     E = {\`E,\'E,\^E,\"E,\k E},
     e = {\`e,\'e,\^e,\"e,\k e},
     f = {011}, % ff
     I = {\`I,\'I,\^I,\"I,\k I},
     i = {\`i,\'i,\^i,\"i,\k i,\i},
     j = {\j},
     L = {\L},
     l = {\l},
     N = {\'N,\~N},
     n = {\'n,\~n},
     O = {\O,\`O,\'O,\^O,\~O,\"O},
     o = {\o,\`o,\'o,\^o,\~o,\"o},
```

The Romanian `\textcommabelow` accents are actually replacements for the `\c` variants, which had previously (and erroneously[9]) been included in QX encoding. They are still kept for backwards compatibility.

```
     S = {\'S,\c S,\textcommabelow S,\v S},
     s = {\'s,\c s,\textcommabelow s,\v s},
     T = {\c T,\textcommabelow T},
     t = {\c t,\textcommabelow t},
     U = {\`U,\'U,\^U,\"U,\k U},
     u = {\`u,\'u,\^u,\"u,\k u},
     Y = {\'Y,\"Y},
     y = {\'y,\"y},
     Z = {\'Z,\.Z,\v Z},
     z = {\'z,\.z,\v z},
     . = \textellipsis
   }
```

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.

```
\DeclareCharacterInheritance
   { encoding = T5 }
   { A = {\`A,\'A,\~A,\h A,\d A,\^A,\u A,
          \`\Acircumflex,\'\Acircumflex,\~\Acircumflex,\h\Acircumflex,\d\Acircumflex,
          \`\Abreve,\'\Abreve,\~\Abreve,\h\Abreve,\d\Abreve},
     a = {\`a,\'a,\~a,\h a,\d a,\^a,\u a,
          \`\acircumflex,\'\acircumflex,\~\acircumflex,\h\acircumflex,\d\acircumflex,
          \`\abreve,\'\abreve,\~\abreve,\h\abreve,\d\abreve},
     D = {\DJ},
     d = {\dj},
     E = {\`E,\'E,\~E,\h E,\d E,\^E,
          \`\Ecircumflex,\'\Ecircumflex,\~\Ecircumflex,\h\Ecircumflex,\d\Ecircumflex},
     e = {\`e,\'e,\~e,\h e,\d e,\^e,
          \`\ecircumflex,\'\ecircumflex,\~\ecircumflex,\h\ecircumflex,\d\ecircumflex},
```

8 Contributed by *Maciej Eder*.
9 Cf. https://tug.org/pipermail/tex-live/2008-August/017204.html

```
    I = {\`I,\'I,\~I,\h I,\d I},
    i = {\`i,\'i,\~i,\h i,\d i,\i},
    O = {\`O,\'O,\~O,\h O,\d O,\^O,\horn O,
         \`\Ocircumflex,\'\Ocircumflex,\~\Ocircumflex,\h\Ocircumflex,\d\Ocircumflex,
         \`\Ohorn,\'\Ohorn,\~\Ohorn,\h\Ohorn,\d\Ohorn},
    o = {\`o,\'o,\~o,\h o,\d o,\^o,\horn o,
         \`\ocircumflex,\'\ocircumflex,\~\ocircumflex,\h\ocircumflex,\d\ocircumflex,
         \`\ohorn,\'\ohorn,\~\ohorn,\h\ohorn,\d\ohorn},
    U = {\`U,\'U,\~U,\h U,\d U,\horn U,
         \`\Uhorn,\'\Uhorn,\~\Uhorn,\h\Uhorn,\d\Uhorn},
    u = {\`u,\'u,\~u,\h u,\d u,\horn u,
         \`\uhorn,\'\uhorn,\~\uhorn,\h\uhorn,\d\uhorn},
    Y = {\`Y,\'Y,\~Y,\h Y,\d Y},
    y = {\`y,\'y,\~y,\h y,\d y}
  }

```

2.5.7 EU1, EU2, TU

The EU1 (XeTeX), 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.

```
\DeclareCharacterInheritance
  { encoding = {TU,EU1,EU2} }
  { A = {\`A,\'A,\^A,\~A,\"A,\r A,\k A,\u A},
    a = {\`a,\'a,\^a,\~a,\"a,\r a,\k a,\u a},
    C = {\'C,\c C,\v C},
    c = {\'c,\c c,\v c},
    D = {\v D,\DH},
    d = {\v d,\dj},
    E = {\`E,\'E,\^E,\"E,\k E,\v E},
    e = {\`e,\'e,\^e,\"e,\k e,\v e},
%     f = {/f_f}, % sometimes /f_f, sometimes /ff
    G = {\u G},
    g = {\u g},
    I = {\`I,\'I,\^I,\"I,\.I},
    i = {\`i,\'i,\^i,\"i,\i},
%     j = {\j},
    L = {\L,\'L,\v L},
    l = {\l,\'l,\v l},
    N = {\'N,\~N,\v N},
    n = {\'n,\~n,\v n},
    O = {\O,\`O,\'O,\^O,\~O,\"O,\H O},
    o = {\o,\`o,\'o,\^o,\~o,\"o,\H o},
    R = {\'R,\v R},
    r = {\'r,\v r},
    S = {\'S,\c S,\v S}, % \SS
    s = {\'s,\c s,\v s},
    T = {\c T,\v T},
    t = {\c t,\v t},
    U = {\`U,\'U,\^U,\"U,\H U,\r U},
    u = {\`u,\'u,\^u,\"u,\H u,\r u},
    Y = {\'Y,\"Y},
    y = {\'y,\"y},
    Z = {\'Z,\.Z,\v Z},
    z = {\'z,\.z,\v z}
  }

⟨/m-t⟩
```

2.5.8 LGR

The Greek LGR encoding. EB Garamond contains some more glyphs.

```
⟨*m-t|ebg⟩
\DeclareCharacterInheritance
  { encoding = LGR,
⟨ebg⟩     family = {EBGaramond-OsF,EBGaramond-TOsF,EBGaramond-LF,EBGaramond-TLF}
  }
  {
⟨m-t⟩     A = {012},
⟨ebg⟩     A = {009,012,253},
⟨ebg⟩  (l)E = {199},
⟨ebg⟩     H = {010},
⟨ebg⟩  (l)H = {159},
     I = {219},
⟨ebg⟩  (l)I = {155},
     O = J,
⟨ebg⟩  (l)O = {151},
     U = {013,223},
     W = {011},
     a = {014,128,129,130,131,132,133,134,135,136,137,138,139,140,141,142,143,
          144,145,146,148,149,150,248},
     e = {224,225,226,227,232,233,234,235},
     h = {152,153,154,156,157,158,160,161,162,163,164,165,166,167,168,169,170,
          171,172,173,174,175,249},
⟨m-t⟩     i = {200,201,202,203,208,209,210,211,216,217,218,240,241,242,243},
⟨ebg⟩     i = {008,200,201,202,203,208,209,210,211,216,217,218,240,241,242,243},
     o = {228,229,230,231,236,237,238,239},
     r = {251,252},
     u = {015,204,205,206,207,212,213,214,215,220,221,222,244,245,246,247},
     w = {176,177,178,179,180,181,182,183,184,185,186,187,188,189,190,191,192,
          193,194,196,197,198,250},
⟨ebg⟩     \textstigma = \textvarstigma,
     . = {059}  % ano teleia
  }

⟨/m-t|ebg⟩
```

2.5.9 Euro symbols

Make Euro symbols settings simpler.

```
⟨*zpeu⟩
\DeclareCharacterInheritance
   { encoding = U,
     family   = {zpeu,zpeus,eurosans} }
   { E = 128 }

⟨/zpeu⟩
⟨*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.

```
\DeclareCharacterInheritance
   { encoding = {OT1,U},
     family   = mvs }
   { 164 = {099,100,101} } % \EURhv,\EURcr,\EURtm

⟨/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.

```
⟨*m-t⟩
%%% ----------------------------------------------------------------------
%%% TRACKING/LETTERSPACING

\SetTracking
  [ name         = default,
    no ligatures = {f} ]
  { encoding     = {OT1,T1,T2A,LY1,OT4,QX,EU2,TU} }
  { }

```

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).

```
%%% ----------------------------------------------------------------------
%%% EXPANSION

\SetExpansion
   [ name     = default      ]
   { encoding = {OT1,OT4,QX,T1,LY1} }
   {
     A = 500,     a = 700,
   \AE = 500,   \ae = 700,
     B = 700,     b = 700,
     C = 700,     c = 700,
     D = 500,     d = 700,
     E = 700,     e = 700,
     F = 700,
     G = 500,     g = 700,
     H = 700,     h = 700,
     K = 700,     k = 700,
     M = 700,     m = 700,
     N = 700,     n = 700,
     O = 500,     o = 700,
   \OE = 500,   \oe = 700,
     P = 700,     p = 700,
     Q = 500,     q = 700,
     R = 700,
     S = 700,     s = 700,
     U = 700,     u = 700,
     W = 700,     w = 700,
     Z = 700,     z = 700,
     2 = 700,
     3 = 700,
     6 = 700,
     8 = 700,
     9 = 700
   }

```

Settings for Cyrillic T2A encoding.[10]

```
\SetExpansion
   [ name     = T2A ]
   { encoding = T2A }
   {
     A = 500,     a = 700,
```

10 Contributed by *Karl Karlsson*.

```
6383      B = 700,      b = 700,
6384      C = 700,      c = 700,
6385      D = 500,      d = 700,
6386      E = 700,      e = 700,
6387      F = 700,
6388      G = 500,      g = 700,
6389      H = 700,      h = 700,
6390      K = 700,      k = 700,
6391      M = 700,      m = 700,
6392      N = 700,      n = 700,
6393      O = 500,      o = 700,
6394      P = 700,      p = 700,
6395      Q = 500,      q = 700,
6396      R = 700,
6397      S = 700,      s = 700,
6398      U = 700,      u = 700,
6399      W = 700,      w = 700,
6400      Z = 700,      z = 700,
6401      2 = 700,
6402      3 = 700,
6403      6 = 700,
6404      8 = 700,
6405      9 = 700,
6406      \CYRA = 500,      \cyra = 700,
6407      \CYRB = 700,      \cyrb = 700,
6408      \CYRV = 700,      \cyrv = 700,
6409      \CYRG = 700,      \cyrg = 700,
6410      \CYRD = 700,      \cyrd = 700,
6411      \CYRE = 700,      \cyre = 700,
6412      \CYRZH = 700,     \cyrzh = 700,
6413      \CYRZ = 700,      \cyrz = 700,
6414      \CYRI = 700,      \cyri = 700,
6415      \CYRISHRT = 700, \cyrishrt = 700,
6416      \CYRK = 700,      \cyrk = 700,
6417      \CYRL = 700,      \cyrl = 700,
6418      \CYRM = 700,      \cyrm = 700,
6419      \CYRN = 700,      \cyrn = 700,
6420      \CYRO = 500,      \cyro = 700,
6421      \CYRP = 700,      \cyrp = 700,
6422      \CYRR = 700,      \cyrr = 700,
6423      \CYRS = 700,      \cyrs = 700,
6424      \CYRT = 700,      \cyrt = 700,
6425      \CYRU = 700,      \cyru = 700,
6426      \CYRF = 700,      \cyrf = 700,
6427      \CYRH = 700,      \cyrh = 700,
6428      \CYRC = 700,      \cyrc = 700,
6429      \CYRCH = 700,     \cyrch = 700,
6430      \CYRSH = 700,     \cyrsh = 700,
6431      \CYRSHCH = 700,   \cyrshch = 700,
6432      \CYRHRDSN = 700, \cyrhrdsn = 700,
6433      \CYRERY = 700,    \cyrery = 700,
6434      \CYRSFTSN = 700, \cyrsftsn = 700,
6435      \CYREREV = 700,   \cyrerev = 700,
6436      \CYRYU = 700,     \cyryu = 700,
6437      \CYRYA = 700,     \cyrya = 700
6438    }
6439
```

T5 encoding does not contain \AE, \ae, \OE and \oe.

```
6440 \SetExpansion
6441    [ name     = T5 ]
6442    { encoding = T5 }
6443    {
6444      A = 500,      a = 700,
6445      B = 700,      b = 700,
```

```
6446      C = 700,      c = 700,
6447      D = 500,      d = 700,
6448      E = 700,      e = 700,
6449      F = 700,
6450      G = 500,      g = 700,
6451      H = 700,      h = 700,
6452      K = 700,      k = 700,
6453      M = 700,      m = 700,
6454      N = 700,      n = 700,
6455      O = 500,      o = 700,
6456      P = 700,      p = 700,
6457      Q = 500,      q = 700,
6458      R = 700,
6459      S = 700,      s = 700,
6460      U = 700,      u = 700,
6461      W = 700,      w = 700,
6462      Z = 700,      z = 700,
6463      2 = 700,
6464      3 = 700,
6465      6 = 700,
6466      8 = 700,
6467      9 = 700
6468    }
6469
6470 ⟨/m-t⟩
```

2.8 Character protrusion

```
6471 %%% ------------------------------------------------------------------------
6472 %%% PROTRUSION
6473
```

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.

```
⟨*cfg-t⟩
\SetProtrusion
⟨m-t⟩   [ name     = default ]
```

We also create configuration files for the fonts

- Bitstream Charter (NFSS code bch)

```
⟨bch⟩   [ name     = bch-default ]
```

- Bitstream Letter Gothic (blg)

```
⟨blg⟩   [ name     = blg-default ]
```

- Computer Modern Roman (cmr)

```
⟨cmr⟩   [ name     = cmr-default ]
```

- EB Garamond

```
⟨ebg⟩   [ name     = EBGaramond-default ]
```

- Minion[11] (pmnx, pmnj)

```
⟨pmn⟩   [ name     = pmnj-default ]
```

- Palatino (ppl, pplx, pplj)

```
⟨ppl⟩   [ name     = ppl-default ]
```

- Times (ptm, ptmx, ptmj)

```
⟨ptm⟩   [ name     = ptm-default ]
```

- URW Garamond (ugm)

```
⟨ugm⟩   [ name     = ugm-default ]
⟨m-t|cmr|pmn|ebg⟩   { }
⟨bch|blg|ugm⟩   { encoding = OT1,
⟨ppl|ptm⟩   { encoding = {OT1,OT4},
⟨bch⟩     family   = bch }
⟨blg⟩     family   = blg }
⟨ppl⟩     family   = {ppl,pplx,pplj} }
⟨ptm⟩     family   = {ptm,ptmx,ptmj} }
⟨ugm⟩     family   = ugm }
   {
⟨m-t|bch|blg|cmr|ebg|pmn|ppl|ptm⟩     A = {50,50},
⟨ugm⟩     A = {50,100},
⟨ebg|ptm⟩   \AE = {50,  },
⟨ugm⟩   \AE = {150,50},
⟨ugm⟩     B = {  ,50},
⟨bch|ebg|pmn|ugm⟩     C = {50,  },
⟨bch|ebg|pmn⟩     D = {  ,50},
⟨ugm⟩     D = {  ,70},
⟨ugm⟩     E = {  ,50},
⟨m-t|bch|cmr|ebg|pmn|ptm⟩     F = {  ,50},
⟨ugm⟩     F = {  ,70},
⟨bch|ebg|pmn⟩     G = {50,  },
⟨ugm⟩     G = {50,50},
⟨blg⟩     I = {150,150},
⟨m-t|cmr|ebg|pmn|ppl|ptm|ugm⟩     J = {50,  },
⟨bch|blg⟩     J = {100,  },
```

11 Contributed by *Harald Harders* and *Karl Karlsson*.

```
6510 ⟨!blg⟩      K = {  ,50},
6511 ⟨blg⟩      K = {50,  },
6512 ⟨m-t|bch|cmr|ebg|pmn|ppl⟩      L = {  ,50},
6513 ⟨blg⟩      L = {  ,150},
6514 ⟨ptm⟩      L = {  ,80},
6515 ⟨ugm⟩      L = {  ,120},
6516 ⟨bch|ebg|pmn|ugm⟩      O = {50,50},
6517 ⟨ebg⟩    \OE = {50,  },
6518 ⟨ugm⟩    \OE = {50,50},
6519 ⟨blg⟩      P = {  ,100},
6520 ⟨ugm⟩      P = {  ,50},
6521 ⟨bch|ebg|pmn⟩      Q = {50,70},
6522 ⟨ugm⟩      Q = {50,50},
6523 ⟨bch⟩      R = {  ,50},
6524 ⟨ugm|ebg⟩      R = {  ,70},
6525 ⟨m-t|bch|cmr|pmn|ppl|ptm⟩      T = {50,50},
6526 ⟨blg⟩      T = {100,100},
6527 ⟨ebg|ugm⟩      T = {70,70},
6528 ⟨m-t|bch|cmr|ebg|pmn|ppl|ptm⟩      V = {50,50},
6529 ⟨blg|ugm⟩      V = {70,70},
6530 ⟨m-t|bch|cmr|ebg|pmn|ppl|ptm⟩      W = {50,50},
6531 ⟨ugm⟩      W = {70,70},
6532 ⟨m-t|bch|cmr|ebg|pmn|ppl|ptm⟩      X = {50,50},
6533 ⟨ugm⟩      X = {50,70},
6534 ⟨m-t|bch|cmr|ebg|pmn|ppl⟩      Y = {50,50},
6535 ⟨blg|ptm|ugm⟩      Y = {80,80},
6536 ⟨ugm⟩      Z = {50,50},
6537 ⟨blg⟩      f = {150,100},
6538 ⟨blg⟩      i = {150,150},
6539 ⟨blg⟩      j = {100,100},
6540 ⟨m-t|bch|cmr|ebg|pmn|ppl|ptm⟩      k = {  ,50},
6541 ⟨ugm⟩      k = {  ,70},
6542 ⟨blg⟩      l = {150,150},
6543 ⟨pmn⟩      l = {  ,-50},
6544 ⟨ppl⟩      p = {50,50},
6545 ⟨ebg|ugm⟩      p = {  ,50},
6546 ⟨ebg|ppl⟩      q = {50,  },
6547 ⟨!blg⟩      r = {  ,50},
6548 ⟨blg⟩      r = {100, 80},
6549 ⟨cmr|ebg|pmn⟩      t = {  ,70},
6550 ⟨bch⟩      t = {  ,50},
6551 ⟨blg⟩      t = {150, 80},
6552 ⟨ugm⟩      t = {  ,100},
6553 ⟨m-t|bch|cmr|ebg|pmn|ppl|ptm⟩      v = {50,50},
6554 ⟨blg⟩      v = {100,100},
6555 ⟨ugm⟩      v = {50,70},
6556 ⟨m-t|bch|cmr|ebg|pmn|ppl|ptm⟩      w = {50,50},
6557 ⟨ugm⟩      w = {50,70},
6558 ⟨!blg⟩      x = {50,50},
6559 ⟨blg⟩      x = {100,100},
6560 ⟨m-t|bch|ebg|pmn⟩      y = {  ,50},
6561 ⟨blg⟩      y = { 50,100},
6562 ⟨cmr|ppl|ptm⟩      y = {50,70},
6563 ⟨ugm⟩      y = {  ,70},

6564 ⟨cmr⟩      0 = {  ,50},
6565 ⟨m-t⟩      1 = {50,50},
6566 ⟨bch|blg|ptm|ugm⟩      1 = {150,150},
6567 ⟨cmr⟩      1 = {100,200},
6568 ⟨pmn⟩      1 = {  ,50},
6569 ⟨ppl⟩      1 = {100,100},
6570 ⟨bch|cmr|ugm⟩      2 = {50,50},
6571 ⟨blg⟩      2 = {  ,100},
6572 ⟨bch|pmn⟩      3 = {50,  },
6573 ⟨cmr|ugm⟩      3 = {50,50},
6574 ⟨blg⟩      3 = {100,  },
```

```
6575 ⟨m-t⟩      4 = {50,50},
6576 ⟨bch⟩      4 = {100,50},
6577 ⟨blg⟩      4 = {100,  },
6578 ⟨cmr|ugm⟩      4 = {70,70},
6579 ⟨pmn⟩      4 = {50,  },
6580 ⟨ptm⟩      4 = {70,  },
6581 ⟨cmr⟩      5 = {  ,50},
6582 ⟨bch⟩      6 = {50,  },
6583 ⟨cmr⟩      6 = {  ,50},
6584 ⟨m-t⟩      7 = {50,50},
6585 ⟨bch|pmn|ugm⟩      7 = {50,80},
6586 ⟨blg⟩      7 = {100,100},
6587 ⟨cmr|ptm⟩      7 = {50,100},
6588 ⟨ppl⟩      7 = {  ,50},
6589 ⟨cmr⟩      8 = {  ,50},
6590 ⟨bch⟩      9 = {50,50},
6591 ⟨cmr⟩      9 = {  ,50},
6592 ⟨m-t|cmr|pmn|ppl|ptm|ugm⟩      . = { ,700},
6593 ⟨bch|ebg⟩      . = { ,600},
6594 ⟨blg⟩      . = {400,500},
6595 ⟨!blg⟩     {,}= { ,500},
6596 ⟨blg⟩     {,}= {300,400},
6597 ⟨m-t|cmr|pmn|ppl|ptm|ugm⟩      : = { ,500},
6598 ⟨bch|ebg⟩      : = { ,400},
6599 ⟨blg⟩      : = {300,400},
6600 ⟨m-t|bch|ebg|pmn|ptm⟩      ; = { ,300},
6601 ⟨blg⟩      ; = {200,300},
6602 ⟨cmr|ppl⟩      ; = { ,500},
6603 ⟨ugm⟩      ; = { ,400},
6604 ⟨!blg⟩      ! = { ,100},
6605 ⟨blg⟩      ! = {200,200},
6606 ⟨m-t|ebg|pmn|ptm⟩      ? = { ,100},
6607 ⟨bch|cmr|ppl|ugm⟩      ? = { ,200},
6608 ⟨blg⟩      ? = {150,150},
6609 ⟨pmn⟩      " = {300,300},
6610 ⟨m-t|bch|cmr|ebg|pmn|ppl⟩      @ = {50,50},
6611 ⟨ptm⟩      @ = {100,100},
6612 ⟨m-t|bch|blg|cmr|ebg|pmn|ppl|ptm⟩      ~ = {200,250},
6613 ⟨ugm⟩      ~ = {300,350},
6614 ⟨ebg|ppl|ptm⟩      & = {50,100},
6615 ⟨ugm⟩      & = {  ,100},
6616 ⟨m-t|cmr|ebg|pmn⟩     \% = {50,50},
6617 ⟨bch⟩     \% = {  ,50},
6618 ⟨ppl|ptm⟩     \% = {100,100},
6619 ⟨ugm⟩     \% = {50,100},
6620 ⟨blg⟩     \# = {100,100},
6621 ⟨m-t|ppl|ptm|ugm⟩      * = {200,200},
6622 ⟨bch|pmn⟩      * = {200,300},
6623 ⟨blg⟩      * = {150,200},
6624 ⟨cmr|ebg⟩      * = {300,300},
6625 ⟨m-t|cmr|ebg|ppl|ptm⟩      + = {250,250},
6626 ⟨bch⟩      + = {150,250},
6627 ⟨blg|pmn⟩      + = {150,200},
6628 ⟨ugm⟩      + = {250,300},
6629 ⟨blg|ugm⟩     {=}= {200,200},
6630 ⟨m-t|ebg|pmn|ptm⟩      ( = {100,   },    ) = {   ,200},
6631 ⟨bch|ugm⟩      ( = {200,   },    ) = {   ,200},
6632 ⟨cmr|blg⟩      ( = {300,   },    ) = {   ,300},
6633 ⟨ppl⟩      ( = {100,   },    ) = {   ,300},
6634 ⟨bch|pmn⟩      [ = {100,   },    ] = {   ,100},
6635 ⟨blg⟩      [ = {300,100},    ] = {   ,300},

6636 ⟨m-t|ebg|pmn|ptm⟩      / = {100,200},
6637 ⟨bch⟩      / = { ,200},
6638 ⟨blg⟩      / = {300,300},
6639 ⟨cmr|ppl⟩      / = {200,300},
```

```
⟨ugm⟩     / = {100,300},
⟨m-t|ptm⟩     - = {500,500},
⟨bch|cmr|ppl⟩     - = {400,500},
⟨blg⟩     - = {300,400},
⟨ebg⟩     - = {300,500},
⟨pmn⟩     - = {200,400},
⟨ugm⟩     - = {500,600},
⟨blg⟩     < = {200,100},    > = {100,200},
⟨blg⟩     _ = {150,250},
⟨blg⟩     | = {250,250},
⟨m-t|pmn⟩     \textendash       = {200,200},   \textemdash        = {150,150},
⟨bch⟩     \textendash       = {200,300},   \textemdash        = {150,250},
⟨cmr⟩     \textendash       = {400,300},   \textemdash        = {300,200},
⟨ebg|ppl|ptm⟩     \textendash       = {300,300},   \textemdash        = {200,200},
⟨ugm⟩     \textendash       = {250,300},   \textemdash        = {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).

```
⟨m-t|bch|pmn⟩     \textquoteleft    = {300,400},   \textquoteright    = {300,400},
⟨blg⟩     \textquoteleft     = {400,600},   \textquoteright    = {400,600},
⟨cmr⟩     \textquoteleft    = {500,700},   \textquoteright    = {500,600},
⟨ebg⟩     \textquoteleft    = {300,500},   \textquoteright    = {400,400},
⟨ppl⟩     \textquoteleft    = {500,700},   \textquoteright    = {500,700},
⟨ptm⟩     \textquoteleft    = {500,500},   \textquoteright    = {300,500},
⟨ugm⟩     \textquoteleft    = {300,600},   \textquoteright    = {300,600},
⟨m-t|ebg|bch|pmn⟩     \textquotedblleft = {300,300},   \textquotedblright = {300,300}
⟨blg⟩     \textquotedblright = {300,400}
⟨cmr⟩     \textquotedblleft = {500,300},   \textquotedblright = {200,600}
⟨ppl|ptm⟩     \textquotedblleft = {300,400},   \textquotedblright = {300,400}
⟨ugm⟩     \textquotedblleft = {400,400},   \textquotedblright = {400,400}
   }

```

Greek uppercase letters are in OT1 encoding only.

```
⟨*m-t|cmr|ebg|pmn⟩
\SetProtrusion
⟨m-t⟩   [ name     = OT1-default,
⟨cmr⟩   [ name     = cmr-OT1,
⟨ebg⟩   [ name     = EBGaramond-OT1,
⟨pmn⟩   [ name     = pmnj-OT1,
⟨m-t⟩     load     = default ]
⟨cmr⟩     load     = cmr-default ]
⟨ebg⟩     load     = EBGaramond-default ]
⟨pmn⟩     load     = pmnj-default ]
⟨m-t⟩   { encoding = OT1 }
⟨cmr⟩   { encoding = {OT1,OT4},
⟨pmn⟩   { encoding = OT1,
⟨cmr⟩     family   = cmr  }
⟨pmn⟩     family   = pmnj }
⟨ebg⟩   { }
   {
⟨m-t|cmr⟩     \AE = {50,   },
⟨pmn⟩     \OE = {50,  }
⟨*cmr|ebg⟩
     "00 = {   ,150}, % \Gamma
     "01 = {100,100}, % \Delta
     "02 = { 50, 50}, % \Theta
     "03 = {100,100}, % \Lambda
⟨ebg⟩     "04 = { 50, 50}, % \Xi
⟨cmr⟩     "06 = { 50, 50}, % \Sigma
     "07 = {100,100}, % \Upsilon
     "08 = { 50, 50}, % \Phi
     "09 = { 50, 50}, % \Psi
⟨ebg⟩     "0A = { 50, 50}, % \Omega
⟨ebg⟩     138 = {   , 50}, % \L
```

Remaining slots can be found in the source file.

```
⟨/cmr|ebg⟩
   }
```

Settings for figure variants.

```
⟨*ebg⟩
\SetProtrusion
   [ name     = EBGaramond-OT1-LF,
     load     = EBGaramond-OT1 ]
   { encoding = OT1,
     family   = {EBGaramond-LF,EBGaramond-TLF,EBGaramond-OsF} }
   {
     1 = {50,50},
     2 = {50,50},
     4 = {50,50},
     7 = {50,50},
   }

\SetProtrusion
   [ name     = EBGaramond-OT1-TOsF,
     load     = EBGaramond-OT1 ]
   { encoding = OT1,
     family   = {EBGaramond-TOsF} }
   {
     1 = {150,150},
     2 = {50,50},
     3 = {50,50},
     4 = {50,50},
     5 = {50,50},
     6 = {50,50},
     7 = {50,80},
     8 = {50,50},
     9 = {50,50},
   }

⟨/ebg⟩
⟨/m-t|cmr|ebg|pmn⟩
```

T1 and LY1 encodings contain some more characters. The default list will be loaded first. For XeTeX (EU1) and LuaTeX (EU2) we simply use the T1 list as default (for now).

```
\SetProtrusion
⟨m-t⟩   [ name     = T1-default,
⟨bch⟩   [ name     = bch-T1,
⟨blg⟩   [ name     = blg-T1,
⟨cmr⟩   [ name     = cmr-T1,
⟨ebg⟩   [ name     = EBGaramond-T1,
⟨pmn⟩   [ name     = pmnj-T1,
⟨ppl⟩   [ name     = ppl-T1,
⟨ptm⟩   [ name     = ptm-T1,
⟨ugm⟩   [ name     = ugm-T1,
⟨m-t⟩     load     = default     ]
⟨bch⟩     load     = bch-default ]
⟨blg⟩     load     = blg-default ]
⟨cmr⟩     load     = cmr-default ]
⟨ebg⟩     load     = EBGaramond-default ]
⟨pmn⟩     load     = pmnj-default ]
⟨ppl⟩     load     = ppl-default ]
⟨ptm⟩     load     = ptm-default ]
⟨ugm⟩     load     = ugm-default ]
⟨m-t⟩   { encoding = {T1,LY1,EU1,EU2,TU} }
⟨bch|cmr|pmn|ppl⟩   { encoding = {T1,LY1},
⟨blg|ptm|ugm⟩   { encoding = {T1},
```

```
⟨ebg⟩   { encoding = {LY1},
⟨bch⟩     family   = bch }
⟨blg⟩     family   = blg }
⟨cmr⟩     family   = cmr }
⟨ebg⟩     family   = {EBGaramond-LF,EBGaramond-TLF,EBGaramond-OsF,EBGaramond-TOsF} }
⟨pmn⟩     family   = pmnj }
⟨ppl⟩     family   = {ppl,pplx,pplj} }
⟨ptm⟩     family   = {ptm,ptmx,ptmj} }
⟨ugm⟩     family   = ugm }
    {
⟨m-t|cmr⟩     \AE = {50,  },
⟨bch|pmn⟩     \OE = {50,  },
⟨pmn⟩     \TH = {  ,50},
⟨blg⟩     \v L = {   ,250},
⟨blg⟩     \v d = {   ,250},
⟨blg⟩     \v l = {   ,250},
⟨blg⟩     \v t = {   ,250},
⟨blg⟩     127 =  {300,400},
⟨blg⟩     156 =  {100,   }, % IJ
⟨blg⟩     188 =  { 80, 80}, % ij
⟨m-t|bch|ebg|pmn|ppl|ptm⟩       _ = {100,100},
⟨cmr⟩       _ = {200,200},
⟨ugm⟩       _ = {100,200},
⟨m-t|ebg|pmn|ptm⟩     \textbackslash    = {100,200},
⟨bch⟩     \textbackslash    = {150,200},
⟨blg⟩     \textbackslash    = {250,300},
⟨cmr|ppl⟩     \textbackslash    = {200,300},
⟨ugm⟩     \textbackslash    = {100,300},
⟨ugm⟩     \textbar          = {200,200},
⟨blg⟩     \textendash       = {300,300},   \textemdash        = {150,150},
⟨blg⟩     \textquotedbl     = {300,400},   \textquotedblleft  = {300,400},
⟨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.

```
⟨m-t|cmr|ebg|ppl|ptm|ugm⟩     \quotesinglbase   = {400,400},   \quotedblbase      = {400,400},
⟨blg⟩     \quotesinglbase   = {400,400},   \quotedblbase      = {300,400},
⟨bch|pmn⟩     \quotesinglbase   = {400,400},   \quotedblbase      = {300,300},
⟨m-t|bch|pmn⟩     \guilsinglleft    = {400,300},   \guilsinglright    = {300,400},
⟨blg⟩     \guilsinglleft    = {300,500},   \guilsinglright    = {300,500},
⟨cmr|ebg|ppl|ptm⟩     \guilsinglleft    = {400,400},   \guilsinglright    = {300,500},
⟨ugm⟩     \guilsinglleft    = {400,400},   \guilsinglright    = {300,600},
⟨m-t⟩     \guillemotleft    = {200,200},   \guillemotright    = {200,200},
⟨cmr⟩     \guillemotleft    = {300,200},   \guillemotright    = {100,400},
⟨bch|pmn⟩     \guillemotleft    = {200,200},   \guillemotright    = {150,300},
⟨blg|ppl|ptm⟩     \guillemotleft    = {300,300},   \guillemotright    = {200,400},
⟨ebg⟩     \guillemotleft    = {300,300},   \guillemotright    = {200,300},
⟨ugm⟩     \guillemotleft    = {300,400},   \guillemotright    = {300,400},
⟨m-t|bch|cmr|ebg|pmn|ppl|ugm⟩     \textexclamdown   = {100,   },   \textquestiondown  = {100,   },
⟨blg⟩     \textexclamdown   = {200,   },   \textquestiondown  = {100,   },
⟨ptm⟩     \textexclamdown   = {200,   },   \textquestiondown  = {200,   },
⟨m-t|cmr|ebg|ppl|ptm|ugm⟩     \textbraceleft    = {400,200},   \textbraceright    = {200,400},
⟨bch|blg|pmn⟩     \textbraceleft    = {200,   },   \textbraceright    = {   ,300},
⟨m-t|bch|cmr|ebg|ppl|ptm|ugm⟩     \textless         = {200,100},   \textgreater       = {100,200}
⟨pmn⟩     \textless         = {100,   },   \textgreater       = {   ,100},
⟨pmn⟩     \textvisiblespace = {100,100} % not in LY1

    }

```

The `lmodern` fonts used to restore the original settings from OT1 fonts. Now, they require even other settings, though.

```
⟨*cmr⟩
\SetProtrusion
   [ name     = lmr-T1,
```

```
      load     = cmr-T1   ]
   { encoding = {T1,LY1},
     family   = lmr      }
   {
     \textquotedblleft  = {300,400},  \textquotedblright = {300,400}
   }

⟨/cmr⟩
⟨*ebg⟩
\SetProtrusion
   [ name     = EBGaramond-T1-LF,
     load     = EBGaramond-T1 ]
   { encoding = T1,
     family   = {EBGaramond-LF,EBGaramond-TLF,EBGaramond-OsF} }
   {
     1 = {50,50},
     2 = {50,50},
     4 = {50,50},
     7 = {50,50},
   }

\SetProtrusion
   [ name     = EBGaramond-T1-TOsF,
     load     = EBGaramond-T1 ]
   { encoding = T1,
     family   = {EBGaramond-TOsF} }
   {
     1 = {150,150},
     2 = {50,50},
     3 = {50,50},
     4 = {50,50},
     5 = {50,50},
     6 = {50,50},
     7 = {50,80},
     8 = {50,50},
     9 = {50,50},
   }

⟨/ebg⟩
```

Settings for the T2A encoding (generic, Computer Modern Roman, and Minion).[12]

```
⟨*m-t|cmr|pmn⟩
\SetProtrusion
⟨m-t⟩   [ name     = T2A-default,
⟨cmr⟩   [ name     = cmr-T2A,
⟨pmn⟩   [ name     = pmnj-T2A,
⟨m-t⟩     load     = default     ]
⟨cmr⟩     load     = cmr-default ]
⟨pmn⟩     load     = pmnj-default ]
   { encoding = T2A,
⟨m-t⟩   }
⟨cmr⟩     family   = cmr }
⟨pmn⟩     family   = pmnj }
   {
     \CYRA = {50,50},
     \CYRG = {  ,50},
     \CYRK = {  ,50},
     \CYRT = {50,50},
     \CYRH = {50,50},
     \CYRU = {50,50},
⟨pmn⟩     \CYRS = {50,  },
⟨pmn⟩     \CYRO = {50,50},
     \cyrk = {  ,50},
     \cyrg = {  ,50},
```

12 Contributed by *Karl Karlsson*.

```
      \cyrh = {50,50},
⟨m-t|pmn⟩      \cyru = {50,50},
⟨cmr⟩      \cyru = {50,70},
⟨m-t⟩        _  = {100,100},
⟨cmr⟩        _  = {200,200},
⟨m-t⟩      \textbackslash    = {100,200},   \quotedblbase      = {400,400},
⟨cmr⟩      \textbackslash    = {200,300},   \quotedblbase      = {400,400},
⟨pmn⟩      \textbackslash    = {100,200},   \quotedblbase      = {300,300},
⟨cmr⟩      \textquotedbl     = {300,300},   \textquotedblleft  = {200,600},
⟨m-t⟩      \guillemotleft    = {200,200},   \guillemotright    = {200,200},
⟨cmr⟩      \guillemotleft    = {300,200},   \guillemotright    = {100,400},
⟨pmn⟩      \guillemotleft    = {200,200},   \guillemotright    = {150,300},
⟨m-t|cmr⟩      \textbraceleft    = {400,200},   \textbraceright    = {200,400},
⟨pmn⟩      \textbraceleft    = {200,   },   \textbraceright    = {   ,300},
⟨m-t|cmr⟩      \textless         = {200,100},   \textgreater       = {100,200}
⟨pmn⟩      \textless         = {100,   },   \textgreater       = {   ,100}
    }

⟨/m-t|cmr|pmn⟩
```

Settings for the QX encoding (generic and Times).[13] It also includes some glyphs otherwise in TS1.

```
⟨*m-t|ptm⟩
\SetProtrusion
⟨m-t⟩    [ name     = QX-default,
⟨ptm⟩    [ name     = ptm-QX,
⟨m-t⟩      load     = default ]
⟨ptm⟩      load     = ptm-default ]
⟨m-t⟩    { encoding = QX }
⟨ptm⟩    { encoding = QX,
⟨ptm⟩      family   = {ptm,ptmx,ptmj} }
    {
      \AE = {50,  },
⟨ptm⟩       *  = {200,200},
      {=} = {100,100},
      \textunderscore   = {100,100},
      \textbackslash    = {100,200},
      \quotedblbase     = {400,400},
⟨m-t⟩      \guillemotleft    = {200,200},   \guillemotright    = {200,200},
⟨ptm⟩      \guillemotleft    = {300,300},   \guillemotright    = {200,400},
      \textexclamdown   = {100,   },   \textquestiondown  = {100,   },
⟨m-t⟩      \textbraceleft    = {400,200},   \textbraceright    = {200,400},
⟨ptm⟩      \textbraceleft    = {200,200},   \textbraceright    = {200,300},
      \textless         = {200,100},   \textgreater       = {100,200},
      \textminus        = {200,200},   \textdegree        = {300,300},
⟨m-t⟩      \copyright        = {100,100},   \textregistered    = {100,100}
⟨ptm⟩      \copyright        = {100,150},   \textregistered    = {100,150},
⟨ptm⟩      \textxgeq         = {   ,100},   \textxleq          = {100,   },
⟨ptm⟩      \textalpha        = {   , 50},   \textDelta         = { 70, 70},
⟨ptm⟩      \textpi           = { 50, 80},   \textSigma         = {   , 70},
⟨ptm⟩      \textmu           = {   , 80},   \texteuro          = { 50, 50},
⟨ptm⟩      \textellipsis     = {150,200},   \textasciitilde    = { 80, 80},
⟨ptm⟩      \textapprox       = { 50, 50},   \textinfty         = {100,100},
⟨ptm⟩      \textdagger       = {150,150},   \textdaggerdbl     = {100,100},
⟨ptm⟩      \textdiv          = { 50,150},   \textsection       = { 80, 80},
⟨ptm⟩      \texttimes        = {100,150},   \textpm            = { 50, 80},
⟨ptm⟩      \textbullet       = {150,150},   \textperiodcentered = {300,300},
⟨ptm⟩      \textquotesingle  = {500,500},   \textquotedbl      = {300,300},
⟨ptm⟩      \textperthousand  = {    ,50}
    }

⟨/m-t|ptm⟩
```

T5 is based on OT1; it shares some but not all extra characters of T1. All accented

13 Contributed by *Maciej Eder*.

characters are already taken care of by the inheritance list.

```
⟨*cmr|bch⟩
\SetProtrusion
⟨cmr⟩   [ name     = cmr-T5,
⟨cmr⟩     load     = cmr-default ]
⟨bch⟩   [ name     = bch-T5,
⟨bch⟩     load     = bch-default ]
   { encoding = T5,
⟨cmr⟩     family   = cmr }
⟨bch⟩     family   = bch }
   {
⟨bch⟩     _ = {100,100},
⟨bch⟩     \textbackslash    = {150,200},
⟨cmr⟩     \textbackslash    = {200,300},
⟨cmr⟩     \textquotedblleft = {200,600},
⟨cmr⟩     \textquotedbl     = {300,300},
⟨bch⟩     \quotesinglbase   = {400,400},   \quotedblbase      = {300,300},
⟨cmr⟩     \quotesinglbase   = {400,400},   \quotedblbase      = {400,400},
⟨bch⟩     \guilsinglleft    = {400,300},   \guilsinglright    = {300,400},
⟨cmr⟩     \guilsinglleft    = {400,400},   \guilsinglright    = {300,500},
⟨bch⟩     \guillemotleft    = {200,200},   \guillemotright    = {150,300},
⟨cmr⟩     \guillemotleft    = {300,200},   \guillemotright    = {100,400},
⟨bch⟩     \textbraceleft    = {200,   },   \textbraceright    = {   ,300},
⟨cmr⟩     \textbraceleft    = {400,200},   \textbraceright    = {200,400},
     \textless         = {200,100},   \textgreater       = {100,200}
   }

⟨/cmr|bch⟩
```

Minion with lining numbers.

```
⟨*pmn⟩
\SetProtrusion
   [ name     = pmnx-OT1,
     load     = pmnj-default ]
   { encoding = OT1,
     family   = pmnx }
   {
     1 = {230,180}
   }

\SetProtrusion
   [ name     = pmnx-T1,
     load     = pmnj-T1  ]
   { encoding = {T1,LY1},
     family   = pmnx     }
   {
     1 = {230,180}
   }

\SetProtrusion
   [ name     = pmnx-T2A,
     load     = pmnj-T2A  ]
   { encoding = {T2A},
     family   = pmnx     }
   {
     1 = {230,180}
   }

⟨/pmn⟩
```

Times is the default font for LY1, therefore we provide settings for the additional characters in this encoding, too.

```
⟨*ptm⟩
 \SetProtrusion
   [ name     = ptm-LY1,
```

```
    load     = ptm-T1 ]
  { encoding = LY1,
    family   = {ptm,ptmx,ptmj} }
  {
    _                          = {100,100},
    \texttrademark             = {100,100},
    \textregistered            = {100,100},
    \textcopyright             = {100,100},
    \textdegree                = {300,300},
    \textminus                 = {200,200},
    \textellipsis              = {150,200},
%   \texteuro                  = {   ,   }, % ?
    \textcent                  = {100,100},
    \textquotesingle           = {500,500},
    \textflorin                = { 50, 70},
    \textdagger                = {150,150},
    \textdaggerdbl             = {100,100},
    \textperthousand           = {   , 50},
    \textbullet                = {150,150},
    \textonesuperior           = {100,100},
    \texttwosuperior           = { 50, 50},
    \textthreesuperior         = { 50, 50},
    \textperiodcentered        = {300,300},
    \textplusminus             = { 50, 80},
    \textmultiply              = {100,100},
    \textdivide                = { 50,150}
```

Remaining slots in the source file.

```
  }

⟨/ptm⟩
```

For the Greek LGR encoding.

```
⟨*ebg⟩
\SetProtrusion
  [ name = EBGaramond-LGR ]
  { }
  {
     A = {50,50},
     D = {100,100},
     F = {50,50},
     G = {  ,150},
     K = {  ,50},
     L = {100,100},
     O = {50,50},
     U = {100,100},
     T = {50,50},
     W = {  ,50},
     Y = {50,50},
     . = { ,600},
    {,}= { ,500},
     : = { ,400},
     ; = { ,300},
     ! = { ,100},
     ? = { ,100},
     ~ = {200,250},
    \% = {50,50},
     * = {300,300},
     + = {250,250},
    {=}= { 50, 50},
     ( = {100,   },    ) = {   ,200},
     / = {100,200},
     - = {300,500},
     \texteuro = { 50,100},
     \textendash       = {300,300},   \textemdash        = {200,200},
```

```
    \textquoteleft    = {300,500},   \textquoteright    = {400,400},
    \guillemotleft    = {300,300},   \guillemotright    = {200,400},
  }

\SetProtrusion
   [ name     = EBGaramond-LGR-LF,
     load     = EBGaramond-LGR ]
   { encoding = LGR,
     family   = {EBGaramond-LF,EBGaramond-TLF,EBGaramond-OsF} }
   {
     1 = {50,50},
     2 = {50,50},
     4 = {50,50},
     7 = {50,50},
   }

\SetProtrusion
   [ name     = EBGaramond-LGR-TOsF,
     load     = EBGaramond-LGR ]
   { encoding = LGR,
     family   = {EBGaramond-TOsF} }
   {
     1 = {150,150},
     2 = {50,50},
     3 = {50,50},
     4 = {50,50},
     5 = {50,50},
     6 = {50,50},
     7 = {50,80},
     8 = {50,50},
     9 = {50,50},
   }

⟨/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. [14]

```
\SetProtrusion
⟨m-t⟩   [ name     = OT1-it   ]
⟨bch⟩   [ name     = bch-it   ]
⟨blg⟩   [ name     = blg-it,
⟨blg⟩     load     = blg-default ]
⟨cmr⟩   [ name     = cmr-it   ]
⟨ebg⟩   [ name     = EBGaramond-it   ]
⟨pmn⟩   [ name     = pmnj-it  ]
⟨ppl⟩   [ name     = ppl-it   ]
⟨ptm⟩   [ name     = ptm-it   ]
⟨ugm⟩   [ name     = ugm-it   ]
⟨m-t|bch|blg|ugm⟩   { encoding = OT1,
⟨ppl|ptm⟩   { encoding = {OT1,OT4},
⟨bch⟩     family   = bch,
⟨blg⟩     family   = blg,
⟨ppl⟩     family   = {ppl,pplx,pplj},
⟨ptm⟩     family   = {ptm,ptmx,ptmj},
```

14 Settings contributed by *Hendrik Vogt*.

```
⟨ugm⟩     family   = ugm,
⟨m-t|bch|ppl|ptm⟩     shape    = {it,sl}  }
⟨blg|ugm⟩     shape    = it  }
⟨cmr|ebg|pmn⟩   { }
   {
⟨cmr⟩     A = {100,100},
⟨ptm⟩     A = {100,50},
⟨ebg|pmn⟩     A = {50,  },
⟨ugm⟩     A = {  ,150},
⟨ppl⟩     A = {50,50},
⟨ptm⟩   \AE = {100,  },
⟨ebg|ppl⟩   \AE = {50,  },
⟨cmr⟩     B = {83,-40},
⟨ebg|ppl|ptm⟩     B = {50,  },
⟨pmn⟩     B = {20,-50},
⟨bch|ppl|ptm|ugm⟩     C = {50,  },
⟨cmr⟩     C = {165,-75},
⟨ebg⟩     C = {100, },
⟨pmn⟩     C = {50,-50},
⟨cmr⟩     D = {75, -28},
⟨ebg|ppl|ptm⟩     D = {50,50},
⟨pmn⟩     D = {20,  },
⟨cmr⟩     E = {80,-55},
⟨ebg|ppl|ptm⟩     E = {50,  },
⟨pmn⟩     E = {20,-50},
⟨cmr⟩     F = {85,-80},
⟨ebg|ptm⟩     F = {100, },
⟨pmn⟩     F = {10,  },
⟨ppl⟩     F = {50,  },
⟨bch|ppl|ptm|ugm⟩     G = {50,  },
⟨cmr⟩     G = {153,-15},
⟨ebg⟩     G = {100, },
⟨pmn⟩     G = {50,-50},
⟨cmr⟩     H = {73,-60},
⟨ebg|ppl|ptm⟩     H = {50,  },
⟨cmr⟩     I = {140,-120},
⟨ebg|ptm⟩     I = {50,  },
⟨pmn⟩     I = {20,-50},
⟨cmr⟩     J = {135,-80},
⟨ebg⟩     J = {50,  },
⟨pmn⟩     J = {20,  },
⟨ptm⟩     J = {100, },
⟨cmr⟩     K = {70,-30},
⟨ebg|ppl|ptm⟩     K = {50,  },
⟨pmn⟩     K = {20,  },
⟨cmr⟩     L = {87, 40},
⟨ebg|ppl|ptm⟩     L = {50,  },
⟨pmn⟩     L = {20,50},
⟨ugm⟩     L = {  ,100},
⟨cmr⟩     M = {67,-45},
⟨pmn⟩     M = {  ,-30},
⟨ptm⟩     M = {50,  },
⟨cmr⟩     N = {75,-55},
⟨pmn⟩     N = {  ,-30},
⟨ptm⟩     N = {50,  },
⟨bch|pmn|ppl|ptm⟩     O = {50,  },
⟨cmr⟩     O = {150,-30},
⟨ebg⟩     O = {100, },
⟨ugm⟩     O = {70,50},
⟨ppl|ptm⟩   \OE = {50,  },
⟨ebg⟩   \OE = {100, },
⟨cmr⟩     P = {82,-50},
⟨ebg|ppl|ptm⟩     P = {50,  },
⟨pmn⟩     P = {20,-50},
⟨bch|pmn|ppl|ptm⟩     Q = {50,  },
```

```
⟨cmr⟩      Q = {150,-30},
⟨ebg⟩      Q = {100, },
⟨ugm⟩      Q = {70,50},
⟨cmr⟩      R = {75, 15},
⟨ebg|ppl|ptm⟩      R = {50,  },
⟨pmn⟩      R = {20,  },
⟨bch|ebg|ppl|ptm⟩      S = {50,  },
⟨cmr⟩      S = {90,-65},
⟨pmn⟩      S = {20,-30},
⟨bch|ebg|ppl|ptm⟩      $ = {50,  },
⟨cmr⟩      $ = {100,-20},
⟨pmn⟩      $ = {20,-30},
⟨bch|pmn|ugm⟩      T = {70,  },
⟨cmr⟩      T = {220,-85},
⟨ebg|ppl|ptm⟩      T = {100, },
⟨cmr⟩      U = {230,-55},
⟨ebg|ppl|ptm⟩      U = {50,  },
⟨pmn⟩      U = {50,-50},
⟨cmr⟩      V = {260,-60},
⟨ebg|pmn|ugm⟩      V = {100, },
⟨ppl|ptm⟩      V = {100,50},
⟨cmr⟩      W = {185,-55},
⟨ebg|pmn|ugm⟩      W = {100, },
⟨ppl⟩      W = {50,  },
⟨ptm⟩      W = {100,50},
⟨cmr⟩      X = {70,-30},
⟨ppl|ptm⟩      X = {50,  },
⟨cmr⟩      Y = {250,-60},
⟨pmn⟩      Y = {50,  },
⟨ppl⟩      Y = {100,50},
⟨ptm⟩      Y = {100, },
⟨cmr⟩      Z = {90,-60},
⟨pmn⟩      Z = {  ,-50},
⟨cmr⟩      a = {150,-10},
⟨cmr⟩      b = {170,   },
⟨cmr⟩      c = {173,-10},
⟨cmr⟩      d = {150,-55},
⟨pmn⟩      d = {  ,-50},
⟨cmr⟩      e = {180, },
⟨cmr⟩      f = {  ,-250},
⟨ebg|pmn⟩      f = { ,-100},
⟨cmr⟩      g = {150,-10},
⟨cmr⟩      h = {100, },
⟨cmr⟩      i = {210, },
⟨pmn⟩      i = {  ,-30},
⟨cmr⟩      j = {  ,-40},
⟨pmn⟩      j = {  ,-30},
⟨cmr⟩      k = {110,-50},
⟨cmr⟩      l = {240,-110},
⟨pmn⟩      l = {  ,-100},
⟨cmr⟩      m = {80, },
⟨cmr⟩      n = {115, },
⟨bch⟩      o = {50,50},
⟨cmr⟩      o = {155, },
⟨bch⟩      p = {  ,50},
⟨pmn⟩      p = {-50,  },
⟨bch⟩      q = {50,  },
⟨cmr⟩      q = {170,-40},
⟨cmr⟩      r = {155,-40},
⟨pmn⟩      r = {  ,50},
⟨cmr⟩      s = {130, },
⟨bch⟩      t = {  ,50},
⟨cmr⟩      t = {230,-10},
⟨cmr⟩      u = {120, },
⟨cmr⟩      v = {140,-25},
```

```
⟨pmn|ugm⟩      v = {50,  },
⟨bch⟩      w = {  ,50},
⟨cmr⟩      w = {98,-20},
⟨pmn|ugm⟩      w = {50,  },
⟨cmr⟩      x = {65,-40},
⟨bch⟩      y = {  ,50},
⟨cmr⟩      y = {130,-20},
⟨cmr⟩      z = {110,-80},
⟨cmr⟩      0 = {170,-85},
⟨bch|ptm⟩      1 = {150,100},
⟨cmr⟩      1 = {230,110},
⟨ebg⟩      1 = {150, },
⟨pmn⟩      1 = {50,  },
⟨ppl⟩      1 = {100, },
⟨ugm⟩      1 = {150,150},
⟨cmr⟩      2 = {130,-70},
⟨ebg|ppl|ptm⟩      2 = {50,  },
⟨pmn⟩      2 = {-50,  },
⟨bch⟩      3 = {50,  },
⟨cmr⟩      3 = {140,-70},
⟨pmn⟩      3 = {-100, },
⟨ptm⟩      3 = {100,50},
⟨bch⟩      4 = {100, },
⟨cmr⟩      4 = {130,80},
⟨ebg⟩      4 = {150, },
⟨ppl|ptm⟩      4 = {50,  },
⟨cmr⟩      5 = {160, },
⟨ptm⟩      5 = {50,  },
⟨bch⟩      6 = {50,  },
⟨cmr⟩      6 = {175,-30},
⟨bch|ebg|ptm⟩      7 = {100, },
⟨cmr⟩      7 = {250,-150},
⟨pmn⟩      7 = {20,  },
⟨ppl⟩      7 = {50,  },
⟨cmr⟩      8 = {130,-40},
⟨cmr⟩      9 = {155,-80},
⟨m-t|cmr|ebg|pmn|ppl⟩      . = { ,500},
⟨blg⟩      . = {400,600},
⟨bch|ptm|ugm⟩      . = { ,700},
⟨blg⟩     {,}= {300,500},
⟨m-t|ebg|pmn|ppl⟩     {,}= { ,500},
⟨cmr⟩     {,}= { ,450},
⟨bch|ugm⟩     {,}= { ,600},
⟨ptm⟩     {,}= { ,700},
⟨m-t|cmr|ebg|ppl⟩      : = { ,300},
⟨bch|ugm⟩      : = { ,400},
⟨pmn⟩      : = { ,200},
⟨ptm⟩      : = { ,500},
⟨m-t|cmr|ebg|ppl⟩      ; = { ,300},
⟨bch|ugm⟩      ; = { ,400},
⟨pmn⟩      ; = { ,200},
⟨ptm⟩      ; = { ,500},
⟨ptm⟩      ! = { ,100},
⟨bch⟩      ? = { ,200},
⟨ptm⟩      ? = { ,100},
⟨ppl⟩      ? = { ,300},
⟨pmn⟩      " = {400,200},
⟨m-t|ebg|pmn|ppl|ptm⟩      & = {50,50},
⟨bch⟩      & = {  ,80},
⟨cmr⟩      & = {130,30},
⟨ugm⟩      & = {50,100},
⟨m-t|ebg|pmn⟩     \% = {100, },
⟨cmr⟩     \% = {180,50},
⟨bch⟩     \% = {50,50},
⟨ppl|ptm⟩     \% = {100,100},
```

```
⟨ugm⟩     \% = {100,50},
⟨m-t|pmn|ppl⟩     * = {200,200},
⟨bch⟩     * = {300,200},
⟨cmr⟩     * = {380,20},
⟨ebg⟩     * = {500,100},
⟨ptm|ugm⟩     * = {400,200},
⟨m-t|pmn|ppl⟩     + = {150,200},
⟨cmr⟩     + = {180,200},
⟨bch|ugm⟩     + = {250,250},
⟨ebg|ptm⟩     + = {250,200},
⟨m-t|ebg|pmn|ppl⟩     @ = {50,50},
⟨bch⟩     @ = {80,50},
⟨cmr⟩     @ = {180,10},
⟨ptm⟩     @ = {150,150},
⟨m-t|bch|ugm⟩     ~ = {150,150},
⟨cmr|ebg|pmn|ppl|ptm⟩     ~ = {200,150},
⟨ugm⟩     {=}= {200,200},
⟨m-t|bch|ebg|pmn|ppl|ptm|ugm⟩     ( = {200, },    ) = {  ,200},
⟨cmr⟩     ( = {300, },    ) = {  ,70},
⟨m-t|ebg|ppl|ptm|ugm⟩     / = {100,200},
⟨cmr⟩     / = {100,100},
⟨bch⟩     / = {  ,150},
⟨pmn⟩     / = {100,150},
⟨m-t⟩     - = {300,300},
⟨bch|ebg⟩     - = {300,400},
⟨pmn⟩     - = {200,300},
⟨cmr⟩     - = {500,300},
⟨ppl⟩     - = {300,500},
⟨ptm⟩     - = {500,500},
⟨ugm⟩     - = {400,700},
⟨blg⟩     _ = {0,300},
⟨m-t|pmn⟩     \textendash       = {200,200},   \textemdash        = {150,150},
⟨bch⟩     \textendash       = {200,300},   \textemdash        = {150,200},
⟨cmr⟩     \textendash       = {500,300},   \textemdash        = {400,170},
⟨ebg|ppl|ptm|ugm⟩     \textendash       = {300,300},   \textemdash        = {200,200},
⟨m-t|bch|pmn|ugm⟩     \textquoteleft    = {400,200},   \textquoteright    = {400,200},
⟨blg⟩     \textquoteleft     = {400,400},    \textquoteright    = {400,400},
⟨cmr⟩     \textquoteleft    = {800,200},   \textquoteright    = {800,-20},
⟨ebg⟩     \textquoteleft    = {800,200},   \textquoteright    = {800,200},
⟨ppl⟩     \textquoteleft    = {700,400},   \textquoteright    = {700,400},
⟨ptm⟩     \textquoteleft    = {800,500},   \textquoteright    = {800,500},
⟨m-t|bch|pmn⟩     \textquotedblleft = {400,200},   \textquotedblright = {400,200}
⟨blg⟩     \textquotedblright = {300,300}
⟨cmr⟩     \textquotedblleft = {540,100},   \textquotedblright = {500,100}
⟨ebg⟩     \textquotedblleft = {700,200},   \textquotedblright = {700,200}
⟨ppl⟩     \textquotedblleft = {500,300},   \textquotedblright = {500,300}
⟨ptm⟩     \textquotedblleft = {700,400},   \textquotedblright = {700,400}
⟨ugm⟩     \textquotedblleft = {600,200},   \textquotedblright = {600,200}
   }

⟨*cmr|ebg|pmn⟩
\SetProtrusion
⟨cmr⟩   [ name     = cmr-it-OT1,
⟨ebg⟩   [ name     = EBGaramond-it-OT1,
⟨pmn⟩   [ name     = pmnj-it-OT1,
⟨cmr⟩     load     = cmr-it   ]
⟨ebg⟩     load     = EBGaramond-it   ]
⟨pmn⟩     load     = pmnj-it  ]
⟨cmr⟩   { encoding = {OT1,OT4},
⟨pmn⟩   { encoding = OT1,
⟨cmr⟩     family   = cmr,
⟨pmn⟩     family   = pmnj,
⟨cmr⟩     shape    = it       }
⟨pmn⟩     shape    = {it,sl}  }
⟨ebg⟩   { }
```

```
7367    {
7368 ⟨cmr⟩      \AE = {100,   },
7369 ⟨pmn⟩      \AE = {  ,-50},
7370 ⟨cmr⟩      \OE = {100,   },
7371 ⟨pmn⟩      \OE = {50,   }
7372 ⟨*cmr|ebg⟩
7373 ⟨cmr⟩      "00 = {200,150}, % \Gamma
7374 ⟨ebg⟩      "00 = {   ,150}, % \Gamma
7375 ⟨cmr⟩      "01 = {150,100}, % \Delta
7376 ⟨ebg⟩      "01 = {100,100}, % \Delta
7377 ⟨cmr⟩      "02 = {150, 50}, % \Theta
7378 ⟨ebg⟩      "02 = { 50, 50}, % \Theta
7379 ⟨cmr⟩      "03 = {150, 50}, % \Lambda
7380 ⟨ebg⟩      "03 = {100,100}, % \Lambda
7381 ⟨cmr⟩      "04 = {100,100}, % \Xi
7382 ⟨ebg⟩      "04 = { 50, 50}, % \Xi
7383 ⟨cmr⟩      "05 = {100,100}, % \Pi
7384 ⟨cmr⟩      "06 = {100, 50}, % \Sigma
7385 ⟨cmr⟩      "07 = {200,150}, % \Upsilon
7386 ⟨ebg⟩      "07 = {100,100}, % \Upsilon
7387 ⟨cmr⟩      "08 = {150, 50}, % \Phi
7388 ⟨ebg⟩      "08 = { 50, 50}, % \Phi
7389 ⟨cmr⟩      "09 = {150,100}, % \Psi
7390 ⟨ebg⟩      "09 = { 50, 50}, % \Psi
7391      "0A = { 50, 50}, % \Omega
7392 ⟨ebg⟩      138 = {   , 50}, % \L
7393 ⟨/cmr|ebg⟩
7394    }
7395
7396 ⟨/cmr|ebg|pmn⟩
7397 ⟨*ebg⟩
7398 \SetProtrusion
7399    [ name     = EBGaramond-it-OT1-LF,
7400      load     = EBGaramond-it-OT1 ]
7401    { encoding = OT1,
7402      family   = {EBGaramond-LF,EBGaramond-TLF},
7403      shape    = it }
7404    {
7405      1 = {50,50},
7406      2 = {50,50},
7407      3 = {80,50},
7408      4 = {50,50},
7409      5 = {50,50},
7410      6 = {50,50},
7411      7 = {50,50},
7412      8 = {50,50},
7413      9 = {50,  },
7414    }
7415
7416 \SetProtrusion
7417    [ name     = EBGaramond-it-OT1-OsF,
7418      load     = EBGaramond-it-OT1 ]
7419    { encoding = OT1,
7420      family   = {EBGaramond-OsF},
7421      shape    = it }
7422    {
7423      1 = {50,50},
7424      2 = {50,50},
7425      3 = {  ,80},
7426      4 = {50,50},
7427      7 = {50,50},
7428    }
7429
7430 \SetProtrusion
7431    [ name     = EBGaramond-it-OT1-TOsF,
```

```
7432      load     = EBGaramond-it-OT1 ]
7433    { encoding = OT1,
7434      family   = {EBGaramond-TOsF},
7435      shape    = it }
7436    {
7437      0 = {150,150},
7438      1 = {150,150},
7439      2 = {80,80},
7440      3 = {50,80},
7441      4 = {50,80},
7442      5 = {50,80},
7443      6 = {50,50},
7444      7 = {50,100},
7445      8 = {50,50},
7446      9 = {50,80},
7447    }
7448
7449 ⟨/ebg⟩
7450 \SetProtrusion
7451 ⟨m-t⟩    [ name     = T1-it-default,
7452 ⟨bch⟩    [ name     = bch-it-T1,
7453 ⟨blg⟩    [ name     = blg-it-T1,
7454 ⟨cmr⟩    [ name     = cmr-it-T1,
7455 ⟨ebg⟩    [ name     = EBGaramond-it-T1,
7456 ⟨pmn⟩    [ name     = pmnj-it-T1,
7457 ⟨ppl⟩    [ name     = ppl-it-T1,
7458 ⟨ptm⟩    [ name     = ptm-it-T1,
7459 ⟨ugm⟩    [ name     = ugm-it-T1,
7460 ⟨m-t⟩      load     = OT1-it   ]
7461 ⟨bch⟩      load     = bch-it   ]
7462 ⟨blg⟩      load     = blg-T1   ]
7463 ⟨cmr⟩      load     = cmr-it   ]
7464 ⟨pmn⟩      load     = pmnj-it  ]
7465 ⟨ebg⟩      load     = EBGaramond-it   ]
7466 ⟨ppl⟩      load     = ppl-it   ]
7467 ⟨ptm⟩      load     = ptm-it   ]
7468 ⟨ugm⟩      load     = ugm-it   ]
7469 ⟨m-t|bch|cmr|pmn|ppl⟩    { encoding = {T1,LY1},
7470 ⟨ebg⟩    { encoding = {LY1},
7471 ⟨blg|ptm|ugm⟩    { encoding = T1,
7472 ⟨bch⟩      family   = bch,
7473 ⟨blg⟩      family   = blg,
7474 ⟨cmr⟩      family   = cmr,
7475 ⟨pmn⟩      family   = pmnj,
7476 ⟨ebg⟩      family   = {EBGaramond-LF,EBGaramond-TLF,EBGaramond-OsF,EBGaramond-TOsF},
7477 ⟨ppl⟩      family   = {ppl,pplx,pplj},
7478 ⟨ptm⟩      family   = {ptm,ptmx,ptmj},
7479 ⟨ugm⟩      family   = ugm,
7480 ⟨m-t|bch|pmn|ppl|ptm⟩      shape    = {it,sl}  }
7481 ⟨blg|cmr|ebg|ugm⟩      shape    = it       }
7482    {
7483 ⟨m-t|bch|pmn⟩      _ = {  ,100},
7484 ⟨blg⟩      _ = {0,300},
7485 ⟨cmr|ugm⟩      _ = {100,200},
7486 ⟨ebg|ppl|ptm⟩      _ = {100,100},
7487 ⟨blg⟩      . = {400,600},
7488 ⟨blg⟩     {,}= {300,500},
7489 ⟨cmr⟩      \AE = {100,   },
7490 ⟨pmn⟩      \AE = {  ,-50},
7491 ⟨bch|pmn⟩      \OE = { 50,   },
7492 ⟨cmr⟩      \OE = {100,   },
7493 ⟨pmn⟩      031 = { ,-100}, % ffl
7494 ⟨cmr|ptm⟩      156 = {100, },  % IJ
7495 ⟨ebg⟩      156 = {50,  },  % IJ
7496 ⟨pmn⟩      156 = {20,  },  % IJ
```

```
⟨pmn⟩      188 = {  ,-30}, % ij
⟨pmn⟩    \v t = { ,100},
⟨m-t|ebg|ppl|ptm⟩      \textbackslash    = {100,200},
⟨cmr|ugm⟩      \textbackslash    = {300,300},
⟨bch⟩      \textbackslash    = {150,150},
⟨pmn⟩      \textbackslash    = {100,150},
⟨ugm⟩      \textbar          = {200,200},
⟨cmr⟩      \textquotedblleft = {500,300},
⟨blg⟩     \textquoteleft     = {400,400},    \textquoteright    = {400,400},
⟨blg⟩     \textquotedbl      = {300,300},    \textquotedblleft  = {300,300},
⟨blg⟩     \textquotedblright = {300,300},    \quotedblbase      = {200,600},
⟨m-t|ptm⟩      \quotesinglbase   = {300,700},   \quotedblbase      = {400,500},
⟨cmr⟩      \quotesinglbase   = {300,700},   \quotedblbase      = {200,600},
⟨bch|pmn⟩      \quotesinglbase   = {200,500},   \quotedblbase      = {150,500},
⟨ebg|ppl⟩      \quotesinglbase   = {500,500},   \quotedblbase      = {400,400},
⟨ugm⟩      \quotesinglbase   = {300,700},   \quotedblbase      = {300,500},
⟨m-t|ppl|ptm⟩      \guilsinglleft    = {400,400},   \guilsinglright    = {300,500},
⟨bch|pmn⟩      \guilsinglleft    = {300,400},   \guilsinglright    = {200,500},
⟨cmr⟩      \guilsinglleft    = {500,300},   \guilsinglright    = {400,400},
⟨ebg⟩      \guilsinglleft    = {500,400},   \guilsinglright    = {300,500},
⟨ugm⟩      \guilsinglleft    = {400,400},   \guilsinglright    = {300,600},
⟨m-t|ppl⟩      \guillemotleft    = {300,300},   \guillemotright    = {300,300},
⟨bch|pmn⟩      \guillemotleft    = {200,300},   \guillemotright    = {150,400},
⟨cmr⟩      \guillemotleft    = {400,100},   \guillemotright    = {200,300},
⟨ebg⟩      \guillemotleft    = {300,300},   \guillemotright    = {200,400},
⟨ptm⟩      \guillemotleft    = {300,400},   \guillemotright    = {200,400},
⟨ugm⟩      \guillemotleft    = {300,400},   \guillemotright    = {300,400},
⟨m-t|ebg|ppl|ugm⟩      \textexclamdown   = {100,   },   \textquestiondown  = {200,   },
⟨cmr|ptm⟩      \textexclamdown   = {200,   },   \textquestiondown  = {200,   },
⟨pmn⟩      \textexclamdown   = {-50,   },   \textquestiondown  = {-50,   },
⟨m-t|ppl|ugm⟩      \textbraceleft    = {200,100},   \textbraceright    = {200,200},
⟨bch|pmn⟩      \textbraceleft    = {200,   },   \textbraceright    = {   ,200},
⟨cmr|ebg|ptm⟩      \textbraceleft    = {400,100},   \textbraceright    = {200,200},
⟨bch|pmn⟩      \textless         = {100,   },   \textgreater       = {   ,100},
⟨cmr|ebg|ppl|ptm⟩      \textless         = {300,100},   \textgreater       = {200,100}
⟨pmn⟩      \textvisiblespace = {100,100}
  }

⟨*ebg⟩
\SetProtrusion
   [ name     = EBGaramond-it-T1-LF,
     load     = EBGaramond-it-T1 ]
   { encoding = T1,
     family   = {EBGaramond-LF,EBGaramond-TLF},
     shape    = it }
   {
     1 = {50,50},
     2 = {50,50},
     3 = {80,50},
     4 = {50,50},
     5 = {50,50},
     6 = {50,50},
     7 = {50,50},
     8 = {50,50},
     9 = {50,  },
   }

\SetProtrusion
   [ name     = EBGaramond-it-T1-OsF,
     load     = EBGaramond-it-T1 ]
   { encoding = T1,
     family   = {EBGaramond-OsF},
     shape    = it }
   {
     1 = {50,50},
```

```
      2 = {50,50},
      3 = {  ,80},
      4 = {50,50},
      7 = {50,50},
   }

\SetProtrusion
   [ name     = EBGaramond-it-T1-TOsF,
     load     = EBGaramond-it-T1 ]
   { encoding = T1,
     family   = {EBGaramond-TOsF},
     shape    = it }
   {
     0 = {150,150},
     1 = {150,150},
     2 = {80,80},
     3 = {50,80},
     4 = {50,80},
     5 = {50,80},
     6 = {50,50},
     7 = {50,100},
     8 = {50,50},
     9 = {50,80},
   }

⟨/ebg⟩
⟨*m-t|cmr|pmn⟩
\SetProtrusion
⟨m-t⟩   [ name     = T2A-it-default,
⟨cmr⟩   [ name     = cmr-it-T2A,
⟨pmn⟩   [ name     = pmnj-it-T2A,
⟨m-t⟩     load     = OT1-it   ]
⟨cmr⟩     load     = cmr-it   ]
⟨pmn⟩     load     = pmnj-it  ]
   { encoding = T2A,
⟨cmr⟩     family   = cmr,
⟨pmn⟩     family   = pmnj,
⟨m-t|pmn⟩     shape    = {it,sl}  }
⟨cmr⟩     shape    = it       }
   {
⟨cmr⟩     \CYRA = {100,50},
⟨pmn⟩     \CYRA = {50,  },
⟨cmr⟩     \CYRB = {50,  },
⟨cmr⟩     \CYRV = {50,  },
⟨pmn⟩     \CYRV = {20,-50},
⟨cmr⟩     \CYRG = {100, },
⟨pmn⟩     \CYRG = {10,  },
⟨cmr⟩     \CYRD = {50,  },
⟨cmr⟩     \CYRE = {50,  },
⟨pmn⟩     \CYRE = {20,-50},
⟨cmr⟩     \CYRZH = {50,  },
⟨cmr⟩     \CYRZ = {50,  },
⟨pmn⟩     \CYRZ = {20,-50},
⟨cmr⟩     \CYRI = {50,  },
⟨pmn⟩     \CYRI = {  ,-30},
⟨cmr⟩     \CYRISHRT = {50,  },
⟨cmr⟩     \CYRK = {50,  },
⟨pmn⟩     \CYRK = {20,  },
⟨cmr⟩     \CYRL = {50,  },
⟨cmr⟩     \CYRM = {50,  },
⟨pmn⟩     \CYRM = {  ,-30},
⟨cmr⟩     \CYRN = {50,  },
⟨cmr⟩     \CYRO = {100, },
⟨pmn⟩     \CYRO = {50,  },
⟨cmr⟩     \CYRP = {50,  },
```

```
⟨cmr⟩     \CYRR = {50,  },
⟨pmn⟩     \CYRR = {20,-50},
⟨cmr⟩     \CYRS = {100, },
⟨pmn⟩     \CYRS = {50,  },
⟨cmr⟩     \CYRT = {100, },
⟨pmn⟩     \CYRT = {70,  },
⟨cmr⟩     \CYRU = {100, },
⟨pmn⟩     \CYRU = {50,  },
⟨cmr⟩     \CYRF = {100, },
⟨cmr⟩     \CYRH = {50,  },
⟨cmr⟩     \CYRC = {50,  },
⟨cmr⟩     \CYRCH = {100, },
⟨cmr⟩     \CYRSH = {50,  },
⟨cmr⟩     \CYRSHCH = {50,  },
⟨cmr⟩     \CYRHRDSN = {100, },
⟨cmr⟩     \CYRERY = {50,  },
⟨cmr⟩     \CYRSFTSN = {50,  },
⟨cmr⟩     \CYREREV = {50,  },
⟨cmr⟩     \CYRYU = {50,  },
⟨cmr⟩     \CYRYA = {50,  },
⟨pmn⟩     \CYRYA = {  ,20},
⟨pmn⟩     \cyrr = {-50,  },
⟨m-t|pmn⟩      _ = {  ,100},
⟨cmr⟩      _ = {100,200},
⟨pmn⟩      031 = { ,-100}, % ffl
⟨pmn⟩     \v t = { ,100},
⟨m-t⟩     \textbackslash    = {100,200},   \quotedblbase      = {400,500},
⟨cmr⟩     \textbackslash    = {300,300},   \quotedblbase      = {200,600},
⟨pmn⟩     \textbackslash    = {100,150},   \quotedblbase      = {150,500},
⟨m-t⟩     \guillemotleft    = {300,300},   \guillemotright    = {300,300},
⟨cmr⟩     \guillemotleft    = {400,100},   \guillemotright    = {200,300},
⟨pmn⟩     \guillemotleft    = {200,300},   \guillemotright    = {150,400},
⟨m-t⟩     \textbraceleft    = {200,100},   \textbraceright    = {200,200},
⟨cmr⟩     \textbraceleft    = {400,100},   \textbraceright    = {200,200},
⟨pmn⟩     \textbraceleft    = {200,   },   \textbraceright    = {   ,200},
⟨cmr⟩     \textquotedblleft = {500,300},
⟨cmr⟩     \textless         = {300,100},   \textgreater       = {200,100}
⟨pmn⟩     \textless         = {100,   },   \textgreater       = {   ,100}
  }

⟨/m-t|cmr|pmn⟩
⟨*m-t|ptm⟩
\SetProtrusion
⟨m-t⟩   [ name     = QX-it-default,
⟨ptm⟩   [ name     = ptm-it-QX,
⟨m-t⟩     load     = OT1-it ]
⟨ptm⟩     load     = ptm-it ]
   { encoding = {QX},
⟨ptm⟩     family   = {ptm,ptmx,ptmj},
     shape    = {it,sl}  }
   {
⟨ptm⟩     009 = {  , 50}, % fk
     {=} = {100,100},
⟨m-t⟩     \textunderscore   = {100,100},
⟨ptm⟩     \textunderscore   = {100,150},
     \textbackslash    = {100,200},
     \quotedblbase     = {300,400},
⟨m-t⟩     \guillemotleft    = {300,300},   \guillemotright    = {300,300},
⟨ptm⟩     \guillemotleft    = {200,400},   \guillemotright    = {200,400},
     \textexclamdown   = {200,   },   \textquestiondown  = {200,   },
     \textbraceleft    = {200,100},   \textbraceright    = {200,200},
     \textless         = {100,100},   \textgreater       = {100,100},
     \textminus        = {200,200},   \textdegree        = {300,150},
⟨m-t⟩     \copyright        = {100,100},   \textregistered    = {100,100}
⟨ptm⟩     \textregistered   = {100,150},   \copyright         = {100,150},
```

```
⟨ptm⟩     \textDelta        = { 70,   },   \textdelta         = {   , 50},
⟨ptm⟩     \textpi           = { 50, 80},   \textmu            = {   , 80},
⟨ptm⟩     \texteuro         = {200,   },   \textellipsis      = {100,200},
⟨ptm⟩     \textquoteleft    = {500,400},   \textquoteright    = {500,400},
⟨ptm⟩     \textquotedblleft = {500,300},   \textquotedblright = {400,400},
⟨ptm⟩     \textapprox       = { 50, 50},   \textinfty         = {100,100},
⟨ptm⟩     \textdagger       = {150,150},   \textdaggerdbl     = {100,100},
⟨ptm⟩     \textdiv          = {150,150},   \textasciitilde    = { 80, 80},
⟨ptm⟩     \texttimes        = {100,150},   \textpm            = { 50, 80},
⟨ptm⟩     \textbullet       = {300,100},   \textperiodcentered = {300,300},
⟨ptm⟩     \textquotesingle  = {500,500},   \textquotedbl      = {300,300},
⟨ptm⟩     \textperthousand  = {    ,50}
   }

⟨/m-t|ptm⟩
⟨*cmr|bch⟩
\SetProtrusion
⟨cmr⟩   [ name = cmr-it-T5,
⟨cmr⟩     load = cmr-it ]
⟨bch⟩   [ name = bch-it-T5,
⟨bch⟩     load = bch-it ]
   { encoding = T5,
⟨bch⟩     family   = bch,
⟨cmr⟩     family   = cmr,
     shape    = it }
   {
⟨bch⟩      _ = {  ,100},
⟨cmr⟩      _ = {100,200},
⟨bch⟩     \textbackslash    = {150,150},
⟨cmr⟩     \textbackslash    = {300,300},
⟨bch⟩     \quotesinglbase   = {200,500},   \quotedblbase      = {150,500},
⟨cmr⟩     \quotesinglbase   = {300,700},   \quotedblbase      = {200,600},
⟨bch⟩     \guilsinglleft    = {300,400},   \guilsinglright    = {200,500},
⟨cmr⟩     \guilsinglleft    = {500,300},   \guilsinglright    = {400,400},
⟨bch⟩     \guillemotleft    = {200,300},   \guillemotright    = {150,400},
⟨cmr⟩     \guillemotleft    = {400,100},   \guillemotright    = {200,300},
⟨bch⟩     \textbraceleft    = {200,   },   \textbraceright    = {   ,200},
⟨cmr⟩     \textbraceleft    = {400,100},   \textbraceright    = {200,200},
⟨bch⟩     \textless         = {100,   },   \textgreater       = {   ,100}
⟨cmr⟩     \textless         = {300,100},   \textgreater       = {200,100}
  }

⟨/cmr|bch⟩
```

Slanted is very similar to italic.

```
⟨*cmr⟩
\SetProtrusion
   [ name     = cmr-sl,
     load     = cmr-it-OT1 ]
   { encoding = {OT1,OT4},
     family   = cmr,
     shape    = sl  }
   {
      L = {  ,50},
      f = { ,-50},
      - = {300, },
     \textendash = {400,  },  \textemdash = {300,  }
   }

\SetProtrusion
   [ name     = cmr-sl-T1,
     load     = cmr-it-T1 ]
   { encoding = {T1,LY1},
     family   = cmr,
     shape    = sl  }
```

```
   {
      L = {  ,50},
      f = { ,-50},
      - = {300, },
     \textendash = {400,  },  \textemdash = {300,  }
   }

\SetProtrusion
   [ name     = cmr-sl-T2A,
     load     = cmr-it-T2A ]
   { encoding = T2A,
     family   = cmr,
     shape    = sl  }
   {
      L = {  ,50},
      f = { ,-50},
      - = {300, },
     \textendash = {400,  },  \textemdash = {300,  }
   }

\SetProtrusion
   [ name     = cmr-sl-T5,
     load     = cmr-it-T5 ]
   { encoding = T5,
     family   = cmr,
     shape    = sl  }
   {
      L = {  ,50},
      f = { ,-50},
      - = {300, },
     \textendash = {400,  },  \textemdash = {300,  }
   }

\SetProtrusion
   [ name     = lmr-it-T1,
     load     = cmr-it-T1 ]
   { encoding = {T1,LY1},
     family   = lmr,
     shape    = {it,sl} }
   {
     \textquotedblleft  = { ,200},  \textquotedblright = { ,200},
     \quotesinglbase    = { ,400},  \quotedblbase      = { ,500}
   }
```

Oldstyle numerals are slightly different.

```
\SetProtrusion
   [ name = cmr(oldstyle)-it,
     load = cmr-it-T1 ]
   { encoding = T1,
     family   = {hfor,cmor},
     shape    = {it,sl}  }
   {
     1 = {250, 50},
     2 = {150,-100},
     3 = {100,-50},
     4 = {150,150},
     6 = {200,   },
     7 = {200, 50},
     8 = {150,-50},
     9 = {100, 50}
   }

⟨/cmr⟩
⟨*pmn⟩
```

```
\SetProtrusion
   [ name     = pmnx-it,
     load     = pmnj-it ]
   { encoding = OT1,
     family   = pmnx,
     shape    = {it,sl} }
   {
     1 = {100,150}
   }

\SetProtrusion
   [ name     = pmnx-it-T1,
     load     = pmnj-it-T1 ]
   { encoding = {T1,LY1},
     family   = pmnx,
     shape    = {it,sl} }
   {
     1 = {100,150}
   }

\SetProtrusion
   [ name     = pmnx-it-T2A,
     load     = pmnj-it-T2A ]
   { encoding = {T2A},
     family   = pmnx,
     shape    = {it,sl} }
   {
     1 = {100,150}
   }

⟨/pmn⟩
⟨*ptm⟩
\SetProtrusion
   [ name     = ptm-it-LY1,
     load     = ptm-it-T1   ]
   { encoding = {LY1},
     family   = {ptm,ptmx,ptmj},
     shape    = {it,sl}  }
   {
     _                          = {100,100},
     \texttrademark             = {100,100},
     \textregistered            = {100,100},
     \textcopyright             = {100,100},
     \textdegree                = {300,100},
     \textminus                 = {200,200},
     \textellipsis              = {100,200},
%    \texteuro                  = {   ,   }, % ?
     \textcent                  = {100,100},
     \textquotesingle           = {500,   },
     \textflorin                = {100, 70},
     \textdagger                = {150,150},
     \textdaggerdbl             = {100,100},
     \textbullet                = {150,150},
     \textonesuperior           = {150,100},
     \texttwosuperior           = {150, 50},
     \textthreesuperior         = {150, 50},
     \textparagraph             = {100,   },
     \textperiodcentered        = {500,300},
     \textonequarter            = { 50,   },
     \textonehalf               = { 50,   },
     \textplusminus             = {100,100},
     \textmultiply              = {150,150},
     \textdivide                = {150,150}
   }

```

```
⟨/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).

```
⟨*!(blg|ugm)⟩
\SetProtrusion
⟨m-t⟩    [ name     = OT1-sc,
⟨bch⟩    [ name     = bch-sc,
⟨cmr⟩    [ name     = cmr-sc-OT1,
⟨ebg⟩    [ name     = EBGaramond-sc-OT1-Prop,
⟨pmn⟩    [ name     = pmnj-sc,
⟨ppl⟩    [ name     = ppl-sc,
⟨ptm⟩    [ name     = ptm-sc,
⟨m-t⟩      load     = default ]
⟨bch⟩      load     = bch-default ]
⟨cmr⟩      load     = cmr-OT1 ]
⟨ebg⟩      load     = EBGaramond-OT1-LF ]
⟨pmn⟩      load     = pmnj-default ]
⟨ppl⟩      load     = ppl-default ]
⟨ptm⟩      load     = ptm-default ]
⟨m-t|bch|ebg|pmn⟩    { encoding = OT1,
⟨cmr|ppl|ptm⟩    { encoding = {OT1,OT4},
⟨bch⟩      family   = bch,
⟨cmr⟩      family   = cmr,
⟨ebg⟩      family   = {EBGaramond-LF,EBGaramond-OsF},
⟨pmn⟩      family   = pmnj,
⟨ppl⟩      family   = {ppl,pplx,pplj},
⟨ptm⟩      family   = {ptm,ptmx,ptmj},
      shape    = sc }
    {
      a = {50,50},
⟨cmr|ebg|ppl|ptm⟩    \ae = {50,  },
⟨bch|pmn⟩      c = {50,  },
⟨bch|ebg|pmn⟩      d = {  ,50},
⟨m-t|bch|cmr|ebg|pmn|ptm⟩      f = {  ,50},
⟨bch|ebg|pmn⟩      g = {50,  },
⟨m-t|cmr|ebg|pmn|ppl|ptm⟩      j = {50,  },
⟨bch⟩      j = {100,  },
⟨m-t|bch|cmr|ebg|pmn|ppl⟩      l = {  ,50},
⟨ptm⟩      l = {  ,80},
⟨m-t|bch|cmr|pmn|ppl⟩    O13 = {  ,50}, % fl
⟨ptm⟩    O13 = {  ,80}, % fl
⟨bch|ebg|pmn⟩      o = {50,50},
⟨ebg|pmn⟩    \oe = {50,  },
⟨ppl⟩      p = { 0, 0},
⟨bch|ebg|pmn⟩      q = {50,70},
⟨ppl⟩      q = { 0,  },
⟨m-t|cmr|ebg|pmn|ppl|ptm⟩      r = {  , 0},
      t = {50,50},
⟨m-t|bch|cmr|ebg|pmn|ppl⟩      y = {50,50}
⟨ptm⟩      y = {80,80}
    }

⟨*ebg⟩
\SetProtrusion
    [ name     = EBGaramond-sc-OT1-Tab,
      load     = EBGaramond-OT1-TOsF ]
    { encoding = OT1,
      family   = {EBGaramond-TLF,EBGaramond-TOsF},
      shape    = sc }
```

```
7940    {
7941      a = {50,50},
7942    \ae = {50,  },
7943      d = {  ,50},
7944      f = {  ,50},
7945      g = {50,  },
7946      j = {50,  },
7947      l = {  ,50},
7948      o = {50,50},
7949    \oe = {50,  },
7950      q = {50,70},
7951      r = {  , 0},
7952      t = {50,50},
7953      y = {50,50}
7954    }
7955
7956 ⟨/ebg⟩
7957 \SetProtrusion
7958 ⟨m-t⟩    [ name     = T1-sc,
7959 ⟨bch⟩    [ name     = bch-sc-T1,
7960 ⟨cmr⟩    [ name     = cmr-sc-T1,
7961 ⟨ebg⟩    [ name     = EBGaramond-sc-T1,
7962 ⟨pmn⟩    [ name     = pmnj-sc-T1,
7963 ⟨ppl⟩    [ name     = ppl-sc-T1,
7964 ⟨ptm⟩    [ name     = ptm-sc-T1,
7965 ⟨m-t⟩      load     = T1-default ]
7966 ⟨bch⟩      load     = bch-T1     ]
7967 ⟨cmr⟩      load     = cmr-T1     ]
7968 ⟨ebg⟩      load     = EBGaramond-T1     ]
7969 ⟨pmn⟩      load     = pmnj-T1    ]
7970 ⟨ppl⟩      load     = ppl-T1     ]
7971 ⟨ptm⟩      load     = ptm-T1     ]
7972 ⟨!ebg⟩    { encoding = {T1,LY1},
7973 ⟨ebg⟩    { encoding = {LY1},
7974 ⟨bch⟩      family   = bch,
7975 ⟨cmr⟩      family   = cmr,
7976 ⟨ebg⟩      family   = {EBGaramond-LF,EBGaramond-TLF,EBGaramond-OsF,EBGaramond-TOsF},
7977 ⟨pmn⟩      family   = pmnj,
7978 ⟨ppl⟩      family   = {ppl,pplx,pplj},
7979 ⟨ptm⟩      family   = {ptm,ptmx,ptmj},
7980       shape    = sc }
7981    {
7982      a = {50,50},
7983 ⟨cmr|ebg|ppl|ptm⟩    \ae = {50,  },
7984 ⟨bch|pmn⟩      c = {50,  },
7985 ⟨bch|ebg|pmn⟩      d = {  ,50},
7986 ⟨m-t|bch|cmr|ebg|pmn|ptm⟩      f = {  ,50},
7987 ⟨bch|ebg|pmn⟩      g = {50,  },
7988 ⟨m-t|cmr|ebg|pmn|ppl|ptm⟩      j = {50,  },
7989 ⟨bch⟩      j = {100,  },
7990 ⟨m-t|bch|cmr|ebg|pmn|ppl⟩      l = {  ,50},
7991 ⟨ptm⟩      l = {  ,80},
7992 ⟨m-t|bch|cmr|pmn|ppl⟩    029 = {  ,50}, % fl
7993 ⟨ptm⟩    029 = {  ,80}, % fl
7994 ⟨bch|ebg|pmn⟩      o = {50,50},
7995 ⟨bch|ebg|pmn⟩    \oe = {50,  },
7996 ⟨ppl⟩      p = { 0, 0},
7997 ⟨bch|ebg|pmn⟩      q = {50,70},
7998 ⟨ppl⟩      q = { 0,  },
7999 ⟨m-t|cmr|ebg|pmn|ppl|ptm⟩      r = {  , 0},
8000      t = {50,50},
8001 ⟨m-t|bch|cmr|ebg|pmn|ppl⟩      y = {50,50}
8002 ⟨ptm⟩      y = {80,80}
8003    }
8004
```

```
⟨/!(blg|ugm)⟩
⟨*m-t|cmr⟩
\SetProtrusion
⟨m-t⟩   [ name     = T2A-sc,
⟨cmr⟩   [ name     = cmr-sc-T2A,
⟨m-t⟩     load     = T2A-default ]
⟨cmr⟩     load     = cmr-T2A     ]
   { encoding = T2A,
⟨cmr⟩     family   = cmr,
     shape    = sc }
   {
     \cyra = {50,50},
     \cyrg = {  ,50},
     \cyrt = {50,50},
     \cyry = {  ,50}
   }

⟨/m-t|cmr⟩
⟨*m-t⟩
\SetProtrusion
   [ name     = QX-sc,
     load     = QX-default ]
   { encoding = QX,
     shape    = sc  }
   {
     a = {50,50},
     f = {  ,50},
     j = {50,  },
     l = {  ,50},
   013 = {  ,50}, % fl
     r = {  , 0},
     t = {50,50},
     y = {50,50}
   }

⟨/m-t⟩
⟨*cmr|bch⟩
\SetProtrusion
⟨bch⟩   [ name     = bch-sc-T5,
⟨bch⟩     load     = bch-T5 ]
⟨cmr⟩   [ name     = cmr-sc-T5,
⟨cmr⟩     load     = cmr-T5 ]
   { encoding = T5,
⟨bch⟩     family   = bch,
⟨cmr⟩     family   = cmr,
     shape    = sc }
   {
     a = {50,50},
⟨bch⟩     c = {50,  },
⟨bch⟩     d = {  ,50},
     f = {  ,50},
⟨bch⟩     g = {50,  },
⟨bch⟩     j = {100, },
⟨cmr⟩     j = {50,  },
     l = {  ,50},
⟨bch⟩     o = {50,50},
⟨bch⟩     q = { 0,  },
⟨cmr⟩     r = {  , 0},
     t = {50,50},
     y = {50,50}
   }

⟨/cmr|bch⟩
⟨*ebg⟩
\SetProtrusion
```

```
8070    [ name     = EBGaramond-sc-T1-Prop,
8071      load     = EBGaramond-T1-LF ]
8072    { encoding = T1,
8073      family   = {EBGaramond-LF,EBGaramond-OsF},
8074      shape    = sc }
8075    {
8076      a = {50,50},
8077    \ae = {50,  },
8078      d = {  ,50},
8079      f = {  ,50},
8080      g = {50,  },
8081      j = {50,  },
8082      l = {  ,50},
8083      o = {50,50},
8084    \oe = {50,  },
8085      q = {50,70},
8086      r = {  , 0},
8087      t = {50,50},
8088      y = {50,50}
8089    }
8090
8091 \SetProtrusion
8092    [ name     = EBGaramond-sc-T1-Tab,
8093      load     = EBGaramond-T1-TOsF ]
8094    { encoding = T1,
8095      family   = {EBGaramond-TLF,EBGaramond-TOsF},
8096      shape    = sc }
8097    {
8098      a = {50,50},
8099    \ae = {50,  },
8100      d = {  ,50},
8101      f = {  ,50},
8102      g = {50,  },
8103      j = {50,  },
8104      l = {  ,50},
8105      o = {50,50},
8106    \oe = {50,  },
8107      q = {50,70},
8108      r = {  , 0},
8109      t = {50,50},
8110      y = {50,50}
8111    }
8112
8113 ⟨/ebg⟩
8114 ⟨*pmn⟩
8115 \SetProtrusion
8116    [ name     = pmnx-sc,
8117      load     = pmnj-sc ]
8118    { encoding = OT1,
8119      family   = pmnx,
8120      shape    = sc }
8121    {
8122      1 = {230,180}
8123    }
8124
8125 \SetProtrusion
8126    [ name     = pmnx-sc-T1,
8127      load     = pmnj-sc-T1 ]
8128    { encoding = {T1,LY1},
8129      family   = pmnx,
8130      shape    = sc }
8131    {
8132      1 = {230,180}
8133    }
8134
```

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`.

```
\SetProtrusion
   [ name     = pmnj-scit,
     load     = pmnj-it   ]
   { encoding = OT1,
     family   = pmnj,
     shape    = {scit,si} }
   {
     a = {50,  },
   \ae = {  ,-50},
     b = {20,-50},
     c = {50,-50},
     d = {20, 0},
     e = {20,-50},
     f = {10, 0},
   012 = {10,-50}, % fi
   013 = {10,-50}, % fl
   014 = {10,-50}, % ffi
   015 = {10,-50}, % ffl
     g = {50,-50},
     i = {20,-50},
     j = {20, 0},
     k = {20,  },
     l = {20,50},
     m = {  ,-30},
     n = {  ,-30},
     o = {50,  },
   \oe = {50,-50},
     p = {20,-50},
     q = {50,  },
     r = {20, 0},
     s = {20,-30},
     t = {70,  },
     u = {50,-50},
     v = {100,  },
     w = {100,  },
     y = {50,  },
     z = {  ,-50}
   }

\SetProtrusion
   [ name     = pmnj-scit-T1,
     load     = pmnj-it-T1   ]
   { encoding = {T1,LY1},
     family   = pmnj,
     shape    = {scit,si}    }
   {
     a = {50,  },
   \ae = {  ,-50},
     b = {20,-50},
     c = {50,-50},
     d = {20, 0},
     e = {20,-50},
     f = {10, 0},
   028 = {10,-50}, % fi
   029 = {10,-50}, % fl
   030 = {10,-50}, % ffi
   031 = {10,-50}, % ffl
     g = {50,-50},
     i = {20,-50},
   188 = {20, 0},  % ij
     j = {20, 0},
```

```
    k = {20,  },
    l = {20,50},
    m = {  ,-30},
    n = {  ,-30},
    o = {50,  },
  \oe = {50,-50},
    p = {20,-50},
    q = {50,  },
    r = {20, 0},
    s = {20,-30},
    t = {70,  },
    u = {50,-50},
    v = {100,  },
    w = {100,  },
    y = {50,  },
    z = {  ,-50}
  }

\SetProtrusion
  [ name     = pmnx-scit,
    load     = pmnj-scit ]
  { encoding = OT1,
    family   = pmnx,
    shape    = {scit,si} }
  {
    1 = {100,150}
  }

\SetProtrusion
  [ name     = pmnx-scit-T1,
    load     = pmnj-scit-T1 ]
  { encoding = {T1,LY1},
    family   = pmnx,
    shape    = {scit,si}    }
  {
    1 = {100,150}
  }

⟨/pmn⟩
⟨*ebg⟩
```

For small caps italics, we copy the definitions from the small caps settings, except that we first load the italics settings.

```
\SetProtrusion
  [ name     = EBGaramond-scit-OT1-Prop,
    load     = EBGaramond-it-OT1-LF ]
  { encoding = OT1,
    family   = {EBGaramond-LF,EBGaramond-OsF},
    shape    = scit }
  {
    a = {50,50},
  \ae = {50,  },
    d = {  ,50},
    f = {  ,50},
    g = {50,  },
    j = {50,  },
    l = {  ,50},
    o = {50,50},
  \oe = {50,  },
    q = {50,70},
    r = {  , 0},
    t = {50,50},
    y = {50,50}
  }

```

```
\SetProtrusion
   [ name     = EBGaramond-scit-OT1-Tab,
     load     = EBGaramond-it-OT1-TOsF ]
   { encoding = OT1,
     family   = {EBGaramond-TLF,EBGaramond-TOsF},
     shape    = scit }
   {
     a = {50,50},
   \ae = {50,  },
     d = {  ,50},
     f = {  ,50},
     g = {50,  },
     j = {50,  },
     l = {  ,50},
     o = {50,50},
   \oe = {50,  },
     q = {50,70},
     r = {  , 0},
     t = {50,50},
     y = {50,50}
   }

\SetProtrusion
   [ name     = EBGaramond-scit-T1-Prop,
     load     = EBGaramond-it-T1-LF ]
   { encoding = T1,
     family   = {EBGaramond-LF,EBGaramond-OsF},
     shape    = scit }
   {
     a = {50,50},
   \ae = {50,  },
     d = {  ,50},
     f = {  ,50},
     g = {50,  },
     j = {50,  },
     l = {  ,50},
     o = {50,50},
   \oe = {50,  },
     q = {50,70},
     r = {  , 0},
     t = {50,50},
     y = {50,50}
   }

\SetProtrusion
   [ name     = EBGaramond-scit-T1-Tab,
     load     = EBGaramond-it-T1-TOsF ]
   { encoding = T1,
     family   = {EBGaramond-TLF,EBGaramond-TOsF},
     shape    = scit }
   {
     a = {50,50},
   \ae = {50,  },
     d = {  ,50},
     f = {  ,50},
     g = {50,  },
     j = {50,  },
     l = {  ,50},
     o = {50,50},
   \oe = {50,  },
     q = {50,70},
     r = {  , 0},
     t = {50,50},
     y = {50,50}
   }
```

```
8323
8324 ⟨/ebg⟩
```

2.8.5 Text companion

Finally the TS1 encoding. Still quite incomplete for Times and especially Palatino. Anybody?

```
8325 \SetProtrusion
8326 ⟨m-t⟩   [ name     = textcomp ]
8327 ⟨bch⟩   [ name     = bch-textcomp ]
8328 ⟨blg⟩   [ name     = blg-textcomp ]
8329 ⟨cmr⟩   [ name     = cmr-textcomp ]
8330 ⟨ebg⟩   [ name     = EBGaramond-textcomp ]
8331 ⟨pmn⟩   [ name     = pmn-textcomp ]
8332 ⟨ppl⟩   [ name     = ppl-textcomp ]
8333 ⟨ptm⟩   [ name     = ptm-textcomp ]
8334 ⟨ugm⟩   [ name     = ugm-textcomp ]
8335 ⟨m-t⟩   { encoding = TS1      }
8336 ⟨!m-t⟩   { encoding = TS1,
8337 ⟨bch⟩     family   = bch }
8338 ⟨blg⟩     family   = blg }
8339 ⟨cmr⟩     family   = cmr }
8340 ⟨ebg⟩     family   = {EBGaramond-LF,EBGaramond-TLF,EBGaramond-OsF,EBGaramond-TOsF} }
8341 ⟨pmn⟩     family   = {pmnx,pmnj} }
8342 ⟨ppl⟩     family   = {ppl,pplx,pplj} }
8343 ⟨ptm⟩     family   = {ptm,ptmx,ptmj} }
8344 ⟨ugm⟩     family   = ugm }
8345    {
8346 ⟨blg⟩     \textquotestraightbase    = {400,500},
8347 ⟨cmr⟩     \textquotestraightbase    = {300,300},
8348 ⟨ebg|pmn⟩     \textquotestraightbase    = {400,400},
8349 ⟨blg⟩     \textquotestraightdblbase = {300,400},
8350 ⟨cmr|pmn⟩     \textquotestraightdblbase = {300,300},
8351 ⟨ebg⟩     \textquotestraightdblbase = {400,400},
8352 ⟨bch|cmr|ebg|pmn|ugm⟩     \texttwelveudash          = {200,200},
8353 ⟨bch|cmr|ebg|pmn⟩     \textthreequartersemdash  = {150,150},
8354 ⟨ugm⟩     \textthreequartersemdash  = {200,200},
8355 ⟨blg⟩     \textquotesingle          = {500,600},
8356 ⟨cmr|pmn⟩     \textquotesingle          = {300,400},
8357 ⟨ebg⟩     \textquotesingle          = {400,500},
8358 ⟨ptm⟩     \textquotesingle          = {500,500},
8359 ⟨ugm⟩     \textquotesingle          = {300,500},
8360 ⟨bch|cmr|pmn⟩     \textasteriskcentered     = {200,300},
8361 ⟨blg⟩     \textasteriskcentered     = {150,200},
8362 ⟨ebg⟩     \textasteriskcentered     = {300,300},
8363 ⟨ugm⟩     \textasteriskcentered     = {100,200},
8364 ⟨pmn⟩     \textfractionsolidus      = {-200,-200},
8365 ⟨cmr⟩     \textoneoldstyle          = {100,100},
8366 ⟨pmn⟩     \textoneoldstyle          = {   , 50},
8367 ⟨cmr⟩     \textthreeoldstyle        = {   , 50},
8368 ⟨ebg|pmn⟩     \textthreeoldstyle        = { 50,   },
8369 ⟨cmr⟩     \textfouroldstyle         = { 50, 50},
8370 ⟨ebg|pmn⟩     \textfouroldstyle         = { 50,   },
8371 ⟨cmr|ebg|pmn⟩     \textsevenoldstyle        = { 50, 80},
8372 ⟨cmr⟩     \textlangle               = {400,   },
8373 ⟨cmr⟩     \textrangle               = {   ,400},
8374 ⟨m-t|bch|pmn|ptm⟩     \textminus                = {200,200},
8375 ⟨cmr|ebg|ppl⟩     \textminus                = {300,300},
8376 ⟨blg|ugm⟩     \textminus                = {250,300},
8377 ⟨bch|ebg|pmn⟩     \textlbrackdbl            = {100,   },
8378 ⟨blg⟩     \textlbrackdbl            = {200,   },
8379 ⟨bch|ebg|pmn⟩     \textrbrackdbl            = {   ,100},
8380 ⟨blg⟩     \textrbrackdbl            = {   ,200},
8381 ⟨pmn⟩     \textasciigrave           = {200,500},
```

```
⟨bch|blg|cmr|ebg|pmn⟩     \texttildelow            = {200,250},
⟨pmn⟩     \textasciibreve          = {300,400},
⟨pmn⟩     \textasciicaron          = {300,400},
⟨pmn⟩     \textacutedbl            = {200,300},
⟨pmn⟩     \textgravedbl            = {150,300},
⟨bch|pmn|ugm⟩     \textdagger              = { 80, 80},
⟨blg⟩     \textdagger              = {200,200},
⟨cmr|ebg⟩     \textdagger              = {100,100},
⟨ptm⟩     \textdagger              = {150,150},
⟨blg⟩     \textdaggerdbl           = {150,150},
⟨cmr|ebg|pmn⟩     \textdaggerdbl           = { 80, 80},
⟨ptm⟩     \textdaggerdbl           = {100,100},
⟨bch⟩     \textbardbl              = {100,100},
⟨blg|ugm⟩     \textbardbl              = {150,150},
⟨bch⟩     \textbullet              = {200,200},
⟨blg⟩     \textbullet              = {400,500},
⟨cmr|ebg|pmn⟩     \textbullet              = {   ,100},
⟨ptm⟩     \textbullet              = {150,150},
⟨ugm⟩     \textbullet              = { 50,100},
⟨bch|cmr|pmn⟩     \textcelsius             = { 50,   },
⟨ebg⟩     \textcelsius             = { 80,   },
⟨bch⟩     \textflorin              = { 50, 50},
⟨blg⟩     \textflorin              = {100,100},
⟨ebg|ugm⟩     \textflorin              = {   ,100},
⟨pmn⟩     \textflorin              = { 50,100},
⟨ptm⟩     \textflorin              = { 50, 70},
⟨cmr⟩     \textcolonmonetary       = {   , 50},
⟨ebg|pmn⟩     \textcolonmonetary       = { 50,   },
⟨pmn⟩     \textinterrobang         = {   ,100},
⟨pmn⟩     \textinterrobangdown     = {100,   },
⟨m-t|ebg|ptm⟩     \texttrademark           = {100,100},
⟨bch⟩     \texttrademark           = {150,150},
⟨blg|cmr|ppl⟩     \texttrademark           = {200,200},
⟨pmn⟩     \texttrademark           = { 50, 50},
⟨ugm⟩     \texttrademark           = {100,150},
⟨bch|ugm⟩     \textcent                = { 50,   },
⟨ptm⟩     \textcent                = {100,100},
⟨bch⟩     \textsterling            = { 50,   },
⟨ugm⟩     \textsterling            = {   , 50},
⟨bch⟩     \textbrokenbar           = {200,200},
⟨blg⟩     \textbrokenbar           = {250,250},
⟨ugm⟩     \textbrokenbar           = {200,300},
⟨pmn⟩     \textasciidieresis       = {300,400},
⟨m-t|bch|cmr|ebg|ptm|ugm⟩     \textcopyright           = {100,100},
⟨pmn⟩     \textcopyright           = {100,150},
⟨ppl⟩     \textcopyright           = {200,200},
⟨bch|cmr|ugm⟩     \textordfeminine         = {100,200},
⟨ebg|pmn⟩     \textordfeminine         = {200,200},
⟨bch|cmr|ebg|pmn|ugm⟩     \textlnot                = {200,   },
⟨blg⟩     \textlnot                = {200,100},
⟨m-t|bch|cmr|ebg|ptm|ugm⟩     \textregistered          = {100,100},
⟨pmn⟩     \textregistered          = { 50,150},
⟨ppl⟩     \textregistered          = {200,200},
⟨pmn⟩     \textasciimacron         = {150,200},
⟨m-t|ppl|ptm⟩     \textdegree              = {300,300},
⟨bch⟩     \textdegree              = {150,200},
⟨blg|ugm⟩     \textdegree              = {200,200},
⟨cmr|ebg⟩     \textdegree              = {400,400},
⟨pmn⟩     \textdegree              = {150,400},
⟨bch|cmr|ebg|pmn|ugm⟩     \textpm                  = {150,200},
⟨blg⟩     \textpm                  = {100,100},
⟨ptm⟩     \textpm                  = { 50, 80},
⟨bch|blg|ugm⟩     \texttwosuperior         = {100,200},
⟨cmr⟩     \texttwosuperior         = { 50,100},
⟨ebg|pmn⟩     \texttwosuperior         = {200,200},
```

```
⟨ptm⟩     \texttwosuperior          = { 50, 50},
⟨bch|blg|ugm⟩     \textthreesuperior        = {100,200},
⟨cmr⟩     \textthreesuperior        = { 50,100},
⟨ebg|pmn⟩     \textthreesuperior        = {200,200},
⟨ptm⟩     \textthreesuperior        = { 50, 50},
⟨pmn⟩     \textasciiacute           = {300,400},
⟨bch|ugm⟩     \textmu                   = {   ,100},
⟨bch|ebg|pmn⟩     \textparagraph            = {   ,100},
⟨bch|cmr|ebg|pmn⟩     \textperiodcentered       = {300,400},
⟨blg⟩     \textperiodcentered       = {400,500},
⟨ptm⟩     \textperiodcentered       = {300,300},
⟨ugm⟩     \textperiodcentered       = {200,500},
⟨bch|blg|ugm⟩     \textonesuperior          = {200,300},
⟨cmr|ebg|pmn⟩     \textonesuperior          = {200,200},
⟨ptm⟩     \textonesuperior          = {100,100},
⟨bch|ebg|pmn|ugm⟩     \textordmasculine         = {200,200},
⟨blg|cmr⟩     \textordmasculine         = {100,200},
⟨bch|cmr|pmn⟩     \texteuro                 = {100,   },
⟨ebg⟩     \texteuro                 = { 50,100},
⟨bch⟩     \texttimes                = {200,200},
⟨blg|ptm⟩     \texttimes                = {100,100},
⟨cmr⟩     \texttimes                = {150,250},
⟨ebg⟩     \texttimes                = {100,150},
⟨pmn⟩     \texttimes                = { 70,100},
⟨ugm⟩     \texttimes                = {200,300},
⟨bch|ebg|pmn⟩     \textdiv                  = {150,200}
⟨blg⟩     \textdiv                  = {100,100}
⟨cmr⟩     \textdiv                  = {150,250}
⟨ptm⟩     \textdiv                  = { 50,100},
⟨ugm⟩     \textdiv                  = {200,300},
⟨ptm⟩     \textperthousand          = {    ,50}
⟨ugm⟩     \textsection              = {   ,100},
⟨ugm⟩     \textonehalf              = { 50,100},
⟨ugm⟩     \textonequarter           = { 50,100},
⟨ugm⟩     \textthreequarters        = { 50,100},
⟨ugm⟩     \textsurd                 = {   ,100}
```

Remaining slots in the source file.

```
   }

⟨*cmr|ebg|pmn|ugm⟩
\SetProtrusion
⟨cmr⟩   [ name     = cmr-textcomp-it ]
⟨ebg⟩   [ name     = EBGaramond-textcomp-it ]
⟨pmn⟩   [ name     = pmn-textcomp-it ]
⟨ugm⟩   [ name     = ugm-textcomp-it ]
   { encoding = TS1,
⟨cmr⟩     family   = cmr,
⟨ebg⟩     family   = {EBGaramond-LF,EBGaramond-TLF,EBGaramond-OsF,EBGaramond-TOsF},
⟨pmn⟩     family   = {pmnx,pmnj},
⟨ugm⟩     family   = ugm,
⟨cmr|pmn⟩     shape    = {it,sl} }
⟨ebg|ugm⟩     shape    = it }
   {
⟨cmr⟩     \textquotestraightbase    = {300,600},
⟨ebg|pmn⟩     \textquotestraightbase    = {400,400},
⟨cmr⟩     \textquotestraightdblbase = {300,600},
⟨ebg⟩     \textquotestraightdblbase = {300,400},
⟨pmn⟩     \textquotestraightdblbase = {300,300},
     \texttwelveudash          = {200,200},
⟨cmr|ebg|pmn⟩     \textthreequartersemdash  = {150,150},
⟨ugm⟩     \textthreequartersemdash  = {200,200},
⟨cmr⟩     \textquotesingle          = {600,300},
⟨ebg⟩     \textquotesingle          = {800,100},
⟨pmn⟩     \textquotesingle          = {300,200},
```

```
8510 ⟨ugm⟩      \textquotesingle          = {500,500},
8511 ⟨cmr⟩      \textasteriskcentered     = {300,200},
8512 ⟨ebg⟩      \textasteriskcentered     = {500,100},
8513 ⟨pmn⟩      \textasteriskcentered     = {200,300},
8514 ⟨ugm⟩      \textasteriskcentered     = {300,150},
8515 ⟨pmn⟩      \textfractionsolidus      = {-200,-200},
8516 ⟨cmr⟩      \textoneoldstyle          = {100, 50},
8517 ⟨ebg⟩      \textoneoldstyle          = {100,   },
8518 ⟨pmn⟩      \textoneoldstyle          = { 50,   },
8519 ⟨ebg⟩      \texttwooldstyle          = { 50,   },
8520 ⟨pmn⟩      \texttwooldstyle          = {-50,   },
8521 ⟨cmr⟩      \textthreeoldstyle        = {100, 50},
8522 ⟨pmn⟩      \textthreeoldstyle        = {-100,  },
8523 ⟨cmr⟩      \textfouroldstyle         = { 50, 50},
8524 ⟨ebg⟩      \textfouroldstyle         = { 50,100},
8525 ⟨cmr⟩      \textsevenoldstyle        = { 50, 80},
8526 ⟨ebg⟩      \textsevenoldstyle        = { 50,   },
8527 ⟨pmn⟩      \textsevenoldstyle        = { 20,   },
8528 ⟨cmr⟩      \textlangle               = {400,   },
8529 ⟨cmr⟩      \textrangle               = {   ,400},
8530 ⟨cmr|ebg⟩      \textminus               = {300,300},
8531 ⟨pmn⟩      \textminus                = {200,200},
8532 ⟨ugm⟩      \textminus                = {250,300},
8533 ⟨ebg|pmn⟩      \textlbrackdbl           = {100,   },
8534 ⟨ebg|pmn⟩      \textrbrackdbl           = {   ,100},
8535 ⟨pmn⟩      \textasciigrave           = {300,300},
8536 ⟨cmr|ebg|pmn⟩      \texttildelow            = {200,250},
8537 ⟨pmn⟩      \textasciibreve           = {300,300},
8538 ⟨pmn⟩      \textasciicaron           = {300,300},
8539 ⟨pmn⟩      \textacutedbl             = {200,300},
8540 ⟨pmn⟩      \textgravedbl             = {150,300},
8541 ⟨cmr⟩      \textdagger               = {100,100},
8542 ⟨ebg⟩      \textdagger               = {200,100},
8543 ⟨pmn⟩      \textdagger               = { 80, 50},
8544 ⟨ugm⟩      \textdagger               = { 80, 80},
8545 ⟨cmr|ebg⟩      \textdaggerdbl           = { 80, 80},
8546 ⟨pmn⟩      \textdaggerdbl            = { 80, 50},
8547 ⟨ugm⟩      \textbardbl               = {150,150},
8548 ⟨cmr⟩      \textbullet               = {200,100},
8549 ⟨ebg⟩      \textbullet               = {300,   },
8550 ⟨pmn⟩      \textbullet               = { 30, 70},
8551 ⟨ugm⟩      \textbullet               = { 50,100},
8552 ⟨cmr⟩      \textcelsius              = {100,   },
8553 ⟨ebg⟩      \textcelsius              = {200,   },
8554 ⟨pmn⟩      \textcelsius              = { 50,-50},
8555 ⟨ebg⟩      \textflorin               = {100,   },
8556 ⟨pmn⟩      \textflorin               = { 50,100},
8557 ⟨ugm⟩      \textflorin               = {   ,100},
8558 ⟨cmr⟩      \textcolonmonetary        = {150,   },
8559 ⟨ebg⟩      \textcolonmonetary        = {100,   },
8560 ⟨pmn⟩      \textcolonmonetary        = { 50,-50},
8561 ⟨cmr|ebg⟩      \texttrademark           = {200,   },
8562 ⟨pmn⟩      \texttrademark            = { 50,100},
8563 ⟨ugm⟩      \texttrademark            = {150, 50},
8564 ⟨ugm⟩      \textcent                 = { 50,   },
8565 ⟨ugm⟩      \textsterling             = {   , 50},
8566 ⟨ugm⟩      \textbrokenbar            = {200,300},
8567 ⟨pmn⟩      \textasciidieresis        = {300,200},
8568 ⟨cmr⟩      \textcopyright            = {100,   },
8569 ⟨ebg⟩      \textcopyright            = {200,100},
8570 ⟨pmn⟩      \textcopyright            = {100,150},
8571 ⟨ugm⟩      \textcopyright            = {300,   },
8572 ⟨cmr⟩      \textordfeminine          = {100,100},
8573 ⟨pmn⟩      \textordfeminine          = {200,200},
8574 ⟨ugm⟩      \textordfeminine          = {100,200},
```

```
⟨cmr|ebg⟩     \textlnot                = {300,   },
⟨pmn|ugm⟩     \textlnot                = {200,   },
⟨cmr⟩      \textregistered          = {100,   },
⟨ebg⟩      \textregistered          = {200,100},
⟨pmn⟩      \textregistered          = { 50,150},
⟨ugm⟩      \textregistered          = {300,   },
⟨pmn⟩      \textasciimacron         = {150,200},
⟨cmr|ebg⟩     \textdegree              = {500,100},
⟨pmn⟩      \textdegree              = {150,150},
⟨ugm⟩      \textdegree              = {300,200},
⟨cmr⟩      \textpm                  = {150,100},
⟨ebg⟩      \textpm                  = {200,150},
⟨pmn|ugm⟩     \textpm                  = {150,200},
⟨cmr⟩      \textonesuperior         = {400,   },
⟨ebg⟩      \textonesuperior         = {300,100},
⟨pmn⟩      \textonesuperior         = {200,100},
⟨ugm⟩      \textonesuperior         = {300,300},
⟨cmr⟩      \texttwosuperior         = {400,   },
⟨ebg⟩      \texttwosuperior         = {300,   },
⟨pmn⟩      \texttwosuperior         = {200,100},
⟨ugm⟩      \texttwosuperior         = {300,200},
⟨cmr⟩      \textthreesuperior       = {400,   },
⟨ebg⟩      \textthreesuperior       = {300,   },
⟨pmn⟩      \textthreesuperior       = {200,100},
⟨ugm⟩      \textthreesuperior       = {300,200},
⟨ugm⟩      \textmu                  = {   ,100},
⟨pmn⟩      \textasciiacute          = {300,200},
⟨cmr⟩      \textparagraph           = {200,   },
⟨pmn⟩      \textparagraph           = {   ,100},
⟨cmr⟩      \textperiodcentered      = {500,500},
⟨ebg|pmn|ugm⟩     \textperiodcentered      = {300,400},
⟨cmr⟩      \textordmasculine        = {100,100},
⟨pmn⟩      \textordmasculine        = {200,200},
⟨ugm⟩      \textordmasculine        = {300,200},
⟨cmr⟩      \texteuro                = {200,   },
⟨ebg⟩      \texteuro                = {100,   },
⟨pmn⟩      \texteuro                = {100,-50},
⟨cmr⟩      \texttimes               = {200,200},
⟨ebg⟩      \texttimes               = {200,100},
⟨pmn⟩      \texttimes               = { 70,100},
⟨ugm⟩      \texttimes               = {200,300},
⟨cmr|ebg⟩     \textdiv                 = {200,200}
⟨pmn⟩      \textdiv                 = {150,200}
⟨ugm⟩      \textdiv                 = {200,300},
⟨ugm⟩      \textsection             = {   ,200},
⟨ugm⟩      \textonehalf             = { 50,100},
⟨ugm⟩      \textonequarter          = { 50,100},
⟨ugm⟩      \textthreequarters       = { 50,100},
⟨ugm⟩      \textsurd                = {   ,100}
   }

⟨/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}
```

`\mathit` (OT1/cmr/m/it) is also already set up.
There are (for the moment) no settings for `\mathsf` and `\mathtt`.
Math font '`letters`' (also used as `\mathnormal`) is declared as:

```
\DeclareSymbolFont{letters}    {OML}{cmm}{m}{it}
\SetSymbolFont{letters}  {bold}{OML}{cmm}{b}{it}
```

```
⟨*cmr⟩
\SetProtrusion
   [ name     = cmr-math-letters ]
   { encoding = OML,
     family   = cmm,
     series   = {m,b},
     shape    = it    }
   {
       A = {100, 50}, % \mathnormal
       B = { 50,   },
       C = { 50,   },
       D = { 50, 50},
       E = { 50,   },
       F = {100, 50},
       G = { 50, 50},
       H = { 50, 50},
       I = { 50, 50},
       J = {150, 50},
       K = { 50,100},
       L = { 50, 50},
       M = { 50,   },
       N = { 50,   },
       O = { 50,   },
       P = { 50,   },
       Q = { 50, 50},
       R = { 50,   },
       S = { 50,   },
       T = { 50,100},
       U = { 50, 50},
       V = {100,100},
       W = { 50,100},
       X = { 50,100},
       Y = {100,100},
       f = {100,100},
       h = {   ,100},
       i = {   , 50},
       j = {   , 50},
       k = {   , 50},
       r = {   , 50},
       v = {   , 50},
       w = {   , 50},
       x = {   , 50},
     "0B = { 50,100}, % \alpha
     "0C = { 50, 50}, % \beta
     "0D = {200,150}, % \gamma
     "0E = { 50, 50}, % \delta
     "0F = { 50, 50}, % \epsilon
     "10 = { 50,150}, % \zeta
     "12 = { 50,   }, % \theta
     "13 = {   ,100}, % \iota
     "14 = {   ,100}, % \kappa
     "15 = {100, 50}, % \lambda
     "16 = {   , 50}, % \mu
     "17 = {   , 50}, % \nu
     "18 = {   , 50}, % \xi
     "19 = { 50,100}, % \pi
     "1A = { 50, 50}, % \rho
     "1B = {   ,150}, % \sigma
```

```
    "1C = { 50,150}, % \tau
    "1D = { 50, 50}, % \upsilon
    "1F = { 50,100}, % \chi
    "20 = { 50, 50}, % \psi
    "21 = {   , 50}, % \omega
    "22 = {   , 50}, % \varepsilon
    "23 = {   , 50}, % \vartheta
    "24 = {   , 50}, % \varpi
    "25 = {100,   }, % \varrho
    "26 = {100,100}, % \varsigma
    "27 = { 50, 50}, % \varphi
    "28 = {100,100}, % \leftharpoonup
    "29 = {100,100}, % \leftharpoondown
    "2A = {100,100}, % \rightharpoonup
    "2B = {100,100}, % \rightharpoondown
    "2C = {300,200}, % \lhook
    "2D = {200,300}, % \rhook
    "2E = {   ,100}, % \triangleright
    "2F = {100,   }, % \triangleleft
    "3A = {   ,500}, % ., \ldotp
    "3B = {   ,500}, % ,
    "3C = {200,100}, % <
    "3D = {300,400}, % /
    "3E = {100,200}, % >
    "3F = {200,200}, % \star
    "5B = {   ,100}, % \flat
    "5E = {200,200}, % \smile
    "5F = {200,200}, % \frown
    "7C = {100,   }, % \jmath
    "7D = {   ,100}  % \wp
```

Remaining slots in the source file.

```
  }

```

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}
```

```
\SetProtrusion
  [ name     = cmr-math-symbols ]
  { encoding = OMS,
    family   = cmsy,
    series   = {m,b},
    shape    = n  }
  {
     A = {150, 50}, % \mathcal
     C = {   ,100},
     D = {   , 50},
     F = { 50,150},
     I = {   ,100},
     J = {100,150},
     K = {   ,100},
     L = {100,   },
     M = { 50, 50},
     N = { 50,100},
     P = {   , 50},
     Q = { 50,   },
     R = {   , 50},
     T = { 50,150},
     V = { 50, 50},
     W = {   , 50},
     X = {100,100},
     Y = {100,   },
     Z = {100,150},
```

```
8743      "00 = {300,300}, % -
8744      "01 = {   ,700}, % \cdot, \cdotp
8745      "02 = {150,250}, % \times
8746      "03 = {150,250}, % *, \ast
8747      "04 = {200,300}, % \div
8748      "05 = {150,250}, % \diamond
8749      "06 = {200,200}, % \pm
8750      "07 = {200,200}, % \mp
8751      "08 = {100,100}, % \oplus
8752      "09 = {100,100}, % \ominus
8753      "0A = {100,100}, % \otimes
8754      "0B = {100,100}, % \oslash
8755      "0C = {100,100}, % \odot
8756      "0D = {100,100}, % \bigcirc
8757      "0E = {100,100}, % \circ
8758      "0F = {100,100}, % \bullet
8759      "10 = {100,100}, % \asymp
8760      "11 = {100,100}, % \equiv
8761      "12 = {200,100}, % \subseteq
8762      "13 = {100,200}, % \supseteq
8763      "14 = {200,100}, % \leq
8764      "15 = {100,200}, % \geq
8765      "16 = {200,100}, % \preceq
8766      "17 = {100,200}, % \succeq
8767      "18 = {200,200}, % \sim
8768      "19 = {150,150}, % \approx
8769      "1A = {200,100}, % \subset
8770      "1B = {100,200}, % \supset
8771      "1C = {200,100}, % \ll
8772      "1D = {100,200}, % \gg
8773      "1E = {300,100}, % \prec
8774      "1F = {100,300}, % \succ
8775      "20 = {100,200}, % \leftarrow
8776      "21 = {200,100}, % \rightarrow
8777      "22 = {100,100}, % \uparrow
8778      "23 = {100,100}, % \downarrow
8779      "24 = {100,100}, % \leftrightarrow
8780      "25 = {100,100}, % \nearrow
8781      "26 = {100,100}, % \searrow
8782      "27 = {100,100}, % \simeq
8783      "28 = {100,100}, % \Leftarrow
8784      "29 = {100,100}, % \Rightarrow
8785      "2A = {100,100}, % \Uparrow
8786      "2B = {100,100}, % \Downarrow
8787      "2C = {100,100}, % \Leftrightarrow
8788      "2D = {100,100}, % \nwarrow
8789      "2E = {100,100}, % \swarrow
8790      "2F = {   ,100}, % \propto
8791      "30 = {   ,400}, % \prime
8792      "31 = {100,100}, % \infty
8793      "32 = {150,100}, % \in
8794      "33 = {100,150}, % \ni
8795      "34 = {100,100}, % \triangle, \bigtriangleup
8796      "35 = {100,100}, % \bigtriangledown
8797      "38 = {   ,100}, % \forall
8798      "39 = {100,   }, % \exists
8799      "3A = {200,   }, % \neg
8800      "3E = {200,200}, % \top
8801      "3F = {200,200}, % \bot, \perp
8802      "5E = {100,200}, % \wedge
8803      "5F = {100,200}, % \vee
8804      "60 = {   ,300}, % \vdash
8805      "61 = {300,   }, % \dashv
8806      "62 = {100,100}, % \lfloor
8807      "63 = {100,100}, % \rfloor
```

```
    "64 = {100,100}, % \lceil
    "65 = {100,100}, % \rceil
    "66 = {150,   }, % \lbrace
    "67 = {   ,150}, % \rbrace
    "68 = {400,   }, % \langle
    "69 = {   ,400}, % \rangle
    "6C = {100,100}, % \updownarrow
    "6D = {100,100}, % \Updownarrow
    "6E = {100,300}, % \, \backslash, \setminus
    "72 = {100,100}, % \nabla
    "79 = {200,200}, % \dagger
    "7A = {100,100}, % \ddagger
    "7B = {100,   }, % \mathparagraph
    "7C = {100,100}, % \clubsuit
    "7D = {100,100}, % \diamondsuit
    "7E = {100,100}, % \heartsuit
    "7F = {100,100}  % \spadesuit
```

Remaining slots in the source file.

```
  }

```

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}
```

⟨/cmr⟩
⟨/cfg-t⟩

2.8.7 AMS symbols

Settings for the AMS math fonts (`amssymb`).

⟨*cfg-u⟩

Symbol font 'a'.

```
⟨*msa⟩
\SetProtrusion
  [ name     = AMS-a ]
  { encoding = U,
    family   = msa  }
  {
    "05  =  {150,250},  % \centerdot
    "06  =  {100,100},  % \lozenge
    "07  =  { 50, 50},  % \blacklozenge
    "08  =  { 50, 50},  % \circlearrowright
    "09  =  { 50, 50},  % \circlearrowleft
    "0A  =  {100,100},  % \rightleftharpoons
    "0B  =  {100,100},  % \leftrightharpoons
    "0D  =  {-50,200},  % \Vdash
    "0E  =  {-50,200},  % \Vvdash
    "0F  =  {-70,150},  % \vDash
    "10  =  {100,150},  % \twoheadrightarrow
    "11  =  {100,150},  % \twoheadleftarrow
    "12  =  { 50,100},  % \leftleftarrows
    "13  =  { 50, 80},  % \rightrightarrows
    "14  =  {120,120},  % \upuparrows
    "15  =  {120,120},  % \downdownarrows
    "16  =  {200,200},  % \upharpoonright
    "17  =  {200,200},  % \downharpoonright
    "18  =  {200,200},  % \upharpoonleft
    "19  =  {200,200},  % \downharpoonleft
    "1A  =  { 80,100},  % \rightarrowtail
    "1B  =  { 80,100},  % \leftarrowtail
```

```
8858      "1C  =  { 50, 50},  % \leftrightarrows
8859      "1D  =  { 50, 50},  % \rightleftarrows
8860      "1E  =  {250,   },  % \Lsh
8861      "1F  =  {   ,250},  % \Rsh
8862      "20  =  {100,100},  % \rightsquigarrow
8863      "21  =  {100,100},  % \leftrightsquigarrow
8864      "22  =  {100, 50},  % \looparrowleft
8865      "23  =  { 50,100},  % \looparrowright
8866      "24  =  { 50, 80},  % \circeq
8867      "25  =  {   ,100},  % \succsim
8868      "26  =  {   ,100},  % \gtrsim
8869      "27  =  {   ,100},  % \gtrapprox
8870      "28  =  {150, 50},  % \multimap
8871      "2B  =  {100,150},  % \doteqdot
8872      "2C  =  {100,150},  % \triangleq
8873      "2D  =  {100, 50},  % \precsim
8874      "2E  =  {100, 50},  % \lesssim
8875      "2F  =  { 50, 50},  % \lessapprox
8876      "30  =  {100, 50},  % \eqslantless
8877      "31  =  { 50, 50},  % \eqslantgtr
8878      "32  =  {100, 50},  % \curlyeqprec
8879      "33  =  { 50,100},  % \curlyeqsucc
8880      "34  =  {100, 50},  % \preccurlyeq
8881      "36  =  { 50,   },  % \leqslant
8882      "38  =  {   , 50},  % \backprime
8883      "39  =  {250,250},  % \dabar@ : the dash bar in \dash(left,right)arrow
8884      "3C  =  { 50,100},  % \succcurlyeq
8885      "3E  =  {   , 50},  % \geqslant
8886      "40  =  {   , 50},  % \sqsubset
8887      "41  =  { 50,   },  % \sqsupset
8888      "42  =  {   ,150},  % \vartriangleright, \rhd
8889      "43  =  {150,   },  % \vartriangleleft, \lhd
8890      "44  =  {   ,100},  % \trianglerighteq, \unrhd
8891      "45  =  {100,   },  % \triangleleftteq, \unlhd
8892      "46  =  {100,100},  % \bigstar
8893      "48  =  { 50, 50},  % \blacktriangledown
8894      "49  =  {   ,100},  % \blacktriangleright
8895      "4A  =  {100,   },  % \blacktriangleleft
8896      "4B  =  {   ,150},  % \dashrightarrow (the arrow)
8897      "4C  =  {150,   },  % \dashleftarrow
8898      "4D  =  { 50, 50},  % \vartriangle
8899      "4E  =  { 50, 50},  % \blacktriangle
8900      "4F  =  { 50, 50},  % \triangledown
8901      "50  =  { 50, 50},  % \eqcirc
8902      "56  =  {   ,150},  % \Rrightarrow
8903      "57  =  {150,   },  % \Lleftarrow
8904      "58  =  {100,300},  % \checkmark
8905      "5C  =  { 50, 50},  % \angle
8906      "5D  =  { 50, 50},  % \measuredangle
8907      "5E  =  { 50, 50},  % \sphericalangle
8908      "5F  =  {   , 50},  % \varpropto
8909      "60  =  {100,100},  % \smallsmile
8910      "61  =  {100,100},  % \smallfrown
8911      "62  =  { 50,   },  % \Subset
8912      "63  =  {   , 50},  % \Supset
8913      "66  =  {150,150},  % \curlywedge
8914      "67  =  {150,150},  % \curlyvee
8915      "68  =  { 50,150},  % \leftthreetimes
8916      "69  =  {100, 50},  % \rightthreetimes
8917      "6C  =  { 50, 50},  % \bumpeq
8918      "6D  =  { 50, 50},  % \Bumpeq
8919      "6E  =  {100,   },  % \lll
8920      "6F  =  {   ,100},  % \ggg
8921      "70  =  { 50,100},  % \ulcorner
8922      "71  =  {100, 50},  % \urcorner
```

```
    "75  =  {150,200},  % \dotplus
    "76  =  { 50,100},  % \backsim
    "78  =  { 50,100},  % \llcorner
    "79  =  {100, 50},  % \lrcorner
    "7C  =  {100,100},  % \intercal
    "7D  =  { 50, 50},  % \circledcirc
    "7E  =  { 50, 50},  % \circledast
    "7F  =  { 50, 50}   % \circleddash
```

Remaining slots in the source file.

```
  }

⟨/msa⟩
```

Symbol font ‘b’.

```
⟨*msb⟩
\SetProtrusion
  [ name     = AMS-b ]
  { encoding = U,
    family   = msb  }
  {
      A  =  { 50, 50},  % \mathbb
      C  =  { 50, 50},
      G  =  {   , 50},
      L  =  {   , 50},
      P  =  {   , 50},
      R  =  {   , 50},
      T  =  {   , 50},
      V  =  { 50, 50},
      X  =  { 50, 50},
      Y  =  { 50, 50},
    "00  =  { 50, 50},  % \lvertneqq
    "01  =  { 50, 50},  % \gvertneqq
    "02  =  { 50, 50},  % \nleq
    "03  =  { 50, 50},  % \ngeq
    "04  =  {100, 50},  % \nless
    "05  =  { 50,150},  % \ngtr
    "06  =  {100, 50},  % \nprec
    "07  =  { 50,150},  % \nsucc
    "08  =  { 50, 50},  % \lneqq
    "09  =  { 50, 50},  % \gneqq
    "0A  =  {100,100},  % \nleqslant
    "0B  =  {100,100},  % \ngeqslant
    "0C  =  {100, 50},  % \lneq
    "0D  =  { 50,100},  % \gneq
    "0E  =  {100, 50},  % \npreceq
    "0F  =  { 50,100},  % \nsucceq
    "10  =  { 50,   },  % \precnsim
    "11  =  { 50, 50},  % \succnsim
    "12  =  { 50, 50},  % \lnsim
    "13  =  { 50, 50},  % \gnsim
    "14  =  { 50, 50},  % \nleqq
    "15  =  { 50, 50},  % \ngeqq
    "16  =  { 50, 50},  % \precneqq
    "17  =  { 50, 50},  % \succneqq
    "18  =  { 50, 50},  % \precnapprox
    "19  =  { 50, 50},  % \succnapprox
    "1A  =  { 50, 50},  % \lnapprox
    "1B  =  { 50, 50},  % \gnapprox
    "1C  =  {150,200},  % \nsim
    "1D  =  { 50, 50},  % \ncong
    "1E  =  {100,150},  % \diagup
    "1F  =  {100,150},  % \diagdown
    "20  =  {100, 50},  % \varsubsetneq
    "21  =  { 50,100},  % \varsupsetneq
```

```
      "22  =  {100, 50},  % \nsubseteqq
      "23  =  { 50,100},  % \nsupseteqq
      "24  =  {100, 50},  % \subsetneqq
      "25  =  { 50,100},  % \supsetneqq
      "26  =  {100, 50},  % \varsubsetneqq
      "27  =  { 50,100},  % \varsupsetneqq
      "28  =  {100, 50},  % \subsetneq
      "29  =  { 50,100},  % \supsetneq
      "2A  =  {100, 50},  % \nsubseteq
      "2B  =  { 50,100},  % \nsupseteq
      "2C  =  { 50,100},  % \nparallel
      "2D  =  {100,150},  % \nmid
      "2E  =  {150,150},  % \nshortmid
      "2F  =  {100,100},  % \nshortparallel
      "30  =  {   ,150},  % \nvdash
      "31  =  {   ,150},  % \nVdash
      "32  =  {   ,100},  % \nvDash
      "33  =  {   ,100},  % \nVDash
      "34  =  {   ,100},  % \ntrianglerighteq
      "35  =  {100,   },  % \ntrianglelefteq
      "36  =  {100,   },  % \ntriangleleft
      "37  =  {   ,100},  % \ntriangleright
      "38  =  {100,200},  % \nleftarrow
      "39  =  {100,200},  % \nrightarrow
      "3A  =  {100,100},  % \nLeftarrow
      "3B  =  { 50,100},  % \nRightarrow
      "3C  =  {100,100},  % \nLeftrightarrow
      "3D  =  {100,200},  % \nleftrightarrow
      "3E  =  { 50, 50},  % \divideontimes
      "3F  =  { 50, 50},  % \varnothing
      "60  =  {200,   },  % \Finv
      "61  =  {   , 50},  % \Game
      "68  =  {100,100},  % \eqsim
      "69  =  { 50,   },  % \beth
      "6A  =  { 50,   },  % \gimel
      "6B  =  {150,   },  % \daleth
      "6C  =  {200,   },  % \lessdot
      "6D  =  {   ,200},  % \gtrdot
      "6E  =  {100,200},  % \ltimes
      "6F  =  {150,100},  % \rtimes
      "70  =  { 50,100},  % \shortmid
      "71  =  { 50, 50},  % \shortparallel
      "72  =  {200,300},  % \smallsetminus
      "73  =  {100,200},  % \thicksim
      "74  =  { 50,100},  % \thickapprox
      "75  =  { 50, 50},  % \approxeq
      "76  =  { 50,100},  % \succapprox
      "77  =  { 50, 50},  % \precapprox
      "78  =  {100,100},  % \curvearrowleft
      "79  =  { 50,150},  % \curvearrowright
      "7A  =  { 50,200},  % \digamma
      "7B  =  {100, 50},  % \varkappa
      "7F  =  {200,   }   % \backepsilon
```

Remaining slots in the source file.

```
   }

⟨/msb⟩
```

2.8.8 Euler

Euler Roman font (package `euler`).

```
⟨*eur⟩
\SetProtrusion
```

```
  [ name     = euler ]
  { encoding = U,
    family   = eur  }
  {
    "01  =  {100,100},
    "03  =  {100,150},
    "06  =  {   ,100},
    "07  =  {100,150},
    "08  =  {100,100},
    "0A  =  {100,100},
    "0B  =  {   , 50},
    "0C  =  {   ,100},
    "0D  =  {100,100},
    "0E  =  {   ,100},
    "0F  =  {100,100},
    "10  =  {100,100},
    "13  =  {   ,100},
    "14  =  {   ,100},
    "15  =  {   , 50},
    "16  =  {   , 50},
    "17  =  { 50,100},
    "18  =  { 50,100},
    "1A  =  {   , 50},
    "1B  =  {   , 50},
    "1C  =  { 50,100},
    "1D  =  { 50,100},
    "1E  =  { 50,100},
    "1F  =  { 50,100},
    "20  =  {   , 50},
    "21  =  {   , 50},
    "22  =  { 50,100},
    "24  =  {   , 50},
    "27  =  { 50,100},
      1  =  {100,100},
      7  =  { 50,100},
    "3A  =  {300,500},
    "3B  =  {200,400},
    "3C  =  {200,100},
    "3D  =  {200,200},
    "3E  =  {100,200},
      A  =  {   ,100},
      D  =  {   , 50},
      J  =  { 50,   },
      K  =  {   , 50},
      L  =  {   , 50},
      Q  =  {   , 50},
      T  =  { 50,   },
      X  =  { 50, 50},
      Y  =  { 50,   },
      h  =  {   , 50},
      k  =  {   , 50}
  }

```

Extended by the `eulervm` package.

```
\SetProtrusion
  [ name     = euler-vm,
    load     = euler ]
  { encoding = U,
    family   = zeur  }
  {
    "28  =  {100,200},
    "29  =  {100,200},
    "2A  =  {100,150},
    "2B  =  {100,150},
```

```
    "2C  =  {200,300},
    "2D  =  {200,300},
    "2E  =  {   ,100},
    "2F  =  {100,   },
    "3F  =  {150,150},
    "5B  =  {   ,100},
    "5E  =  {100,100},
    "5F  =  {100,100},
    "80  =  {   , 50},
    "81  =  {200,250},
    "82  =  {100,200}
  }

⟨/eur⟩
```

Euler Script font (`eucal`).

```
⟨*eus⟩
\SetProtrusion
  [ name     = euscript ]
  { encoding = U,
    family   = eus  }
  {
      A  =  {100,100},
      B  =  { 50,100},
      C  =  { 50, 50},
      D  =  { 50,100},
      E  =  { 50,100},
      F  =  { 50,   },
      G  =  { 50,   },
      H  =  {   ,100},
      K  =  {   , 50},
      L  =  {   ,150},
      M  =  {   , 50},
      N  =  {   , 50},
      O  =  { 50, 50},
      P  =  { 50, 50},
      T  =  {   ,100},
      U  =  {   , 50},
      V  =  { 50, 50},
      W  =  { 50, 50},
      X  =  { 50, 50},
      Y  =  { 50,   },
      Z  =  { 50,100},
    "00  =  {250,250},
    "18  =  {200,200},
    "3A  =  {200,150},
    "40  =  {   ,100},
    "5E  =  {100,100},
    "5F  =  {100,100},
    "66  =  { 50,   },
    "67  =  {   , 50},
    "6E  =  {200,200}
  }

\SetProtrusion
  [ name     = euscript-vm,
    load     = euscript ]
  { encoding = U,
    family   = zeus  }
  {
    "01  =  {600,600},
    "02  =  {200,200},
    "03  =  {200,200},
    "04  =  {200,200},
    "05  =  {150,150},
```

```
9168      "06  =  {200,200},
9169      "07  =  {200,200},
9170      "08  =  {100,100},
9171      "09  =  {100,100},
9172      "0A  =  {100,100},
9173      "0B  =  {100,100},
9174      "0C  =  {100,100},
9175      "0D  =  {100,100},
9176      "0E  =  {150,150},
9177      "0F  =  {100,100},
9178      "10  =  {150,150},
9179      "11  =  {100,100},
9180      "12  =  {150,100},
9181      "13  =  {100,150},
9182      "14  =  {150,100},
9183      "15  =  {100,150},
9184      "16  =  {200,100},
9185      "17  =  {100,200},
9186      "19  =  {150,150},
9187      "1A  =  {150,100},
9188      "1B  =  {100,150},
9189      "1C  =  {100,100},
9190      "1D  =  {100,100},
9191      "1E  =  {250,100},
9192      "1F  =  {100,250},
9193      "20  =  {150,200},
9194      "21  =  {150,200},
9195      "22  =  {150,150},
9196      "23  =  {150,150},
9197      "24  =  {100,200},
9198      "25  =  {150,150},
9199      "26  =  {150,150},
9200      "27  =  {100,100},
9201      "28  =  {100,100},
9202      "29  =  {100,150},
9203      "2A  =  {100,100},
9204      "2B  =  {100,100},
9205      "2C  =  {100,100},
9206      "2D  =  {150,150},
9207      "2E  =  {150,150},
9208      "2F  =  {100,100},
9209      "30  =  {100,100},
9210      "31  =  {100,100},
9211      "32  =  {100,100},
9212      "33  =  {100,100},
9213      "34  =  {100,100},
9214      "35  =  {100,100},
9215      "3E  =  {150,150},
9216      "3F  =  {150,150},
9217      "60  =  {   ,200},
9218      "61  =  {200,   },
9219      "62  =  {100,100},
9220      "63  =  {100,100},
9221      "64  =  {100,100},
9222      "65  =  {100,100},
9223      "68  =  {300,   },
9224      "69  =  {   ,300},
9225      "6C  =  {100,100},
9226      "6D  =  {100,100},
9227      "6F  =  {100,100},
9228      "72  =  {100,100},
9229      "73  =  {200,100},
9230      "76  =  {   ,100},
9231      "77  =  {100,   },
9232      "78  =  { 50, 50},
```

```
    "79  =  {100,100},
    "7A  =  {100,100},
    "7D  =  {150,150},
    "7E  =  {100,100},
    "A8  =  {100,100},
    "A9  =  {100,100},
    "AB  =  {200,200},
    "BA  =  {   ,200},
    "BB  =  {   ,200},
    "BD  =  {200,200},
    "DE  =  {200,200}
  }

⟨/eus⟩
```

Euler Fraktur font (eufrak).

```
⟨*euf⟩
\SetProtrusion
  [ name     = mathfrak ]
  { encoding = U,
    family   = euf  }
  {
      A  =  {   , 50},
      B  =  {   , 50},
      C  =  { 50, 50},
      D  =  {   , 80},
      E  =  { 50,   },
      G  =  {   , 50},
      L  =  {   , 80},
      O  =  {   , 50},
      T  =  {   , 80},
      X  =  { 80, 50},
      Z  =  { 80, 50},
      b  =  {   , 50},
      c  =  {   , 50},
      k  =  {   , 50},
      p  =  {   , 50},
      q  =  { 50,   },
      v  =  {   , 50},
      w  =  {   , 50},
      x  =  {   , 50},
      1  =  {100,100},
      2  =  { 80, 80},
      3  =  { 80, 50},
      4  =  { 80, 50},
      7  =  { 50, 50},
    "12  =  {500,500},
    "13  =  {500,500},
      !  =  {   ,200},
      '  =  {200,300},
      (  =  {200,   },
      )  =  {   ,200},
      *  =  {200,200},
      +  =  {200,250},
      -  =  {200,200},
     {,} =  {300,300},
      .  =  {400,400},
     {=} =  {200,200},
      :  =  {   ,200},
      ;  =  {   ,200},
      ]  =  {   ,200}
  }

⟨/euf⟩
⟨/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`[15]). The `euroitc` settings are hidden in the package itself (1.3.8) for 'free software' compliance reasons. (Not quite sure whether this is what Karl really had in mind ...)

```
⟨*cfg-e⟩
\SetProtrusion
⟨zpeu⟩   { encoding = U,
⟨mvs⟩    { encoding = {OT1,U},
⟨zpeu⟩     family   = zpeu }
⟨mvs⟩      family   = mvs }
   {
⟨zpeu⟩     E = {50, }
⟨mvs⟩      164 = {50,50},   % \EUR
⟨mvs⟩      068 = {50,-100}  % \EURdig
   }

⟨*zpeu⟩
\SetProtrusion
   { encoding = U,
     family   = zpeu,
     shape    = it* }
   {
     E = {100,-50}
   }

\SetProtrusion
   { encoding = U,
     family   = {zpeus,eurosans} }
   {
     E = {100,50}
   }

\SetProtrusion
   { encoding = U,
     family   = {zpeus,eurosans},
     shape    = it* }
   {
     E = {200, }
   }

⟨/zpeu⟩
⟨/cfg-e⟩
```

2.9 Interword spacing

Default unit is space.

```
⟨*m-t|cmr⟩
%%% ------------------------------------------------------------------------
%%% INTERWORD SPACING

⟨/m-t|cmr⟩
⟨*m-t⟩
\SetExtraSpacing
   [ name = default ]
   { encoding = {OT1,T1,LY1,OT4,QX,T5} }
   {
```

These settings are only a first approximation. The following reasoning is from a

15 Of course, there are many more symbols in this font. Feel free to contribute protrusion settings!

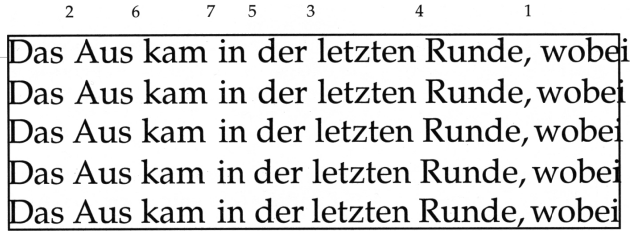


Figure 1:

Example of interword spacing (from: M. Siemoneit, *Typographisches Gestalten*, Frankfurt/M. 1989). The numbers indicate the preference for shrinking the interword space.

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

```
{,} = { ,-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)

```
r  = { ,-300,300},
```

- [before or] after lowercase characters with ascenders

```
b  = { ,-200,200},
d  = { ,-200,200},
f  = { ,-200,200},
h  = { ,-200,200},
k  = { ,-200,200},
l  = { ,-200,200},
t  = { ,-200,200},
```

- [before or] after lowercase characters with x-height plus descender with additional optical space, e.g., 'v', or 'w'

```
c  = { ,-100,100},
p  = { ,-100,100},
v  = { ,-100,100},
w  = { ,-100,100},
z  = { ,-100,100},
x  = { ,-100,100},
y  = { ,-100,100},
```

- [before or] after lowercase characters with x-height plus descender without additional optical space

```
i  = { , 50, -50},
m  = { , 50, -50},
n  = { , 50, -50},
u  = { , 50, -50},
```

- after colon and semicolon

```
:  = { ,200,-200},
;  = { ,200,-200},
```

- after punctuation which ends a sentence, e.g., period, exclamation mark, question mark

```
        .  = { ,250,-250},
        !  = { ,250,-250},
        ?  = { ,250,-250}
```

The order has to be reversed when enlarging is needed.'

```
  }

⟨/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*):

```
\parfillskipOpt
\rightskipOpt plus 1em
\spaceskip\fontdimen2\font
 test test\par
\pdfadjustinterwordglue2
\stbscode\font`t=-50
 test test
\bye
```

Some more characters in T2A.[16]

```
⟨*cmr⟩
\SetExtraSpacing
   [ name     = T2A,
     load     = default ]
   { encoding = T2A,
     family   = cmr }
   {
      \cyrg  = { ,-300,300},
      \cyrb  = { ,-200,200},
      \cyrk  = { ,-200,200},
      \cyrs  = { ,-100,100},
      \cyrr  = { ,-100,100},
      \cyrh  = { ,-100,100},
      \cyru  = { ,-100,100},
      \cyrt  = { , 50, -50},
      \cyrp  = { , 50, -50},
      \cyri  = { , 50, -50},
      \cyrishrt  = { , 50, -50},
   }

```

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:

16 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.

```
\SetExtraSpacing
   [ name     = nonfrench-cmr,
     load     = default,
     context  = nonfrench ]
   { encoding = {OT1,T1,LY1,OT4,QX,T5},
     family   = cmr }
   {
```

`latex.ltx` has:

```
\def\nonfrenchspacing{
  \sfcode`\. 3000
  \sfcode`\? 3000
  \sfcode`\! 3000
```

```
     . = {333,2000,-667},
     ? = {333,2000,-667},
     ! = {333,2000,-667},
```

```
  \sfcode`\: 2000
```

```
     : = {333,1000,-500},
```

```
  \sfcode`\; 1500
```

```
     ; = {   , 500,-333},
```

```
  \sfcode`\, 1250
```

```
    {,}= {   , 250,-200}
```

```
}
```

```
   }

⟨/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.

```
⟨*m-t⟩
\SetExtraSpacing
   [ name     = nonfrench-default,
     load     = default,
     context  = nonfrench ]
   { encoding = {OT1,T1,LY1,OT4,QX,T5} }
   {
     . = {240,2000,-667},
     ? = {240,2000,-667},
     ! = {240,2000,-667},
     : = {240,1000,-500},
     ; = {   , 500,-333},
    {,}= {   , 250,-200}
   }

```

Empty settings to prevent spurious warnings.

```
\SetExtraSpacing
   [ name = empty ]
   { encoding = {TS1} }
   { }
```

2.10 Additional kerning

Default unit is 1 em.

```
%%% ------------------------------------------------------------------------
%%% ADDITIONAL KERNING
```

A dummy list to be loaded when no context is active.

```
\SetExtraKerning
   [ name = empty ]
   { encoding = {OT1,T1,T2A,LY1,OT4,QX,T5,TS1} }
   { }
```

2.10.1 French

The ratio of `\fontdimen 2` to `\fontdimen 6` varies for different fonts, so that either the kerning of the colon (which should be a space, i.e., `\fontdimen 2`) or that of the other punctuation characters (TEX's `\thinspace`, i.e., one sixth of `\fontdimen 6`) may be inaccurate, depending on which `unit` we choose (`space` or `1em`). For Times, for example, a thin space would be 665. I don't know whether French typography really wants a thin space, or rather (as it happens to turn out with CMR) half a space. (Wikipedia[17] 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.)

```
\SetExtraKerning
   [ name     = french-default,
     context  = french,
     unit     = space   ]
   { encoding = {OT1,T1,LY1} }
   {
     :  = {1000,}, % = \fontdimen2
     ;  = {500, }, % ~ \thinspace
     !  = {500, },
     ?  = {500, }
   }
```

These settings have the disadvantage that a word following a left guillemet will not be hyphenated. This might be fixed in pdfTEX.

```
\SetExtraKerning
   [ name     = french-guillemets,
     context  = french-guillemets,
     load     = french-default,
     unit     = space   ]
   { encoding = {T1,LY1} }
   {
    \guillemotleft  = { ,800}, % = 0.8\fontdimen2
    \guillemotright = {800, }
   }
```

17 https://fr.wikipedia.org/wiki/Espace_typographique, 5 July 2007.

```
\SetExtraKerning
   [ name     = french-guillemets-OT1,
     context  = french-guillemets,
     load     = french-default,
     unit     = space   ]
   { encoding = OT1     }
   { }

```

2.10.2 Turkish

```
\SetExtraKerning
   [ name     = turkish,
     context  = turkish ]
   { encoding = {OT1,T1,LY1} }
   {
     :  = {167, }, % = \thinspace
     !  = {167, },
    {=} = {167, }
   }

⟨/m-t⟩
⟨/config⟩
```

3 OpenType configuration files

These are the configuration files for the following OpenType fonts: [18]

- Latin Modern Roman
- New Computer Modern [19]
- Charis SIL
- EB Garamond
- Palatino [20]

The settings are typeset in the respective font.

3.1 Character inheritance

OpenType fonts may differ considerably in how complete their arsenal of glyphs is. Therefore, each font family should have their own inheritance settings.

```
%%% ------------------------------------------------------------------------
%%% INHERITANCE

%% for xetex (EU1) and luatex (EU2), resp. both (TU)
```

3.1.1 Latin Modern Roman/New Computer Modern

```
⟨*LatinModernRoman|NewComputerModern⟩
\DeclareCharacterInheritance
   { encoding = {TU,EU1,EU2},
⟨LatinModernRoman⟩      family   = Latin Modern Roman }
⟨NewComputerModern⟩     family   = {New Computer Modern} }

  {
    A = {À,Á,Â,Ã,Ä,Å,Ā,Ă,Ą,Ǻ,Ǟ,Ạ,Ả,Ấ,Ầ,Ẩ,Ẫ,Ậ,Ắ,Ằ,Ẳ,Ặ,
⟨LatinModernRoman⟩          A  % Greek
⟨NewComputerModern⟩         A,A̓,A̔,A̓̀,A̓́,A̓͂,A̔̀,A̔́,A̔͂,Ἀ,Ἁ,Ἂ,Ἃ,Ἄ,Ἅ,Ἆ,Ἇ,Ὰ,Ά,ᾼ,  % Greek
        },
    Æ = {Ǽ},
    B = {Ɓ,
         B},  % Greek
    C = {Ç,Ć,Ĉ,Ċ,Č},
    D = {Ð,Ď,Đ,Ḍ,Ḏ},
    E = {È,É,Ê,Ë,Ē,Ĕ,Ė,Ę,Ě,Ȅ,Ẹ,Ẻ,Ẽ,Ề,Ế,Ễ,Ể,Ệ,
         E},  % Greek
⟨NewComputerModern⟩  (l)E = {E,E̓,E̔,E̓̀,E̓́,E̓͂,E̔̀,E̔́,E̔͂,E},  % Greek accents fully protruded left
    G = {Ĝ,Ğ,Ġ,Ģ,Ǧ,Ǵ},
    H = {Ĥ,Ħ,Ḥ,Ḧ,Ḩ,
⟨LatinModernRoman⟩          H  % Greek
⟨NewComputerModern⟩         H,Ḥ  % Greek
        },
⟨NewComputerModern⟩    (l)H = {H̓,H̔,H̓̀,H̓́,H̓͂,H̔̀,H̔́,H̔͂,Ḥ̓,Ḥ̔,Ḥ̓̀,Ḥ̓́,Ḥ̓͂,Ḥ̔̀,Ḥ̔́,Ḥ̔͂,Ḥ},  % Greek accents fully protruded left
⟨NewComputerModern⟩  %(l)/uni1FCC.alt = {/uni1F98.alt},
    I = {Ì,Í,Î,Ï,Ĩ,Ī,Ĭ,Į,İ,Ỉ,Ị,
⟨LatinModernRoman⟩          I  % Greek
⟨NewComputerModern⟩         I,Ǐ,Ī  % Greek
```

18 This is file `microtype-utf.dtx`.
19 These settings have been contributed by *Antonis Tsolomitis*.
20 These settings have been contributed by *Loren B. Davis*.

```
9512          },
9513 ⟨NewComputerModern⟩  (l)I = {̓I,̔I,̓̀I,̔̀I,̓́I,̔́I,̓̃I,̔̃I,̔̄I,I},  % Greek
9514      J = {Ĵ},
9515      K = {Ķ,
9516          K},  % Greek
9517      L = {Ĺ,Ļ,Ł,Ḷ},  % Ŀ,Ŀ,L̄
9518      M = {M},  % Greek
9519      N = {Ñ,Ń,Ņ,Ň,Ṅ,Ṇ,
9520          N},  % Greek
9521      O = {Ò,Ó,Ô,Õ,Ö,Ø,Ō,Ŏ,Ő,Ọ,Ơ,Ǫ,Ǿ,Ȍ,Ỏ,Ố,Ồ,Ổ,Ỗ,Ộ,Ớ,Ờ,Ở,Ỡ,Ợ,
9522          O},  % Greek
9523 ⟨NewComputerModern⟩  (l)O = {O,̓O,̔O,̓̀O,̔̀O,̓́O,̔́O,O},  % Greek accents except O that has indep. protrusion numbers (below)
9524      P = {P},  % Greek
9525 ⟨NewComputerModern⟩  (l)P = {̔P},  % Greek accents fully protruded left
9526      R = {Ŕ,Ŗ,Ř,Ȑ,Ȓ,Ṛ,R̄},
9527      S = {Ś,Ŝ,Ş,Š,Ș,Ṣ},
9528      T = {Ţ,Ť,Ț,Ṭ,T̲,
9529          T},  % Greek
9530      U = {Ù,Ú,Û,Ü,Ũ,Ū,Ŭ,Ů,Ű,Ų,Ư,Ȕ,Ụ,Ủ,Ứ,Ừ,Ử,Ữ,Ự},
9531      W = {Ŵ,Ẁ,Ẃ,Ẅ},
9532      X = {X},  % Greek
9533      Y = {Ý,Ŷ,Ÿ,Ỿ,Ỷ,Ỹ},
9534 ⟨NewComputerModern⟩      ϒ = {ϓ,ϔ,Ῡ},
9535 ⟨NewComputerModern⟩  (l)ϒ = {ϒ,̓ϒ,̔ϒ,̓̀ϒ,̔̀ϒ,̓́ϒ,̔́ϒ},
9536      Z = {Ź,Ż,Ž,Ẓ,
9537          Z},  % Greek
9538      a = {à,á,â,ã,ä,å,ā,ă,ą,ǻ,ȁ,ạ,ả,ấ,ầ,ẩ,ẫ,ậ,ắ,ằ,ẳ,ẵ},
9539      æ = {ǽ},
9540      c = {ç,ć,ĉ,ċ,č},
9541      d = {đ,ḍ,d̲},
9542      e = {è,é,ê,ë,ē,ĕ,ė,ę,ě,ȅ,ȇ,ẹ,ẻ,ẽ,ế,ề,ể,ễ,ệ},
9543        f = {ff},  % Unicode 64256, glyph name in Latin Modern Roman: /f_f ; in New Computer Modern: /ff
9544      g = {ĝ,ğ,ġ,ģ,ǧ,ǵ},
9545      h = {ĥ,ħ,ḥ,ḧ,ẖ},
9546      i = {ì,í,î,ï,ĩ,ī,ĭ,į,ı,ȉ,ȋ,ị,i},
9547      j = {ĵ},
9548      k = {ķ},
9549      l = {ĺ,ļ,ł,ḷ,l̄},  % ŀ,l ·
9550      n = {ñ,ń,ņ,ň,ṅ,ṇ},
9551      o = {ò,ó,ô,õ,ö,ø,ō,ŏ,ő,ọ,ơ,ǫ,ǿ,ȍ,ỏ,ố,ồ,ổ,ỗ,ộ,ớ,ờ,ở,ỡ,ợ,ọ
9552 ⟨NewComputerModern⟩          ,o,ó,ȯ,ȱ,ð,ð,ǒ,ő,ȯ,ȱ % Greek
9553          },
9554      r = {ŕ,ŗ,ř,ȑ,ȓ,ṛ,r̄},
9555      s = {ś,ŝ,ş,š,ș,ṣ},
9556      t = {ţ,ť,ț,ṭ,t̲,ẗ},  % ẗ
9557      u = {ù,ú,û,ü,ũ,ū,ŭ,ů,ű,ų,ư,ȕ,ụ,ủ,ứ,ừ,ử,ữ,ự},
9558      w = {ŵ,ẁ,ẃ,ẅ},
9559      y = {ý,ŷ,ÿ,ỳ,ẏ,ỷ,ỹ},
9560      z = {ź,ż,ž,ẓ},
9561 ⟨*NewComputerModern⟩
9562      α = {ά,ᾶ,ᾷ,ᾰ,ᾱ,ᾲ,ᾳ,ᾴ,ᾀ,ᾁ,ᾂ,ᾃ,ᾄ,ᾅ,ᾆ,ᾇ,ὰ},
9563      ε = {έ,ἐ,ἑ,ἒ,ἓ,ἔ,ἕ,ὲ},
9564      η = {ή,ἠ,ἡ,ἢ,ἣ,ἤ,ἥ,ἦ,ἧ,ῆ,ῇ,ῂ,ῃ,ῄ,῅},
9565      ι = {ί,ἰ,ἱ,ἲ,ἳ,ἴ,ἵ,ἶ,ἷ,ῐ,ῑ,ῒ,ΐ,ῖ,ῗ},
9566      ϊ = {ΐ,ῒ,ΐ,ῗ},
9567      υ = {ύ,ὐ,ὑ,ὒ,ὓ,ὔ,ὕ,ὖ,ὗ,ῠ,ῡ,ῢ,ΰ,ῦ,ῧ},
9568      ω = {ώ,ὠ,ὡ,ὢ,ὣ,ὤ,ὥ,ὦ,ὧ,ᾠ,ᾡ,ᾢ,ᾣ,ᾤ,ᾥ,ᾦ,ᾧ,ῲ,ῳ,ῴ,ῶ,ῷ},
9569 ⟨/NewComputerModern⟩
9570   }
9571 ⟨/LatinModernRoman|NewComputerModern⟩
```

3.1.2 Charis SIL

```
⟨*CharisSIL⟩
\DeclareCharacterInheritance
   { encoding = {TU,EU1,EU2},
     family   = Charis SIL }
   { A  =  {À,Á,Â,Ã,Ä,Å,Ā,Ă,Ą,Ǎ,Ǟ,Ǡ,Ȧ,Ǻ,Ȁ,Ȃ,Ḁ,Ạ,Ả,Ấ,Ầ,Ẩ,Ẫ,Ậ,Ắ,Ằ,Ẳ,Ẵ,Ặ,Ꜳ,
            А,Ӑ,Ӓ},  %  Cyrillic
     Æ  =  {Ǣ,
            Ǽ,Ӕ},  %  Cyrillic
     B  =  {Ḃ,Ḅ,Ḇ,
            В},  %  Cyr
     C  =  {Ç,Ć,Ĉ,Ḉ,Ċ,Č,
            С,Ҫ},  %  Cyr
     D  =  {Ď,Ḋ,Ḍ,Ḏ,Ḑ,Ḓ,Đ},
     E  =  {È,É,Ê,Ë,Ē,Ĕ,Ė,Ę,Ě,Ȅ,Ȩ,Ȇ,Ḕ,Ḗ,Ḙ,Ḛ,Ḝ,Ẹ,Ẻ,Ẽ,Ế,Ề,Ể,Ễ,Ệ,
            Е,Ѐ,Ё,Ӗ},  %  Cyr
     F  =  {Ḟ},
     G  =  {Ĝ,Ğ,Ġ,Ģ,Ǧ,Ǵ,Ḡ,Ԍ},
     H  =  {Ĥ,Ȟ,Ḣ,Ḥ,Ḧ,Ḩ,Ḫ,
            Н,Ң,Ӈ,Ӊ,Ӊ},  %  Cyr
     I  =  {Ì,Í,Î,Ȉ,Ï,Į,Ĩ,Ị,Ī,İ,Ǐ,Ỉ,Ȋ,Ĭ,Ḭ,Ḯ,
            І,Ї,Ӏ,Ӏ},  %  Cyr
     J  =  {Ĵ,
            Ј},  %  Cyr
     K  =  {Ķ,Ǩ,Ḱ,Ḳ,Ḵ,
            К,Ќ,Қ,Ҟ,Ҟ,Ҡ,Ҝ,Ҟ},  %  Cyr
     L  =  {Ĺ,Ļ,Ľ,Ḷ,Ḹ,Ḻ,Ḽ},  %  Ŀ
     M  =  {Ḿ,Ṁ,Ṃ,
            М,Ӎ},  %  Cyr
     N  =  {Ñ,Ń,Ņ,Ň,Ǹ,Ṅ,Ṇ,Ṉ,Ṋ,
            И,Й,Ѝ,Ҋ,Ӣ,Ӥ},  %  Cyr
     O  =  {Ò,Ó,Ô,Õ,Ö,Ō,Ŏ,Ő,Ǒ,Ǫ,Ǭ,Ȍ,Ȏ,Ȫ,Ȭ,Ȯ,Ȱ,Ṍ,Ṏ,Ṑ,Ṓ,Ọ,Ỏ,Ố,Ồ,Ổ,Ỗ,Ộ,Ớ,Ờ,Ở,Ỡ,Ợ,
            О,Ө,Ӧ,Ѳ,Ӫ,  %  Cyr
            Θ},  %  Greek
     P  =  {Ṕ,Ṗ,
            Р,Ҏ},    %  Cyr
     Q  =  {Ԛ},  %  Cyr
     R  =  {Ŕ,Ŗ,Ř,Ȑ,Ȓ,Ṙ,Ṛ,Ṝ,Ṟ},
     S  =  {Ś,Ŝ,Ş,Š,Ș,Ṡ,Ṣ,Ṥ,Ṧ,Ṩ,
            Ѕ},  %  Cyr
     T  =  {Ţ,Ť,Ț,Ṫ,Ṭ,Ṯ,Ṱ,
            Т,Ҭ},  %  Cyr
     U  =  {Ù,Ú,Û,Ü,Ũ,Ū,Ŭ,Ů,Ű,Ų,Ǔ,Ǖ,Ǘ,Ǚ,Ǜ,Ȕ,Ȗ,Ṳ,Ṵ,Ṷ,Ṹ,Ṻ,Ụ,Ủ,Ứ,Ừ,Ử,Ữ,Ự},
     V  =  {Ṽ,Ṿ},
     W  =  {Ŵ,Ẁ,Ẃ,Ẅ,Ẇ,Ẉ,
            Ԝ},  %  Cyr
     X  =  {Ẋ,Ẍ,
            Х,Ҳ,Ӽ,Ӿ},    %  Cyr
     Y  =  {Ý,Ŷ,Ÿ,Ȳ,Ẏ,Ỳ,Ỵ,Ỷ,Ỹ,
            Ү,Ұ},  %  Cyr
     Z  =  {Ź,Ż,Ž,Ẑ,Ẓ,Ẕ},
     a  =  {à,á,â,ã,ä,å,ā,ă,ą,ǎ,ǟ,ǡ,ȧ,ǻ,ȁ,ȃ,ḁ,ạ,ả,ầ,ấ,ẩ,ẫ,ậ,ắ,ằ,ẳ,ẵ,ặ,  %  aʾ
            а,ӑ,ӓ},  %  Cyr
     æ  =  {ǽ,
            ӕ},  %  Cyr
     b  =  {ḃ,ḅ,ḇ},
     c  =  {ç,ć,ĉ,ċ,č,ḉ,
            с,ҫ},  %  Cyr
     d  =  {ď,ḋ,ḍ,ḏ,ḑ,ḓ},
     e  =  {è,é,ê,ë,ē,ĕ,ė,ę,ě,ȅ,ȩ,ȇ,ḕ,ḗ,ḙ,ḛ,ḝ,ẹ,ẻ,ẽ,ề,ế,ể,ễ,ệ,
            е,ѐ,ё,ӗ},  %  Cyr
     f  =  {ḟ,ﬀ},  %  /f_f
```

```
    g  =  {ĝ,ğ,ġ,ǵ,ğ̦,ǵ,ḡ},
    h  =  {ĥ,ȟ,ḣ,ḥ,ḧ,ḩ,ḫ,ẖ,
           ħ,h},  %  Cyr
    i  =  {ı,ì,í,î,ȉ,ǐ,ï,į,ī,ị,ĩ,ḭ,ḯ,ỉ,ȋ,ĭ,
           i,ï},  %  Cyr
    j  =  {ĵ,ǰ,
           j},  %  Cyr
    k  =  {ķ,ǩ,ḱ,ḳ,ḵ},
    l  =  {ĺ,ļ,ḻ,ḷ,ḹ,ḽ},  %  ľ,l·
    m  =  {ḿ,ṁ,ṃ},
    n  =  {ñ,ń,ņ,ň,ǹ,ṅ,ṇ,ṉ,ṋ},  %  ’n
    o  =  {ò,ó,ô,õ,ö,ō,ŏ,ő,ǒ,ǫ,ǭ,ȍ,ȏ,ȫ,ȭ,ȯ,ȱ,ṍ,ṏ,ṑ,ṓ,ọ,ỏ,ồ,ố,ổ,ỗ,ộ,ớ,ờ,ở,ỡ,ợ,
           o,ɵ,ö,ɵ,ӫ},  %  Cyr
    p  =  {ṕ,ṗ,
           p,ꝑ},  %  Cyr
    q  =  {q},  %  Cyr
    r  =  {ŕ,ŗ,ř,ȑ,ȓ,ṙ,ṛ,ṝ,ṟ},
    s  =  {ś,ŝ,ş,š,ș,ṡ,ṣ,ṥ,ṧ,ṩ,
           s},  %  Cyr
    t  =  {ţ,ț,ṫ,ṭ,ṯ,ṱ,ẗ},  %  ť
    u  =  {ù,ú,û,ü,ũ,ū,ŭ,ů,ű,ų,ǔ,ǖ,ǘ,ǚ,ǜ,ȕ,ȗ,ṳ,ṵ,ṷ,ṹ,ṻ,ụ,ủ,ứ,ừ,ử,ữ,ự},
    v  =  {ṽ,ṿ},
    w  =  {ŵ,ẁ,ẃ,ẅ,ẇ,ẉ,ẘ,
           w},   %  Cyr
    x  =  {ẋ,ẍ,
           x,ҳ},  %  Cyr
    y  =  {ý,ÿ,ŷ,ȳ,ẏ,ẙ,ỳ,ỵ,ỷ,ỹ,
           у,ў,ӯ,ӱ,ӳ},  %  Cyr
    z  =  {ź,ż,ž,ẑ,ẓ,ẕ},
  %  Cyrillic
    Г  =  {Ѓ,Ґ,Ғ,Ӷ,Ӻ},
    Ж  =  {Җ,Ӝ,Ӂ},
    З  =  {Ӟ,Ҙ},
    Л  =  {Ӆ},
    П  =  {Ԥ},
    У  =  {Ў,Ӯ,Ӱ,Ӳ},
    Ч  =  {Ҷ,Ҹ,Ӌ,Ӵ},
    Ы  =  {Ӹ},
    Ә  =  {Ӛ},
    Ҽ  =  {Ҿ},
    г  =  {ѓ,ґ,ғ,ӷ,ӻ},
    ж  =  {җ,ӂ,ӝ},
    з  =  {ҙ,ӟ},
    и  =  {й,ѝ,ҋ,ӣ,ӥ},
    к  =  {ќ,қ,ҝ,ҟ,ҡ,ӄ,ԟ},
    л  =  {ӆ},
    м  =  {ӎ},
    н  =  {ң,ҥ,ӈ,ӊ},
    п  =  {ԥ},
    т  =  {ҭ},
    х  =  {ҳ,ӿ},
    ч  =  {ҷ,ҹ,ӌ,ӵ},
    ш  =  {щ},
    ы  =  {ӹ},
    э  =  {ӭ},
    ҽ  =  {ҿ},
    ә  =  {ӛ},
    ү  =  {ұ},
    Γ  =  {Γ},  %  Greek
    Π  =  {Π},  %  Greek
  %  missing:  tipa,  math,  symbols,  ...
  }
⟨/CharisSIL⟩
```

3.1.3 EB Garamond

```
⟨*EBGaramond⟩
\DeclareCharacterInheritance
   { encoding = {TU,EU1,EU2},
     family   = EBGaramond }

   {
     A = {À,Á,Â,Ã,Ä,Å,Ā,Ă,Ą,Ǎ,Ǟ,Ǡ,Ǻ,Ȁ,Ȃ,Ȧ,Ạ,Ả,Ấ,Ầ,Ẩ,Ẫ,Ậ,Ắ,Ằ,Ẳ,Ẵ,Ặ,Ḁ,/Adieresis.deu,
           А,Ӑ,Ӓ,                  % Cyrillic
           Α,Ά,Ἀ,Ἁ,Ἄ,Ἅ,Ἂ,Ἃ,Ἆ,Ἇ,ᾈ,ᾉ,ᾌ,ᾍ,ᾊ,ᾋ,ᾎ,ᾏ,Ᾰ,Ᾱ,Ὰ,Ά,ᾼ}, % Greek
% (l)A    {Ά,Ἀ,Ἁ,Ἄ,Ἅ,Ἂ,Ἃ,Ἆ,Ἇ,ᾈ,ᾉ,ᾌ,ᾍ,ᾊ,ᾋ,ᾎ,ᾏ,Ᾰ,Ᾱ,Ὰ,Ά,ᾼ}, % (accents not protruded)
     B = {Ḃ,Ḅ,Ḇ,
           В,                      % Cyrillic
           Β},                     % Greek
     C = {Ç,Ć,Ĉ,Ċ,Č,Ḉ,
           С,С,Ҫ,                  % Cyrillic
           Ⅽ},                     % Roman numeral
     D = {Ď,Đ,Ð,Ḋ,Ḍ,Ḏ,Ḑ,Ḓ,
           Đ,Ɗ,                    % Cyrillic
           Ⅾ},                     % Roman numeral
     E = {È,É,Ê,Ë,Ē,Ĕ,Ė,Ę,Ě,Ȅ,Ḗ,Ȩ,Ḙ,Ḛ,Ḝ,Ẹ,Ẻ,Ẽ,Ế,Ề,Ể,Ễ,Ệ,Ḕ,Ȇ,
           Ѐ,Ё,Ӗ,Е,                % Cyrillic
           Ε},                     % Greek
  (l)E = {Έ,Ἐ,Ἑ,Ἔ,Ἕ,Ἒ,Ἓ,Ὲ,Έ},    % Greek (accents protruded)
     F = {Ḟ},
     G = {Ĝ,Ğ,Ġ,Ģ,Ǥ,Ǧ,Ǵ,Ḡ},
     H = {Ĥ,Ħ,Ȟ,Ḣ,Ḥ,Ḧ,Ḩ,Ḫ,H̨,Ⱨ,
           Н,Ң,Ӊ,Ӈ,  %  Ҥ          % Cyrillic
           Η},                     % Greek
  (l)H = {Ή,Ἠ,Ἡ,Ἤ,Ἥ,Ἢ,Ἣ,Ἦ,Ἧ,Ὴ,Ή,ᾘ,ᾙ,ᾜ,ᾝ,ᾚ,ᾛ,ᾞ,ᾟ},
     I = {Ì,Í,Î,Ï,Ĩ,Ī,Ĭ,Į,İ,Ǐ,Ȉ,Ȋ,Ḭ,Ḯ,Ỉ,Ị,
           І,Ї,Ӏ,                  % Cyrillic
           Ι,                      % Greek
           Ⅰ,Ⅱ,Ⅲ},                 % Roman numeral
  (l)I = {Ί,Ϊ,Ἰ,Ἱ,Ἴ,Ἵ,Ἲ,Ἳ,Ἶ,Ἷ,Ῐ,Ῑ,Ὶ,Ί}, % Greek
     J = {Ĵ,
           Ј},                     % Cyrillic
     K = {Ķ,Ǩ,Ḱ,Ḳ,Ḵ,Ⱪ,
           Κ,K},                   % Greek
     L = {Ĺ,Ļ,Ľ,Ŀ,Ł,Ḷ,Ḹ,Ḻ,Ḽ,Ƚ,Ł,
           Ⅼ},                     % Roman numeral
     M = {Ḿ,Ṁ,Ṃ,
           М,Ӎ,                    % Cyrillic
           Μ,                      % Greek
           Ⅿ},                     % Roman numeral
     N = {Ñ,Ń,Ņ,Ň,Ŋ,Ǹ,Ṅ,Ṇ,Ṉ,Ṋ,
           Ν},                     % Greek
    O = {Ò,Ó,Ô,Õ,Ö,Ø,Ō,Ŏ,Ő,Ǒ,Ǫ,Ǭ,Ǿ,Ȍ,Ȏ,Ȫ,Ȭ,Ȯ,Ȱ,Ṍ,Ṏ,Ṑ,Ṓ,Ọ,Ỏ,Ố,Ồ,Ổ,Ỗ,Ộ,Ớ,Ờ,Ở,Ỡ,Ợ,Ơ,/Odieresis.deu,
           О,Ӧ,Ө,Ӫ,                % Cyrillic
           Ο,Ό,Ὀ,Ὁ,Ὄ,Ὅ,Ὂ,Ὃ,Ὸ,Ό}, % Greek
% (l)O = {Ό,Ὀ,Ὁ,Ὄ,Ὅ,Ὂ,Ὃ,Ὸ,Ό}, % (accents not protruded)
     P = {Ṕ,Ṗ,Ᵽ,
           Р,Ҏ,                    % Cyrillic
           Ρ},                     % Greek
  (l)P = {Ῥ},                      % Greek
     Q = {Ԛ},                      % Cyrillic
     R = {Ŕ,Ŗ,Ř,Ȑ,Ȓ,Ṙ,Ṛ,Ṝ,Ṟ,Ɽ,},
     S = {Ś,Ŝ,Ş,Š,Ș,Ṡ,Ṣ,Ṥ,Ṧ,Ṩ,
           Ѕ},                     % Cyrillic
     T = {Ţ,Ť,Ŧ,Ț,Ṫ,Ṭ,Ṯ,Ṱ,
           Т,Ҭ,                    % Cyrillic
           Τ},                     % Greek
     U = {Ù,Ú,Û,Ü,Ũ,Ū,Ŭ,Ů,Ű,Ų,Ǔ,Ǖ,Ǘ,Ǚ,Ǜ,Ȕ,Ȗ,Ṳ,Ṵ,Ṷ,Ṹ,Ṻ,Ụ,Ủ,Ứ,Ừ,Ử,Ữ,Ự}, % /Udieresis.deu ?
     V = {Ṽ,Ṿ,/U.LAT,
           Ⅴ},                     % Roman numeral
```

```
W = {Ŵ,Ẁ,Ẃ,Ẅ,Ẇ,Ẉ,
     Ԝ},                          % Cyrillic
X = {Ẋ,Ẍ,
     Х,Ҳ,Ӽ,Ӿ,                     % Cyrillic
     Χ,                           % Greek
     Ⅹ},                          % Roman numeral
Y = {Ý,Ŷ,Ÿ,Ȳ,Ẏ,Ỳ,Ỵ,Ỷ,Ỹ,
     Ү,Ұ},  % Cyrillic
Z = {Ź,Ż,Ž,Ẑ,Ẓ,Ẕ,Ȥ,
     Ζ},                          % Greek
a = {à,á,â,ã,ä,å,ā,ă,ą,ǎ,ǟ,ǡ,ǻ,ȁ,ȃ,ȧ,ḁ,ạ,ả,ấ,ầ,ẩ,ẫ,ậ,ắ,ằ,ẳ,ẵ,ặ,ả,
     а,ӑ,ӓ},                      % Cyrillic
b = {ḃ,ḅ,ḇ},
c = {ç,ć,ĉ,ċ,č,ḉ,
     с,ҫ,                         % Cyrillic
     ⅽ},                          % Roman numeral
d = {ď,đ,ḋ,ḍ,ḏ,ḑ,ḓ,
     ⅾ},                          % Roman numeral
e = {è,é,ê,ë,ē,ĕ,ė,ę,ě,ȩ,ḕ,ḗ,ḙ,ḛ,ḝ,ẹ,ẻ,ẽ,ế,ề,ể,ễ,ệ,ȅ,ȇ,
     е,ѐ,ё,ӗ},                    % Cyrillic
f = {ḟ,ﬀ,/f.long,/f.DEU,/f_f},
ﬂ = {ﬄ,/longs_l,/longs_longs_l,/f_l},
ﬁ = {ﬃ,/longs_i,/longs_longs_i,/f_i},
/f.short = {/f_f.short},
g = {ĝ,ğ,ġ,ģ,ḡ,ǥ,ǧ,ǵ},
h = {ĥ,ħ,ḣ,ḥ,ḧ,ḩ,ḫ,ẖ,ȟ,ⱨ,
     һ,ԧ},                        % Cyrillic
i = {ì,í,î,ï,ĩ,ī,ĭ,į,ı,ǐ,ȉ,ȋ,ḭ,ỉ,ị,ḯ,/i.TRK,
     і,ї,                         % Cyrillic
     ⅰ,ⅱ,ⅲ},                      % Roman numeral
j = {ĵ,ǰ,
     ј},                          % Cyrillic
k = {ķ,ǩ,ḱ,ḳ,ḵ,ⱪ},
l = {ĺ,ļ,ľ,ŀ,ł,ḷ,ḹ,ḻ,ḽ,ƚ,
     ӏ,                           % palochka
     ⅼ},                          % Roman numeral
m = {ḿ,ṁ,ṃ,
     ⅿ},                          % Roman numeral
n = {ñ,ń,ņ,ň,ŋ,ṅ,ṇ,ṉ,ṋ,ǹ}, % ŉ
o = {ò,ó,ô,õ,ö,ø,ō,ŏ,ő,ǒ,ǫ,ǭ,ǿ,ȍ,ȏ,ȫ,ȭ,ȯ,ȱ,ṍ,ṏ,ṑ,ṓ,ọ,ỏ,ố,ồ,ổ,ỗ,ộ,ớ,ờ,ở,ỡ,ợ,
     о,ӧ},                        % Cyrillic
p = {ṕ,ṗ,
     р,ҏ},                        % Cyrillic
q = {ԛ},                          % Cyrillic
r = {ŕ,ŗ,ř,ȑ,ȓ,ṙ,ṛ,ṝ,ṟ},
s = {ś,ŝ,ş,š,ș,ṡ,ṣ,ṥ,ṧ,ṩ,
     ѕ},                          % Cyrillic
t = {ţ,ť,ŧ,ț,ṫ,ṭ,ṯ,ṱ,ẗ},
u = {ù,ú,û,ü,ũ,ū,ŭ,ů,ű,ų,ǔ,ǖ,ǘ,ǚ,ǜ,ȕ,ȗ,ṳ,ṵ,ṷ,ṹ,ṻ,ụ,ủ,ứ,ừ,ử,ữ,ự,/u.LATmedi},
v = {ṽ,ṿ,
     ⅴ},                          % Roman numeral
w = {ŵ,ẁ,ẃ,ẅ,ẇ,ẉ,ẘ,
     ԝ},                          % Cyrillic
x = {ẋ,ẍ,
     х,ҳ,                         % Cyrillic
     ⅹ},                          % Roman numeral
y = {ý,ÿ,ŷ,ȳ,ẏ,ẙ,ỳ,ỵ,ỷ,ỹ,
     у,ӯ,ӱ,ӳ,ў},                  % Cyrillic
z = {ź,ż,ž,ȥ,ẑ,ẓ,ẕ},
Æ = {Ǣ,Ǽ,
     Ӕ},                          % Cyrillic
æ = {ǣ,ǽ,
     ӕ},                          % Cyrillic
DZ = {Ǆ},
Dz = {ǅ},
```

```
    dz = {dž},
  % Smallcaps
    /a.sc = {/A.sc},
    /ae.sc = {/AE.sc},
    /d.sc = {/D.sc},
    /f.sc = {/F.sc},
    /g.sc = {/G.sc},
    /j.sc = {/J.sc},
    /l.sc = {/L.sc},
    /o.sc = {/O.sc},
    /oe.sc = {/OE.sc},
    /q.sc = {/Q.sc},
    /r.sc = {/R.sc},
    /t.sc = {/T.sc},
    /y.sc = {/Y.sc},
  % Cyrillic
    Г = {Ґ,Ғ,Ѓ,Ӷ},
    Ж = {Җ,Ӝ,Ӂ,Ж},
    З = {Ҙ,Ӟ},
    И = {Й,Ҋ,Ӣ,Ӥ,Ѝ},
    К = {Қ,Ҡ,Ҟ,Ҝ,Ќ,Ӄ},
    Л = {Ӆ,Ԓ,Ԓ},
    П = {Ԥ},
    У = {Ӯ,Ӱ,Ӳ,Ў},
    Ц = {Ꚏ,Ц},
    Ч = {Ҷ,Ҹ,Ӌ,Ӵ},
    Ш = {Щ},
    Ы = {Ӹ},
    Ь = {Ҍ},
    Э = {Ӭ},
    Ѵ = {Ѷ},
    Є = {Є̈},
    Ә = {Ӛ},
    г = {ѓ,ґ,ғ,ӷ},
    ж = {җ,ӂ,ӝ,ж},
    з = {ҙ,ӟ},
    и = {й,ѝ,ҋ,ӣ,ӥ},
    к = {ќ,қ,ҝ,ӄ}, % ҟ,ҡ
    л = {ӆ,ԓ,ӆ},
    м = {ӎ},
    н = {ң,ӈ,ӊ,ԩ}, %   нг
    п = {ԥ},
    т = {ҭ},
    ц = {ꚏ},
    ч = {ҷ,ҹ,ӌ,ӵ},
    ш = {щ},
    ы = {ӹ},
    э = {ӭ},
    ө = {ө,ӫ},
    ѵ = {ѷ},
    ү = {ұ},
    є = {є̈},
    ә = {ӛ},
  % Greek
    Υ = {Ϋ,ϒ,Ϋ,Ῠ,Ῡ},
 (l)Υ = {Ύ,Ύ,Ὑ,Ὓ,Ὕ,Ὗ,Ὺ,Ύ},
 (l)Ω = {Ώ,Ὠ,Ὡ,Ὢ,Ὣ,Ὤ,Ὥ,Ὦ,Ὧ,ᾨ,ᾩ,ᾪ,ᾫ,ᾬ,ᾭ,ᾮ,ᾯ,Ὼ,Ώ},
    Ω = {ῼ,Ω}, % math
    Δ = {∆}, % math
    Π = {∏}, % math
    α = {ά,ἀ,ἁ,ἂ,ἃ,ἄ,ἅ,ἆ,ἇ,ὰ,ά,ᾀ,ᾁ,ᾂ,ᾃ,ᾄ,ᾅ,ᾆ,ᾇ,ᾰ,ᾱ,ᾲ,ᾳ,ᾴ,ᾶ,ᾷ},
    ε = {έ,ἐ,ἑ,ἒ,ἓ,ἔ,ἕ,ὲ,έ},
    η = {ή,ἠ,ἡ,ἢ,ἣ,ἤ,ἥ,ἦ,ἧ,ὴ,ή,ῂ,ῃ,ῄ,ῆ,ῇ,ᾐ,ᾑ,ᾒ,ᾓ,ᾔ,ᾕ,ᾖ,ᾗ},
    ι = {ί,ϊ,ἰ,ἱ,ἲ,ἳ,ἴ,ἵ,ἶ,ἷ,ὶ,ί,ῐ,ῑ,ῒ,ΐ,ῖ,ῗ,ΐ},
    ο = {ό,ǫ,ὀ,ὁ,ὂ,ὃ,ὄ,ὅ,ὸ,ό},
```

```
    ρ = {ṕ,ṕ},
    υ = {ṷ,ṷ,ṷ,ṷ,ṷ,ṷ,ṷ,ṷ,ṷ,ṷ,ṷ,ṷ,ṷ,ṷ,ṷ,ṷ},
    ω = {ώ,ώ,ώ,ώ,ώ,ώ,ώ,ώ,ώ,ώ,ώ,ώ,ώ,ώ,ώ,ώ,ώ,ώ,ώ,ώ,ώ,ώ},
  % other
    (1)  = {(2),(3),(4),(5),(6),(7),(8),(9),(10),(11),(12),(13),(14),(15),(16),(17),(18),(19),(20)},
    (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)},
    🄰  = {🄱,🄲,🄳,🄴,🄵,🄶,🄷,🄸,🄹,🄺,🄻,🄼,🄽,🄾,🄿,🅀,🅁,🅂,🅃,🅄,🅅,🅆,🅇,🅈,🅉},
    ! = {‼},
    ? = {⁇},
    . = {/onedotenleader},
    /endash = {/figuredash},
  }
```

⟨/*EBGaramond*⟩

3.1.4 Palatino

⟨**Palatino*⟩

```
\DeclareCharacterInheritance
  { encoding = {TU,EU1,EU2},
    family = {Palatino} }
```

Unfortunately, I don't have a Palatino variant containing all of the following glyphs. The settings are typeset in TEX 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`.

```
  { A = {À,Á,Â,Ã,Ä,Ā,Ă,Ą,Ǎ,Ȁ,Ȃ,Ạ,Ả,Ấ,Ầ,Ẩ,Ẫ,Ậ,Ắ,Ằ,Ẳ,Ẵ,Ặ,Ⱥ},
    B = {Ḃ,Ḅ,Ḇ},
    C = {Ç,Ć,Ĉ,Ċ,Č},
    D = {Ď,Ḋ,Ḍ,Ḏ,Ḑ,Ḓ},
    E = {È,É,Ê,Ë,Ē,Ĕ,Ė,Ę,Ě,Ȅ,Ȇ,Ẹ,Ẻ,Ế,Ề,Ể,Ễ,Ệ,Ḕ,Ḗ,Ḙ,Ḛ,Ḝ},
    F = {Ḟ},
    G = {Ĝ,Ğ,Ġ,Ģ,Ǧ,Ǵ,Ḡ},
    H = {Ĥ,Ȟ,Ḣ,Ḥ,Ḧ,Ḩ,Ḫ},
    I = {Ì,Í,Î,Ï,Ĩ,Ī,Ĭ,Į,Ǐ,Ȉ,Ȋ,Ị,Ỉ,Ḭ,Ḯ},
    J = {Ĵ},
    K = {Ķ,Ǩ,Ḱ,Ḳ,Ḵ},
    L = {Ĺ,Ļ,Ľ,Ḷ,Ḹ,Ḻ,Ḽ,Ŀ,Ł}, % L·
    M = {Ḿ,Ṁ,Ṃ},
    N = {Ñ,Ń,Ņ,Ň,Ǹ,Ṅ,Ṇ,Ṉ,Ṋ},
    O = {Ò,Ó,Ô,Õ,Ö,Ō,Ŏ,Ő,Ǒ,Ǫ,Ǭ,Ȍ,Ȏ,Ơ,Ọ,Ỏ,Ố,Ồ,Ổ,Ỗ,Ộ,Ớ,Ờ,Ở,Ỡ,Ợ,ⱺ},
    P = {Ṕ,Ṗ},
    R = {Ŕ,Ŗ,Ř,Ȑ,Ȓ,Ṙ,Ṛ,Ṝ,Ṟ},
    S = {Ś,Ŝ,Ş,Š,Ș,Ṡ,Ṣ,Ṥ,Ṧ,Ṩ},
    T = {Ţ,Ť,Ț,Ṫ,Ṭ,Ṯ,Ṱ},
    U = {Ù,Ú,Û,Ü,Ũ,Ū,Ŭ,Ů,Ű,Ų,Ǔ,Ǖ,Ǘ,Ǚ,Ǜ,Ȕ,Ȗ,Ụ,Ủ,Ứ,Ừ,Ử,Ữ,Ự},
    V = {Ṽ,Ṿ},
    W = {Ŵ,Ẁ,Ẃ,Ẅ,Ẇ,Ẉ},
    X = {Ẋ,Ẍ},
    Y = {Ý,Ŷ,Ÿ,Ȳ,Ẏ,Ỳ,Ỵ,Ỷ,Ỹ},
    Z = {Ź,Ż,Ž,Ẑ,Ẓ,Ẕ},
    a = {à,á,â,ã,ä,å,ā,ă,ą,ǎ,ȁ,ȃ,ạ,ả,ấ,ầ,ẩ,ẫ,ậ,ắ,ằ,ẳ,ẵ,ặ,ⱥ}, % aᵌ
    b = {ḃ,ḅ,ḇ},
    c = {ç,ć,ĉ,ċ,č,ȼ},
    d = {ď,ḋ,ḍ,ḏ,ḑ,ḓ},
    e = {è,é,ê,ë,ē,ĕ,ė,ę,ě,ȅ,ȇ,ẹ,ẻ,ế,ề,ể,ễ,ệ,ḕ,ḗ,ḙ,ḛ,ḝ,ɇ},
    f = {ḟ,ff},
    g = {ĝ,ğ,ġ,ģ,ǧ,ǵ,ḡ},
    h = {ĥ,ȟ,ḣ,ḥ,ḧ,ḩ,ḫ,ẖ},
    i = {ı,ì,í,î,ï,ĩ,ī,ĭ,ǐ,ȉ,ȋ,ị,ỉ,ḭ,ḯ},
    j = {ĵ,ǰ},
    k = {ķ,ǩ,ḱ,ḳ,ḵ},
    l = {ĺ,ļ,ľ,ḷ,ḹ,ḻ,ḽ}, % l·
```

```
    m = {ḿ,ṁ,ṃ},
    n = {ñ,ń,ņ,ň,ǹ,ṅ,ṇ,ṉ,ṋ}, % ’n
    o = {ò,ó,ô,õ,ö,ō,ŏ,ő,ǒ,ǫ,ǭ,ȍ,ȏ,ȫ,ȭ,ȯ,ȱ,ṍ,ṏ,ṑ,ṓ,ọ,ỏ,ồ,ố,ổ,ỗ,ộ,ớ,ờ,ở,ỡ,ợ},
    p = {ṕ,ṗ},
    r = {ŕ,ŗ,ř,ȑ,ȓ,ṙ,ṛ,ṝ,ṟ},
    s = {ś,ŝ,ş,š,ș,ṡ,ṣ,ṥ,ṧ,ṩ},
    t = {ţ,ț,ṫ,ṭ,ṯ,ṱ,ẗ}, % ť
    u = {ù,ú,û,ü,ũ,ū,ŭ,ů,ű,ų,ǔ,ǖ,ǘ,ǚ,ǜ,ȕ,ȗ,ṳ,ṵ,ṷ,ṹ,ṻ,ụ,ủ,ứ,ừ,ử,ữ,ự},
    v = {ṽ,ṿ},
    w = {ŵ,ẁ,ẃ,ẅ,ẇ,ẉ,ẘ},
    x = {ẋ,ẍ},
    y = {ý,ÿ,ŷ,ȳ,ẏ,ẙ,ỳ,ỵ,ỷ,ỹ},
    z = {ź,ż,ž,ẑ,ẓ,ẕ},
  }
⟨/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.

```
⟨*TU-basic⟩
\DeclareCharacterInheritance
  { encoding = {TU,EU1,EU2},
    family   = {TU-basic} }
  { A = {À,Á,Â,Ã,Ä,Å},
    a = {à,á,â,ã,ä,å},
    C = {Ç},
    c = {ç},
    D = {Đ},
    E = {È,É,Ê,Ë},
    e = {è,é,ê,ë},
    I = {Ì,Í,Î,Ï},
    i = {ì,í,î,ï,ı},
    L = {Ł},
    l = {ł},
    N = {Ñ},
    n = {ñ},
    O = {Ø,Ò,Ó,Ô,Õ,Ö},
    o = {ø,ò,ó,ô,õ,ö},
    S = {Š},
    s = {š},
    U = {Ù,Ú,Û,Ü},
    u = {ù,ú,û,ü},
    Y = {Ý,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.

```
    y = {ý,ß},
    Z = {Ž},
    z = {ž}
  }
⟨/TU-basic⟩
```

3.1.6 Empty glyph set

Other fonts, e.g., the self-professedly awesone Font Awesome font, have no meaningful glyph arsenal at all, and should therefore be aliased so that empty settings are applied.

```
⟨*TU-empty⟩
\DeclareCharacterInheritance
```

```
  { encoding = {TU,EU1,EU2},
    family   = {TU-empty} }
  { }
⟨/TU-empty⟩
```

3.2 Character protrusion

```

%%% ------------------------------------------------------------------------
%%% PROTRUSION

```

3.2.1 Latin Modern Roman/New Computer Modern

```
⟨*LatinModernRoman|NewComputerModern⟩
\SetProtrusion
⟨LatinModernRoman⟩    [ name     = LMR-default ]
⟨NewComputerModern⟩    [ name     = NCM-default ]
⟨LatinModernRoman⟩    { encoding = {TU,EU1,EU2},
⟨LatinModernRoman⟩      family   = Latin Modern Roman }
⟨NewComputerModern⟩    { }
   {
    A = {50,50},
    Æ = {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 = {  ,70},
    v = {50,50},
    w = {50,50},
    x = {50,50},
    y = {50,70},
    0 = {  ,50},
    1 = {100,200},
    2 = {50,50},
    3 = {50,50},
    4 = {70,70},
    5 = {  ,50},
    6 = {  ,50},
    7 = {50,100},
    8 = {  ,50},
    9 = {  ,50},
    . = { ,700},
   {,}= { ,500},
    : = { ,500},
    ; = { ,500},
    ! = { ,100},
    ? = { ,200},
    @ = {50,50},
    ~ = {200,250},
   \% = {50,50},
    * = {300,300},
    + = {250,250},
    - = {400,500},  % /hyphen
    – = {400,300},  % /endash
    — = {300,200},  % /emdash
    _ = {200,200},  % /underscore
```

```
10048     / = {200,300},
10049    /backslash    = {200,300},
10050     ' = {300,400}, % /quotesingle
10051     ‘ = {300,400},  ’ = {300,400},
10052     “ = {300,300},  ” = {300,300},
10053     , = {400,400},  „ = {400,400},
10054     ‹ = {400,400},  › = {300,500},
10055     « = {300,200},  » = {100,400},
10056     ¡ = {100,   },  ¿ = {100,   },
10057     ( = {300,   },  ) = {   ,300},
10058     <  = {200,100}, > = {100,200},
10059    /braceleft = {400,200}, /braceright = {200,400},
10060    /angleleft = {400,   }, /angleright = {   ,400},
10061     † = {100,100},
10062     ‡ = { 80, 80},
10063     • = {200,200},
10064     · = {400,450}, % / periodcentered
10065     ℃ = { 80, 50},
10066     ℃ = {   , 50},
10067     ° = {400,400},
10068     ™ = {100,200},
10069     © = {100,100},
10070     ® = {100,100},
10071     ª = {100,200},
10072     º = {100,200},
10073     ¹ = {200,250},
10074     ² = { 50,100},
10075     ³ = { 50,100},
10076     ¬ = {200,   },
10077     − = {300,300},
10078     ± = {150,200},
10079     × = {150,250},
10080     ÷ = {150,250},
10081     € = {100,   },
10082 ⟨*LatinModernRoman⟩
10083    /one.oldstyle   = {100,100},
10084    /two.oldstyle   = { 50, 50},
10085    /three.oldstyle = { 30, 80},
10086    /four.oldstyle  = { 50, 50},
10087    /seven.oldstyle = { 50, 80},
10088 ⟨/LatinModernRoman⟩
10089 ⟨*NewComputerModern⟩
10090     A = {50,50},   % /Alphatonos
10091     Ά = {120,50},  %
10092     Ἀ = {120,50},  %
10093     Ἁ = {80,50},   %
10094     Ἂ = {220,50}, %
10095     Ἃ = {220,50}, %
10096     Ἄ = {170,50}, %
10097     Ἅ = {170,50}, %
10098     Ἆ = {190,50}, %
10099     Ἇ = {190,50}, %
10100     Ἀ = {150,50}, %
10101     Ἁ = {80,50},   %
10102     Ἂ = {220,50}, %
10103     Ἃ = {220,50}, %
10104     Ἄ = {170,50}, %
10105     Ἅ = {170,50}, %
10106     Ἆ = {210,50}, %
10107     Ἇ = {210,50}, %
10108     /uni1FBC.alt = {,205}, % Alpha prosgegrammeni
10109     /uni1F88.alt = {50,190}, %Alpha psili prosgegrammeni
10110     /uni1F89.alt = {,200}, %Alpha dasia prosgegrammeni
10111     /uni1F8A.alt = {130,180}, %Alpha psili baria prosgegrammeni
10112     /uni1F8B.alt = {130,190}, %Alpha dasia baria prosgegrammeni
```

```
10113     /uni1F8C.alt = {100,190}, %Alpha psili oxia prosgegrammeni
10114     /uni1F8D.alt = {70,190}, %Alpha dasia oxia prosgegrammeni
10115     /uni1F8E.alt = {120,190}, %Alpha psili perispomeni prosgegrammeni
10116     /uni1F8F.alt = {120,190}, %Alpha dasia perispomeni prosgegrammeni
10117   %
10118     /uni1FCC.alt = {,205}, % Eta prosgegrammeni
10119     /uni1F98.alt = {185,170}, %Eta psili prosgegrammeni
10120     /uni1F99.alt = {185,170}, %Eta dasia prosgegrammeni
10121     /uni1F9A.alt = {220,170}, %Eta psili baria prosgegrammeni
10122     /uni1F9B.alt = {220,170}, %Eta dasia baria prosgegrammeni
10123     /uni1F9C.alt = {220,170}, %Eta psili oxia prosgegrammeni
10124     /uni1F9D.alt = {220,170}, %Eta dasia oxia prosgegrammeni
10125     /uni1F9E.alt = {255,170}, %Eta psili perispomeni prosgegrammeni
10126     /uni1F9F.alt = {255,170}, %Eta dasia perispomeni prosgegrammeni
10127   %
10128     O = {95,50}, %
10129 ⟨/NewComputerModern⟩
10130     Γ = {   ,180}, % /Gamma
10131 ⟨LatinModernRoman⟩     Δ = {100,100}, % /Delta
10132 ⟨NewComputerModern⟩     Δ = {50,50}, % /Delta
10133     Θ = { 50, 50}, % /Theta
10134 ⟨LatinModernRoman⟩     Λ = {100,100}, % /Lambda
10135 ⟨NewComputerModern⟩     Λ = {50,50}, % /Lambda
10136 %    Ξ = {,},       % /Xi
10137 %    Π = {,},       % /Pi
10138     Σ = { 50, 50}, % /Sigma
10139 ⟨LatinModernRoman⟩     ϒ = {100,100}, % /Upsilon
10140 ⟨NewComputerModern⟩     ϒ = {80,80}, % /Upsilon
10141     Φ = { 50, 50}, % /Phi
10142     Ψ = { 50, 50}, % /Psi
10143 ⟨*NewComputerModern⟩
10144     Ω = { 20, 30}, % /Omega
10145     Ω = {150,30},
10146     ̔Ω = {220,30},
10147     ́Ω = {205,30},
10148     ̔́Ω = {285,30},
10149     ̓́Ω = {285,30},
10150     ̔̀Ω = {270,30},
10151     ̓̀Ω = {270,30},
10152     ̔̃Ω = {310,30},
10153     ̓̃Ω = {310,30},
10154     ̔Ω = {205,30},
10155     ́Ω = {205,30},
10156     ̔́Ω = {285,30},
10157     ̓́Ω = {285,30},
10158     ̔̀Ω = {270,30},
10159     ̓̀Ω = {270,30},
10160     ̔̃Ω = {310,30},
10161     ̓̃Ω = {310,30},
10162     /uni1FFC.alt = {,230}, % Omega prosgegrammeni
10163     /uni1FA8.alt = {185,190}, %Omega psili prosgegrammeni
10164     /uni1FA9.alt = {185,190}, %Omega dasia prosgegrammeni
10165     /uni1FAA.alt = {220,190}, %Omega psili baria prosgegrammeni
10166     /uni1FAB.alt = {220,190}, %Omega dasia baria prosgegrammeni
10167     /uni1FAC.alt = {220,190}, %Omega psili oxia prosgegrammeni
10168     /uni1FAD.alt = {220,190}, %Omega dasia oxia prosgegrammeni
10169     /uni1FAE.alt = {255,190}, %Omega psili perispomeni prosgegrammeni
10170     /uni1FAF.alt = {255,190}, %Omega dasia perispomeni prosgegrammeni
10171   %
10172     α = {,50},
10173     γ = {50,50},
10174     ζ = {,50},
10175     ϑ = {30,40},
10176     ι = {,50},
10177     ϊ = {-20,-30},
```

```
    ϰ = {50,50},
    λ = {50,50},
    ν = {50,25},
    π = {50,50},
    σ = {,50},
    ς = {,50},
    τ = {50,50},
    χ = {50,50},
    ψ = {50,50},
%   /uni1F98.alt = {,},
```

CMU Serif doesn't include `*.end` glyphs, and the OldStyle numbers' names differ.

```
  }

\SetProtrusion
  [ name     = NCM-TU,
    load     = NCM-default ]
  { encoding = {TU,EU1,EU2},
    family   = {New Computer Modern} }
  {
    /a.end = {,330},
    /e.end = {,350},
    /k.alt = { ,50},
    /r.end = {,300},
    /m.end = {,200},
    /n.end = {,300},
    /one.oldstyle   = {100,100},
    /two.oldstyle   = { 50, 50},
    /three.oldstyle = { 30, 80},
    /four.oldstyle  = { 50, 50},
    /seven.oldstyle = { 50, 80},
  }

\SetProtrusion
  [ name     = CMU-TU,
    load     = NCM-default ]
  { encoding = {TU,EU1,EU2},
    family   = {CMU Serif} }
  {
    /oneoldstyle   = {100,100},
    /twooldstyle   = { 50, 50},
    /threeoldstyle = { 30, 80},
    /fouroldstyle  = { 50, 50},
    /sevenoldstyle = { 50, 80},
⟨/NewComputerModern⟩
  }

\SetProtrusion
⟨LatinModernRoman⟩   [ name     = LMR-it ]
⟨NewComputerModern⟩   [ name     = NCM-it ]
⟨LatinModernRoman⟩   { encoding = {TU,EU1,EU2},
⟨LatinModernRoman⟩     family   = Latin Modern Roman,
⟨LatinModernRoman⟩     shape    = {it,sl}       }
⟨NewComputerModern⟩   { }
  {
    A = {125,100},
    Æ = {125,-55},
    B = {90,-40},
    C = {145,-75},
    D = {75, -28},
    E = {80,-55},
    F = {85,-80},
    G = {153,-15},
    H = {73,-60},
    I = {140,-120},
```

```
10241     IJ = {140,-80},
10242     J = {135,-80},
10243     K = {70,-30},
10244     L = {87, 40},
10245     M = {67,-45},
10246     N = {75,-55},
10247     O = {150,-30},
10248     Œ = {150,-55},
10249     P = {82,-50},
10250     Q = {150,-30},
10251     R = {75, 15},
10252     S = {90,-65},
10253     $ = {100,-20},
10254     T = {220,-85},
10255     U = {230,-55},
10256     V = {260,-60},
10257     W = {185,-55},
10258     X = {70,-30},
10259     Y = {250,-60},
10260     Z = {90,-60},
10261     a = {150,-10},
10262     b = {170,    },
10263     c = {173,-10},
10264     d = {150,-55},
10265     e = {180, },
10266     f = {   ,-250},
10267     g = {150,-10},
10268     h = {100, },
10269     i = {210, },
10270     ij = {210,-40},
10271     j = {   ,-40},
10272     k = {110,-50},
10273     l = {240,-110},
10274     m = {80, },
10275     n = {115, },
10276     o = {155, },
10277     q = {170,-40},
10278     r = {155,-40},
10279     s = {130, },
10280     t = {230,-10},
10281     u = {120, },
10282     v = {140,-25},
10283     w = {98,-20},
10284     x = {65,-40},
10285     y = {130,-20},
10286     z = {110,-80},
10287     0 = {170,-85},
10288     1 = {230,110},
10289     2 = {130,-70},
10290     3 = {140,-70},
10291     4 = {130,80},
10292     5 = {160, },
10293     6 = {175,-30},
10294     7 = {250,-150},
10295     8 = {130,-40},
10296     9 = {155,-80},
10297     . = { ,500},
10298    {,}= { ,450},
10299     : = { ,300},
10300     ; = { ,300},
10301     & = {130,30},
10302    \% = {180,50},
10303     * = {380,20},
10304     + = {180,200},
10305     @ = {180,10},
```

```
    ~ = {200,150},
    ( = {300, },    ) = {  ,70},
    / = {100,100},
    - = {500,300}, % /hyphen
    – = {500,300}, % /endash
    — = {400,170}, % /emdash
    _ = {100,200}, % /underscore
    ' = {300,400}, % /quotesingle
    " = {500,300},
    ‘ = {800,200},  ’ = {800,-20},
    “ = {540,100},  ” = {500,100},
    , = {300,700},  „ = {200,600},
    ‹ = {500,300},  › = {400,400},
    « = {400,100},  » = {200,300},
    ¡ = {200,   },  ¿ = {200,   },
    < = {300,100},  > = {200,100},
   /backslash   = {300,300},
   /braceleft   = {400,100},   /braceright    = {200,200},
    † = {200, 80},
    ‡ = {120, 80},
    • = {220,100},
    · = {550,300}, % / periodcentered
   ℃ = {170,   },
   ℂ = {100, 50},
   ¶ = {200,   },
   ° = {500,300},
   ™ = {200, 70},
   © = { 50, 70},
   ® = { 50, 70},
   ª = {140,100},
   º = {140,100},
   ¹ = {400,150},
   ² = {250, 80},
   ³ = {250, 80},
   ¬ = {250, 80},
   − = {300,200},
   ± = {150,170},
   × = {200,200},
   ÷ = {200,200},
   € = {150,   },
⟨*LatinModernRoman⟩
   /one.oldstyle   = {100,100},
   /two.oldstyle   = {100, 80},
   /three.oldstyle = { 80, 50},
   /four.oldstyle  = { 80, 80},
   /five.oldstyle  = { 50,   },
   /six.oldstyle   = { 50,   },
   /seven.oldstyle = { 80, 80},
   /eight.oldstyle = { 50,   },
⟨/LatinModernRoman⟩
    Γ = {100,120}, % /Gamma
    Δ = {120,100}, % /Delta
    Θ = {120, 50}, % /Theta
⟨LatinModernRoman⟩    Λ = {130,100}, % /Lambda
⟨NewComputerModern⟩    Λ = {160,100}, % /Lambda
    Ξ = {100,},    % /Xi
    Π = {100,},    % /Pi
    Σ = {100, 50}, % /Sigma
⟨LatinModernRoman⟩    ϒ = {180,100}, % /Upsilon
⟨NewComputerModern⟩    ϒ = {260,100}, % /Upsilon
    Φ = {130, 70}, % /Phi
    Ψ = {130, 50}, % /Psi
    Ω = { 50,},    % /Omega
⟨*NewComputerModern⟩
    Ά = {190,50},  %
```

```
    ᾼ = {220,50},  %
    Ά = {200,50},  %
    ᾼ = {300,50}, %
    ᾼ = {300,50}, %
    ᾼ = {300,50}, %
    ᾼ = {300,50}, %
    ᾼ = {320,50}, %
    ᾼ = {320,50}, %
    ᾌ = {200,50}, %
    ᾍ = {200,50},  %
    ᾌ = {300,50}, %
    ᾌ = {300,50}, %
    ᾌ = {300,50}, %
    ᾌ = {300,50}, %
    ᾌ = {320,50}, %
    ᾌ = {320,50}, %
    /uni1FBC.alt = {,205}, % Alpha prosgegrammeni
    /uni1F88.alt = {50,190}, %Alpha psili prosgegrammeni
    /uni1F89.alt = {,200}, %Alpha dasia prosgegrammeni
    /uni1F8A.alt = {130,180}, %Alpha psili baria prosgegrammeni
    /uni1F8B.alt = {130,190}, %Alpha dasia baria prosgegrammeni
    /uni1F8C.alt = {100,190}, %Alpha psili oxia prosgegrammeni
    /uni1F8D.alt = {70,190}, %Alpha dasia oxia prosgegrammeni
    /uni1F8E.alt = {120,190}, %Alpha psili perispomeni prosgegrammeni
    /uni1F8F.alt = {120,190}, %Alpha dasia perispomeni prosgegrammeni
  %
    /uni1FCC.alt = {,205}, % Eta prosgegrammeni
    /uni1F98.alt = {185,170}, %Eta psili prosgegrammeni
    /uni1F99.alt = {185,170}, %Eta dasia prosgegrammeni
    /uni1F9A.alt = {220,170}, %Eta psili baria prosgegrammeni
    /uni1F9B.alt = {220,170}, %Eta dasia baria prosgegrammeni
    /uni1F9C.alt = {220,170}, %Eta psili oxia prosgegrammeni
    /uni1F9D.alt = {220,170}, %Eta dasia oxia prosgegrammeni
    /uni1F9E.alt = {255,170}, %Eta psili perispomeni prosgegrammeni
    /uni1F9F.alt = {255,170}, %Eta dasia perispomeni prosgegrammeni
  %
    O = {95,50}, %
    Ω = {120, 30}, % /Omega
    Ω = {160,30},
    ᾺΩ = {250,30},
    ΏΩ = {250,30},
    ᾺΩ = {300,30},
    ᾺΩ = {300,30},
    ᾺΩ = {300,30},
    ᾺΩ = {300,30},
    ᾺΩ = {330,30},
    ᾺΩ = {330,30},
    Ω = {30,30},
    ᾩ = {230,30},
    ᾩ = {230,30},
    ᾩ = {300,30},
    ᾩ = {300,30},
    ᾩ = {300,30},
    ᾩ = {300,30},
    ᾩ = {330,30},
    ᾩ = {330,30},
    /uni1FFC.alt = {,230}, % Omega prosgegrammeni
    /uni1FA8.alt = {185,190}, %Omega psili prosgegrammeni
    /uni1FA9.alt = {185,190}, %Omega dasia prosgegrammeni
    /uni1FAA.alt = {220,190}, %Omega psili baria prosgegrammeni
    /uni1FAB.alt = {220,190}, %Omega dasia baria prosgegrammeni
    /uni1FAC.alt = {220,190}, %Omega psili oxia prosgegrammeni
    /uni1FAD.alt = {220,190}, %Omega dasia oxia prosgegrammeni
    /uni1FAE.alt = {255,190}, %Omega psili perispomeni prosgegrammeni
    /uni1FAF.alt = {255,190}, %Omega dasia perispomeni prosgegrammeni
```

```
  %
    α = {50,50},
    γ = {100,50},
    δ = {30,50},
    ε = {30,},
    ζ = {20,50},
    ϑ = {30,40},
    ι = {,50},
    ϊ = {-20,-30},
    ϰ = {50,50},
    λ = {-20,50},
    ν = {50,25},
    ο ={40,},
    π = {50,50},
    σ = {40,50},
    ς = {20,50},
    τ = {50,50},
    υ = {80,},
    φ = {80,},
    χ = {20,},
    ψ = {80,},
%   /uni1F98.alt = {,},
   }

\SetProtrusion
   [ name     = NCM-it-TU,
     load     = NCM-it ]
   { encoding = {TU,EU1,EU2},
     family   = {New Computer Modern},
     shape    = {it,sl} }
   {
     /a.end = {,330}, %Fix
     /e.end = {,350}, %Fix
     /k.alt = {  ,50}, %Fix
     /r.end = {,300}, %Fix
     /m.end = {,200}, %Fix
     /n.end = {,300}, %Fix
     /one.oldstyle   = {100,100},
     /two.oldstyle   = {100, 80},
     /three.oldstyle = { 80, 50},
     /four.oldstyle  = { 80, 80},
     /five.oldstyle  = { 50,   },
     /six.oldstyle   = { 50,   },
     /seven.oldstyle = { 80, 80},
     /eight.oldstyle = { 50,   },
   }

\SetProtrusion
   [ name     = CMU-it-TU,
     load     = NCM-it ]
   { encoding = {TU,EU1,EU2},
     family   = {CMU Serif},
     shape    = {it,sl} }
   {
     /oneoldstyle   = {100,100},
     /twooldstyle   = {100, 80},
     /threeoldstyle = { 80, 50},
     /fouroldstyle  = { 80, 80},
     /fiveoldstyle  = { 50,   },
     /sixoldstyle   = { 50,   },
     /sevenoldstyle = { 80, 80},
     /eightoldstyle = { 50,   },
⟨/NewComputerModern⟩
   }
⟨/LatinModernRoman|NewComputerModern⟩
```

3.2.2 Charis SIL

```
⟨*CharisSIL⟩
\SetProtrusion
   [ name     = Charis-default ]
   { encoding = {TU,EU1,EU2},
     family   = Charis SIL }
   {
      A = {50,50},
      Æ = {50,50},
      C = {50,  },
      D = {  ,50},
      F = {  ,50},
      G = {50,  },
      J = {100, },
      K = {  ,50},
      L = {  ,50},
      L· = {  ,100},
      O = {50,50},
      Œ = {50,  },
      P = {  ,50},
      Q = {50,70},
      R = {  ,50},
      ß = {  ,40}, % capital sharp s
      T = {50,50},
      V = {50,50},
      W = {50,50},
      X = {50,50},
      Y = {50,50},
      k = {  ,50},
      l· = {  ,150},
      r = {  ,50},
      t = {  ,50},
      v = {50,50},
      w = {50,50},
      x = {50,50},
      y = {  ,50},
      1 = {150,150},
      2 = {50,50},
      3 = {50,  },
      4 = {100,50},
      6 = {50,  },
      7 = {50,80},
      9 = {50,50},
      . = { ,600},
    {,}= { ,500},
      : = { ,400},
      ; = { ,300},
      ! = { ,100},
      ? = { ,200},
      @ = {50,50},
      ~ = {200,250},
    \% = {  ,50},
      * = {300,300},
      + = {200,250},
      / = { ,200},
    /backslash = {150,200},
      | = {200,200},
      - = {400,500}, % hyphen
      – = {200,300}, % endash
      — = {150,250}, % emdash
      — = {200,200}, % Horizontal Bar = \texttwelveudash
      – = {150,150}, % Figure Dash = \textthreequartersemdash
      _ = {100,100},
    {=} = {100,100},
```

```
10564       ‘ = {300,400},   ’ = {300,400},
10565       “ = {300,300},   ” = {300,300},
10566       , = {400,400},   „ = {300,300},
10567       ‹ = {400,300},   › = {300,400},
10568       « = {200,200},   » = {150,300},
10569       ¡ = {100,     },   ¿ = {100,     },
10570       ( = {200,     },   ) = {     ,200},
10571       < = {200,150},   > = {100,200},
10572       [ = {100,     },   ] = {     ,100},
10573     /braceleft = {200,     }, /braceright = {     ,300},
10574       † = { 80,  80},
10575       ‡ = {100,100},
10576       • = {200,200},
10577       ° = {150,200},
10578       ™ = {150,150},
10579       ¢ = { 50,     },
10580       £ = { 50,     },
10581       ¦ = {200,200},
10582       © = {100,100},
10583       ® = {100,100},
10584       ª = {100,200},
10585       º = {200,200},
10586       ¬ = {200,  50},
10587       µ = {     ,100},
10588       ¶ = {     ,100},
10589       · = {300,400},
10590       ¹ = {200,300},
10591       ² = {100,200},
10592       ³ = {100,200},
10593       € = {100,     },
10594       ± = {150,200},
10595       × = {200,200},
10596       ÷ = {250,250},
10597     /minus = {200,200},
10598       − = {200,200},
10599     % Cyrillic
10600       Б = {    ,50},
10601       Г = {    ,130},
10602       Ж = {50,50},
10603       З = {30,50},
10604       Л = {50,    },
10605       У = {50,50},
10606       Ф = {50,50},
10607       Ч = {100,  },
10608       Ъ = {    ,50},
10609       Ь = {    ,50},
10610       Э = {50,50},
10611       Ю = {    ,40},
10612       Я = {50,    },
10613       Ѵ = {50,50},
10614       Ѣ = {50,    },
10615       Ѣ = {50,100},
10616       Є = {50,    },
10617       Љ = {50,50},
10618       Њ = {    ,50},
10619       Ћ = {50,50},
10620       Ѯ = {100,100},
10621       Ѱ = {50,50},
10622       Ѣ = {    ,50},
10623       Ь = {    ,50},
10624       Џ = {50,80},
10625       Ҥ = {    ,80},
10626       Ҭ = {50,50},
10627       Ј = {50,    },
10628       Ј = {50,40},
```

```
    Ԟ  =  {   ,50},
    Ӕ  =  {50,   },
    Ԉ  =  {   ,50},
    Ԋ  =  {   ,50},
    Ԁ  =  {   ,100},
    б  =  {50,50},
    г  =  {   ,70},
    к  =  {   ,50},
    л  =  {50,   },
    т  =  {50,50},
    ф  =  {50,50},
    ч  =  {50,   },
    ъ  =  {   ,50},
    ь  =  {   ,50},
    э  =  {   ,50},
    я  =  {50,   },
    љ  =  {50,   },
    њ  =  {   ,50},
    ѣ  =  {   ,50},
    ѵ  =  {50,50},
    ҽ  =  {50,   },
    ҍ  =  {   ,50},
    ү  =  {50,50},
    ҕ  =  {   ,50},
    ҧ  =  {   ,50},
    ԁ  =  {   ,100},
    ԅ  =  {100,100},
    ԇ  =  {50,50},
    ԡ  =  {50,70},
    ԣ  =  {   ,70},
    ӕ  =  {50,30},
    ԉ  =  {   ,50},
    ԋ  =  {   ,50},
    %        Д П Ц Ш Щ Ы Ҕ Ҧ Ꙍ Ә Ҵ Ꚑ Ӭ Ӡ Ԑ Ԁ
    %        в д ж з и м н п ц ш ы ю ђ є ћ ꚑ ә ԑ ꙍ ҵ ӡ ԁ ԍ ꚍ ԏ ԓ ԯ
  % Greek
    Δ  =  {50,50},
    Ψ  =  {50,50},
    γ  =  {70,70},
    λ  =  {40,70},
    π  =  {40,50},
    ρ  =  {   ,50},
    σ  =  {   ,50},
    χ  =  {50,50},
}

\SetProtrusion
   [ name     = Charis-it   ]
   { encoding = {TU,EU1,EU2},
     family   = Charis SIL,
     shape    = {it,sl}  }
   {
    C  =  {50,   },
    G  =  {50,   },
    J  =  {50,   },
    L  =  {50,50},
    O  =  {50,   },
    Œ  =  {50,   },
    Q  =  {50,   },
    S  =  {50,   },
    $  =  {50,   },
    T  =  {70,   },
    o  =  {50,50},
    p  =  {   ,50},
    q  =  {50,   },
```

```
10694       t = {   ,50},
10695       w = {   ,50},
10696       y = {   ,50},
10697       1 = {150,100},
10698       3 = {50,    },
10699       4 = {100,   },
10700       6 = {50,    },
10701       7 = {100,   },
10702       . = {   ,700},
10703     {,}= {   ,600},
10704       : = {   ,400},
10705       ; = {   ,400},
10706       ? = {   ,150},
10707       & = {   ,80},
10708     \% = {50,50},
10709       * = {300,200},
10710       + = {250,250},
10711       @ = {80,50},
10712       ~ = {150,150},
10713       / = {   ,150},
10714     /backslash = {150,150},
10715       - = {300,400}, % hyphen
10716       – = {200,300}, % endash
10717       — = {150,200}, % emdash
10718       _ = {   ,100},
10719     {=} = {200,200},
10720       ± = {150,200},
10721       × = {250,250},
10722       ÷ = {250,250},
10723       ° = {150,200},
10724       · = {300,400},
10725       ‘ = {400,200},   ’ = {400,200},
10726       “ = {300,200},   ” = {400,200},
10727       , = {200,500},   „ = {150,500},
10728       ‹ = {300,400},   › = {200,500},
10729       « = {200,300},   » = {150,400},
10730       ( = {200,     },   ) = {     ,200},
10731       < = {200,200},   > = {200,200},
10732     /braceleft = {300,     }, /braceright = {     ,200},
10733     % Cyrillic
10734       Ж = {50,30},
10735       Л = {50,    },
10736       У = {50,30},
10737       Ф = {50,    },
10738       Ч = {100,   },
10739       Ъ = {   ,50},
10740       Ь = {   ,50},
10741       Э = {50,50},
10742       Я = {50,    },
10743       Ѵ = {50,50},
10744       Љ = {50,50},
10745       Ҙ = {140,100},
10746       Ҷ = {70,50},
10747       Ћ = {50,80},
10748       Ҥ = {   ,80},
10749       Ҭ = {50,50},
10750       г = {50,50},
10751       д = {50,30},
10752       м = {50,    },
10753       ф = {50,    },
10754       ч = {50,    },
10755       ъ = {   ,50},
10756       ь = {   ,50},
10757       э = {   ,50},
10758       я = {50,    },
```

```
      љ = {50,50},
      њ = {  ,50},
      ѵ = {50,50},
      ь = {  ,50},
      ҕ = {140,100},
      ҙ = {70,50},
      ҷ = {50,70},
      ӈ = {  ,70},
    % Greek
      Γ = {  ,130},
      Δ = {50,50},
      Ψ = {50,50},
      γ = {70,70},
      λ = {40,70},
      π = {40,50},
      ρ = {  ,50},
      σ = {  ,50},
      χ = {50,50},
  }
```

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).

```
% quick and dirty -- maybe we'll promote this to a
% regular key some time
\define@key{MT@pr@c}{command}{\csname #1\endcsname}

% glyph names have changed with version 5.0 of Charis SIL:
% before: /a.SC, /b.SC, ...
% after:  /a.sc, /b.sc, ...
\ifx\MT@lua\@undefined
  \gdef\MT@get@CHARIS@SC{
    % test whether glyph "a.sc" exists
    \ifnum\numexpr\XeTeXglyphindex "a.sc"\relax > 0
      \gdef\MT@CHARIS@SC{sc}%
    \else
      \gdef\MT@CHARIS@SC{SC}%
    \fi
  }
\else
  \gdef\MT@get@CHARIS@SC{
    \gdef\MT@CHARIS@SC{\MT@lua{
      % check font version
% --  why doesn't this work?:
%     f = font.getfont(font.current());
%     i = fontloader.info(f.filename);
%     if (tonumber(i.version) < 5) then;
      if (tonumber(fontloader.info(font.getfont(font.current()).filename).version) < 5) then;
        tex.print("SC");
      else;
        tex.print("sc");
      end
    }}
  }
\fi

\SetProtrusion
   [ name     = Charis-sc,
     load     = Charis-default,
     command  = {MT@get@CHARIS@SC} ]
   { encoding = {TU,EU1,EU2},
     family   = Charis SIL,
     shape    = {sc}  }
```

```
    {
%     A = {100,100}, % etc., doesn't work with \textsc
      /a.\MT@CHARIS@SC = {100,100},
      /c.\MT@CHARIS@SC = {50,  },
      /d.\MT@CHARIS@SC = {  ,50},
      /f.\MT@CHARIS@SC = {  ,50},
      /g.\MT@CHARIS@SC = {50,  },
      /j.\MT@CHARIS@SC = {100, },
      /k.\MT@CHARIS@SC = {  ,50},
      /l.\MT@CHARIS@SC = {  ,50},
    /f_l.\MT@CHARIS@SC = {  ,50},
      /o.\MT@CHARIS@SC = {50,50},
     /oe.\MT@CHARIS@SC = {50,  },
      /q.\MT@CHARIS@SC = {50,70},
      /r.\MT@CHARIS@SC = {  ,50},
      /t.\MT@CHARIS@SC = {50,100},
      /v.\MT@CHARIS@SC = {50,50},
      /w.\MT@CHARIS@SC = {50,50},
      /x.\MT@CHARIS@SC = {50,50},
      /y.\MT@CHARIS@SC = {50,50}
    }
⟨/CharisSIL⟩
```

3.2.3 EB Garamond

```
⟨*EBGaramond⟩
\SetProtrusion
  [ name     = EBGaramond-TU,
    load     = EBGaramond-T1-LF ]
  { encoding = {TU,EU1,EU2},
    family   = EBGaramond }
  {
   /one.tosf   = {150,150},
   /two.tosf   = {50,50},
   /three.tosf = {50,50},
   /four.tosf  = {50,50},
   /five.tosf  = {50,50},
   /six.tosf   = {50,50},
   /seven.tosf = {50,80},
   /eight.tosf = {50,50},
   /nine.tosf  = {50,50},
   /one.lf     = {50,50},
   /two.lf     = {50,50},
   /four.lf    = {50,50},
   /seven.lf   = {50,50},
   /one.osf    = {50,50},
   /two.osf    = {50,50},
   /four.osf   = {50,50},
   /seven.osf  = {50,50},
   IV =  {   , 35},
   VI =  { 35,   },
   VII  = { 30,   },
   VIII  = { 25,   },
   IX =  {   , 35},
   XI =  { 35,   },
   XII =  { 30,   },
   iv =  {   , 25},
   vi =  { 25,   },
   vii  = { 20,   },
   viii  = { 20,   },
   ix =  {   , 25},
   xi =  { 25,   },
   xii  = { 20,   },
  % textcomp
   \textquotesingle = {400,500},
   _ = {200,250},
```

```
10882     ƒ = {    ,100},
10883     ₡ = { 50,    },
10884     † = {100,100},
10885     ‡ = { 80, 80},
10886     • = {    ,100},
10887     · = {300,400}, % periodcentered
10888   /twodotenleader = {150,200},
10889   /ellipsis   = {100,150},
10890     ℃ = { 80,    },
10891     ° = {400,400},
10892     ™ = {100,100},
10893     © = {100,100},
10894     ® = {100,100},
10895     ª = {200,200},
10896     º = {200,200},
10897     ¹ = {200,200},
10898     ² = {200,200},
10899     ³ = {200,200},
10900     ¬ = {200,    },
10901     ¶ = {    ,100},
10902     − = {300,300}, % minus
10903     ± = {150,200},
10904     × = {100,150},
10905     ÷ = {150,200},
10906     € = { 50,100},
10907     ¥ = { 50, 50},
10908   % Greek
10909     Γ = {    ,150},
10910     Δ = {100,100},
10911     Θ = { 50, 50},
10912     Λ = {100,100},
10913     Ξ = { 50, 50},
10914     Υ = {100,100},
10915     Φ = { 50, 50},
10916     Ψ = { 50, 50},
10917     Ω = {    , 50},
10918     ζ = {    , 50},
10919     λ = { 50, 50},
10920     γ = { 50, 50},
10921     π = { 50, 50},
10922     ρ = {    , 50},
10923     σ = { 50, 50},
10924     τ = { 50, 50},
10925     χ = { 50, 50},
10926     φ = { 50, 50},
10927     ϙ = { 50, 50},
10928     ψ = { 50, 50},
10929   % Cyrillic
10930     Г = {    ,150},
10931     Д = { 50, 50},
10932     Ж = { 50, 50},
10933     К = {    , 50},
10934     Л = { 50,    },
10935     Љ = { 50, 50},
10936     З = { 50, 50},
10937     У = { 50,100},
10938     Ф = { 50, 50},
10939     Ч = { 70,    },
10940     Я = { 50,    },
10941     Ъ = { 50, 50},
10942     Ь = {    , 50},
10943     ж = { 50, 50},
10944     ф = { 50, 50},
10945     ъ = { 50, 50},
10946     Ψ = { 50, 50},
```

```
    r = {    , 50},
    V = { 50, 50},
  % other
    Þ = {    , 50},
    þ = {    , 50},
    Λ = {100,100},
    (ı)  = { 35, 65},
    (a)  = { 30, 60},
  }

\SetProtrusion
  [ name     = EBGaramond-it-TU,
    load     = EBGaramond-it-T1-LF ]
  { encoding = {TU,EU1,EU2},
    family   = EBGaramond,
    shape    = it }
  {
    /zero.tosf  = {150,150},
    /one.tosf   = {150,150},
    /two.tosf   = {80,80},
    /three.tosf = {50,80},
    /four.tosf  = {50,80},
    /five.tosf  = {50,80},
    /six.tosf   = {50,50},
    /seven.tosf = {50,100},
    /eight.tosf = {50,50},
    /nine.tosf  = {50,80},
    /one.lf     = {50,50},
    /two.lf     = {50,50},
    /three.lf   = {80,50},
    /four.lf    = {50,50},
    /five.lf    = {50,50},
    /six.lf     = {50,50},
    /seven.lf   = {50,50},
    /eight.lf   = {50,50},
    /nine.lf    = {50,  },
    /one.osf    = {50,50},
    /two.osf    = {50,50},
    /three.osf  = {   ,80},
    /four.osf   = {50,50},
    /seven.osf  = {50,50},
  % textcomp
    \textquotesingle = {800,100},
    − = {300,300}, % minus
    ‗ = {200,250},
    † = {200,100},
    ‡ = { 80, 80},
    • = {300,    },
    ℃ = {200,    },
    ƒ = {100,    },
    ₡ = {100,    },
    ™ = {200,    },
    © = {200,100},
    ® = {200,100},
    ¬ = {300,    },
    ° = {500,100},
    ± = {200,150},
    ¹ = {300,100},
    ² = {300,    },
    ³ = {300,    },
    · = {300,500}, % periodcentered
   /twodotenleader = {150,300},
   /ellipsis  = {100,200},
    € = {100,    },
    × = {200,100},
```

```
    ÷ = {200,200},
    ¶ = {   ,100},
    ª = {200,200},
    º = {200,200},
    ¥ = { 50, 50},
  % Greek
    Δ = {150,   },
    Θ = { 50,   },
    Λ = {150,   },
    Υ = {100, 50},
    Φ = { 50,   },
    Χ = { 50,   },
    Ψ = {100,   },
    Ω = { 50,   },
    γ = {   , 50},
    λ = { 50,   },
  % Cyrillic
    Υ = { 50,   },
    Ч = {100,   },
    З = {100,   },
  % other
    Þ = { 50, 50},
    þ = {   , 50},
  }

\SetProtrusion
  [ name     = EBGaramond-sc-TU,
    load     = EBGaramond-TU ]
  { encoding = {TU,EU1,EU2},
    family   = EBGaramond,
    shape    = sc }
  {
    a = {50,50},
   \ae = {50,  },
    d = {  ,50},
    f = {  ,50},
    g = {50,  },
    j = {50,  },
    l = {  ,50},
    o = {50,50},
   \oe = {50,  },
    q = {50,70},
    r = {  , 0},
    t = {50,50},
    y = {50,50},
  % Greek
    α = {50,50},
    γ = {  ,50},
    δ = {50,50},
    λ = {50,50},
    ο = {50,50},
    τ = {50,50},
    υ = {50,50},
    ψ = {50,50},
  % Cyrillic
    т = {50,50},
  }

\SetProtrusion
  [ name     = EBGaramond-scit-TU,
    load     = EBGaramond-it-TU ]
  { encoding = {TU,EU1,EU2},
    family   = EBGaramond,
    shape    = scit }
```

```
    {
      a = {50,50},
    \ae = {50,  },
      d = {  ,50},
      f = {  ,50},
      g = {50,  },
      j = {50,  },
      l = {  ,50},
      o = {50,50},
    \oe = {50,  },
      q = {50,70},
      r = {  , 0},
      t = {50,50},
      y = {50,50},
    % Greek
      α = {50,50},
      γ = {  ,50},
      δ = {50,50},
      λ = {50,50},
      ο = {50,50},
      τ = {50,50},
      υ = {50,50},
      ψ = {50,50},
    % Cyrillic
      т = {50,50},
    }
⟨/EBGaramond⟩
```

3.2.4 Palatino

```
⟨*Palatino⟩
\SetProtrusion
   [ name     = palatino-default ]
   { encoding = {TU,EU1,EU2},
     family   = {Palatino} }
   {
     A = {50,50},
     D = {  ,50},
     J = {50,  },
     K = {  ,50},
     L = {  ,50},
     O = {25,  },
     T = {50,50},
     V = {50,50},
     W = {50,50},
     X = {50,50},
     Y = {50,50},
     b = {  ,25},
     d = {25,30},
     f = {  ,50},
     g = {  ,100},
     k = {  ,50},
     p = {  ,50},
     q = {50,  },
     r = {  ,50},
     t = {  ,50}, ﬀ = { ,50}, ﬁ = {  ,50},
     v = {75,50},
     w = {50,50},
     x = {50,50},
     y = {50,70},
     1 = {100,50},
     2 = {25,50},
     4 = {50,  },
     6 = {50,  },
     9 = {25,  },
```

```
      Æ = {100, },
      Œ = {25,  },
      . = { ,700},      .. = { ,350},     ... = {,150},
     {,}= { ,500},
      : = { ,500},
      ; = { ,500},
      ! = { ,100},      ‼ = { ,100},
      ? = { ,200},      ⁇ = { ,200},
      @ = {50,50},
      ~ = {200,250},
      & = {50,100},
     \% = {100,100},
      * = {200,200},
      + = {250,250},
      ( = {100,    },    ) = {    ,300},
      / = {200,300},
      - = {400,500},
      \textendash        = {300,300},   \textemdash          = {200,200},
      \textquoteleft     = {500,700},   \textquoteright     = {500,700},
      \textquotedblleft  = {300,400},   \textquotedblright  = {300,400},
      \textbackslash     = {200,300},
      \quotesinglbase    = {400,400},   \quotedblbase       = {400,400},
      \guilsinglleft     = {400,400},   \guilsinglright     = {300,500},
      \guillemotleft     = {300,300},   \guillemotright     = {200,400},
      \textexclamdown    = {100,    },  \textquestiondown   = {100,    },
      \textbraceleft     = {400,200},   \textbraceright     = {200,400},
      \textless          = {200,100},   \textgreater        = {100,200},
      ≤                  = {200,100},   ≥                   = {100,200},
      \textminus                 = {300,300},
      \texttrademark             = {200,200},
      \textcopyright             = {200,200},
      \textregistered            = {200,200},
      \textdegree                = {300,300},
      ¦                  = {450,500},   ¬                   = {250,150},
      ⌐                  = {150,250},
      ·                          = {850, 700},
      ¶                          = {100,0},
      ×                          = {150, 300},
      ª                  = {300,300},   º                   = {300,300},
      ⁰ = {200,400},
      ¹ = {400,350},          ² = {200,300},          ³ = {250,400},
      ⁴ = {250,350},          ⁵ = {200,300},          ⁶ = {250,400},
      ⁷ = {200,450},          ⁸ = {250,400},          ⁹ = {200,350},
      ₀ = {200,400},
      ₁ = {400,250},          ₂ = {200,300},          ₃ = {250,400},
      ₄ = {250,350},          ₅ = {200,300},          ₆ = {250,400},
      ₇ = {200,450},          ₈ = {250,400},          ₉ = {200,350},
      ± = {150,100},                                  ÷ = {300,300},
      þ = {   ,25},
      ₊ = {300,450},          ₋ = {300,450},
      ⁺ = {300,450},          ⁻ = {300,450},
      †                  = {200,250},   ‡                   = {200,250},
      π = {50,   },
      f = {   ,50},
      № = {100,150},
      \textservicemark           = {100,200},
      - = {400,500},          - = {400,500},          − = {200,300},
      – = {205,305},          — = {200,300},          — = {50,150},
      • = {125,200},
% /a.sc = {50,50},
   }

\SetProtrusion
   [ name     = palatino-it   ]
   { encoding = {TU,EU1,EU2},
```

```
11203     family   = {Palatino},
11204     shape    = {it,sl}  }
11205   {
11206     A = {50,50},
11207     Æ = {50,  },
11208     B = {50,  },
11209     C = {50,  },
11210     D = {50,50},
11211     E = {50,  },
11212     F = {50,  },
11213     G = {50,  },
11214     H = {50,  },
11215     K = {50,  },
11216     L = {50,  },
11217     O = {50,  },
11218     Œ = {50,  },
11219     P = {50,  },
11220     Q = {50,  },
11221     R = {50,  },
11222     S = {50,  },
11223     $ = {50,  },
11224     T = {100, },
11225     U = {50,  },
11226     V = {100,50},
11227     W = {50,  },
11228     X = {50,  },
11229     Y = {100,50},
11230     b = {   ,50},
11231     c = {25,  },
11232     g = {75,  },
11233     i = {25,  },
11234     m = {   ,50},
11235     n = {   ,50},
11236     p = {   ,25},
11237     q = {25,  },
11238     x = {   ,50},
11239     1 = {100, },
11240     2 = {50,  },
11241     4 = {50,  },
11242     7 = {50,  },
11243     . = { ,500},      .. = { ,350},     ... = { ,200},
11244    {,}= { ,500},
11245     : = { ,300},
11246     ; = { ,300},
11247     ? = { ,300},      ‽ = { ,300},
11248     & = {50,50},
11249    \% = {100,100},
11250     * = {200,200},
11251     + = {150,200},
11252     @ = {50,50},
11253     ~ = {200,150},
11254     ( = {200, },     ) = {   ,200},
11255     / = {100,200},
11256     - = {300,500},
11257     \textendash        = {300,300},   \textemdash        = {200,200},
11258     \textquoteleft     = {700,400},   \textquoteright    = {700,400},
11259     \textquotedblleft  = {500,300},   \textquotedblright = {500,300},
11260     _ = {100,100},
11261     \textbackslash     = {100,200},
11262     \quotesinglbase    = {500,500},   \quotedblbase      = {400,400},
11263     \guilsinglleft     = {400,400},   \guilsinglright    = {300,500},
11264     \guillemotleft     = {300,300},   \guillemotright    = {300,300},
11265     \textexclamdown    = {100,   },   \textquestiondown  = {200,   },
11266     \textbraceleft     = {200,100},   \textbraceright    = {200,200},
11267     \textless          = {300,100},   \textgreater       = {200,100},
```

```
    ≤ = {200,100},  ≥ = {100,200},
    ¦ = {450,500},  ¬ = {250,150},
    · = {850, 700},
    ¶ = {100,0},
    × = {150, 300},
    ª = {300,250},  º = {300,250},
    ⁰ = {300,200},
    ¹ = {300,150},  ² = {350,200},  ³ = {250,150},
    ⁴ = {350,100},  ⁵ = {300, 50},  ⁶ = {400,100},
    ⁷ = {400, 50},  ⁸ = {250, 50},  ⁹ = {300, 50},
    ₀ = {300,300},
    ₁ = {300,350},  ₂ = {300,150},  ₃ = {250,250},
    ₄ = {400,200},  ₅ = {300,100},  ₆ = {450,200},
    ₇ = {450,150},  ₈ = {400,250},  ₉ = {400,200},
    ± = {150,100},  ÷ = {300,300},
    þ = { 50,  },
    † = {250,200},  ‡ = {250,200},
    ₊ = {300,450},  ₋ = {300,450},
    ⁺ = {300,450},  ⁻ = {300,450},
    - = {300,500},  - = {300,500},  − = {100,300},
    – = {125,305},  — = {200,300},  — = {125,150},
    • = {125,200}
  }

\SetProtrusion
  [ name     = palatino-sc,
    load     = palatino-default ]
  { encoding = {TU,EU1,EU2},
    family   = {Palatino},
    shape    = sc }
  {
    a = {50,50},
    æ = {50,  },
    b = { 0, 0},
    d = { 0, 0},
    f = { 0, 0},
    g = { 0, 0},
    j = {50,  },
    l = {  ,50},
    o = { 0, 0},
    p = { 0, 0},
    q = { 0,  },
    r = {  , 0},
    t = {50,50},
    y = {50,50},
    fl = { 0,50},
    ffl = { 0,50},
    ﬁ = { 0,50},
    ﬂ = { 0,50}
  }
⟨/Palatino⟩
```

3.2.5 Basic glyph set

The protrusion settings will still be loaded from `microtype.cfg`.

```
⟨TU-basic⟩ %% No settings.
```

3.2.6 Empty glyph set

```
⟨*TU-empty⟩
\SetProtrusion
  [ name = empty ]
  { encoding = {TU,EU1,EU2},
```

```
      family   = {TU-empty} }
   { }
⟨/TU-empty⟩
```

4 Auxiliary file for micro fine tuning

This file may be used to test protrusion and (less so) expansion settings.

```
⟨*test⟩
\documentclass{article}
%% options are passed through to microtype
\usepackage[stretch=50]{microtype-show}

%% options for microtype-show
\ShowGlyphIndextrue
\ShowMissingGlyphstrue
\def\GlyphScaleFactor{2}

%% load any required font packages:
\ifpdftex
 \usepackage[T1]{fontenc}
\else
 \usepackage{fontspec}
\fi

\begin{document}
\microtypesetup{expansion=false}

%% load your font here:

\ShowCharacterInheritance

\newpage
\ShowProtrusion

\newpage
%% show single glyphs
 %\ShowDummyLine
 %\ShowProtrusionLineGlyph{A}
 %\ShowProtrusionLineIndex{27}

%% loop through all glyphs of the font;
%% protrusion values are shown in 1000th of 1em
 \ShowProtrusionDefined

 %\ShowProtrusionMissing

 %\ShowProtrusionAll

\newpage %% --------------------------------------------------------------------
This is the current font stretched by 5\%, normal, and shrunk by 5\%:

\newlength{\MTln}
\newcommand*\teststring
  {ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz}
\settowidth{\MTln}{\teststring}
\microtypesetup{expansion=true}

\bigskip\noindent\parbox{1.05\MTln}{\teststring\linebreak\\\teststring}\par
\bigskip\noindent\parbox{0.95\MTln}{\teststring}
\end{document}
⟨/test⟩
```

Needless to say that things may always be improved. For suggestions, mail to w.m.l@gmx.net or file an issue at https://github.com/schlcht/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}
```

11382 ⟨*logo⟩

Here's how the logo on the title page was created.[21] 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.[22] 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`.

```
11383 \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.

```
11384 \input bbox.sty
```

`\tempdim` Allocate some dimen registers.

```
11385 \newdimen\tempdim
```

`\fboxrulei` Frame width of the box as TEX sees it.

```
11386 \newdimen\fboxrulei
11387 \fboxrulei=0.1pt
```

`\fboxruleii` Frame width of the bounding box.

```
11388 \newdimen\fboxruleii
11389 \fboxruleii=0.1pt
```

`\kernboxheight` Height of the box indicating the kern.

```
11390 \newdimen\kernboxheight
11391 \kernboxheight=5pt
```

`\scaletoem` An auxiliary macro. Return a dimension relative to the em-width of the font. Requires e-TEX.

```
11392 \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).

```
11393 \fontinstcc
11394 \def\showlogo#1{%
```

Some fonts do not specify the `\fontdimen 6` (width of an em) in the `afm` file. In this case, use the font size, which is correct in most cases.

```
11395   \ifdim\fontdimen6\font = 0pt
11396     \typeout{***~Warning:~no~fontdimen~6~specified~***^^J%
11397              ***~setting~it~to~\pdffontsize\font \ifnum\pdftexversion < 130 pt\fi~***}
11398     \fontdimen6\font=\pdffontsize\font \ifnum\pdftexversion < 130 pt\fi\relax
11399   \fi
11400  \installfonts
11401    \input_metrics{}{\logofont,\metrics\printbbs{#1}\relax}
```

21 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.

22 Message ID: `42aa3687$0$24366$9b4e6d93@newsread2.arcor-online.net`

```
  \endinstallfonts
}
\normalcc
```

Layers.

```
\makeatletter
\def\mtl@layer#1#2{\pdfliteral{/OC/#1 BDC}#2\pdfliteral{EMC}}
\ifx\mt@objects\@undefined\let\mt@objects\@empty\fi
\ifx\mt@order  \@undefined\let\mt@order  \@empty\fi
\xdef\mt@order{\mt@order[(Logo)}
\let\mtl@resources\@empty
\def\mtl@register#1{%
  \immediate\pdfobj{<< /Type/OCG /Name(#1) >>}
  \expandafter\xdef\csname mtl@#1\endcsname{\the\pdflastobj\space 0 R }
  \xdef\mt@objects{\mt@objects\csname mtl@#1\endcsname}
  \xdef\mt@order{\mt@order\csname mtl@#1\endcsname}
  \xdef\mtl@resources{\mtl@resources/#1 \csname mtl@#1\endcsname}}
\mtl@register{canvas}
\mtl@register{characters}
\mtl@register{bounding-boxes}
\mtl@register{TeX-boxes}
\xdef\mt@order{\mt@order]}
\global\let\mtl@objects\mt@objects
\def\togglelayer#1#2{%
  \pdfstartlink width \wd\logobox height \ht\logobox depth \dp\logobox
    user{/Subtype/Link
         /BS << /Type/Border/W 0 >> /H/O
         /A << /S/SetOCGState
               /State[/Toggle \csname mtl@#1\endcsname] >>
  }#2\pdfendlink
}
```

`\printbbs` Preparation.

```
\setcommand\printbbs#1{%
  \setbox0\hbox{#1}%
  \leavevmode
  \kern-\fboxrulei
```

The canvas in the natural width of the text minus protrusion, in color `bgcolor`.

```
  \mtl@layer{canvas}{%
    \getboundarychars#1\relax
    \tempdim=\dimexpr\wd0 - (\scaletoem{\lpcode\font\firstchar}+
                             \scaletoem{\rpcode\font\lastchar})\relax
    \kern\dimexpr\scaletoem{\lpcode\font\firstchar}\relax
    \lower\dimexpr\dp0+0.05em \relax \vbox{\color{bgcolor}%
          \hrule width  \tempdim
                height \dimexpr\dp0+\ht0+0.15em\relax}%
    \kern-\tempdim
```

The baseline, in color `blcolor`.

```
    \vbox{\color{blcolor}%
          \hrule width  \tempdim
                height \fboxrulei}%
  }%
  \kern-\dimexpr\wd0 -\scaletoem{\rpcode\font\lastchar}\relax
```

The string.

```
  \printbbss #1\relax\relax
}
```

`\getboundarychars` Get first ....

```
\def\getboundarychars#1#2\relax{%
   \def\firstchar{`#1}%
   \getlastchar#1#2\relax
}
```

`\getlastchar` ... and last character.

```
\def\getlastchar#1#2{%
```

```
    \ifx\relax#2\relax
       \def\lastchar{`#1}%
    \else
       \expandafter\getlastchar
    \fi #2%
}
```

\printbbss Loop over all characters of the string.

```
\def\printbbss#1#2#3\relax{%
    \ifx\relax#1\relax
    \else
       \ifx\relax#2\relax
          \printbb{#1}{}%
       \else
          \printbb{#1}{#2}%
       \fi
       \expandafter\printbbss
    \fi #2#3\relax
}
```

\printbb Record the kern between the current and the following character, then print the character. `\kerning` is a `fontinst` command.

```
\setcommand\printbb#1#2{%
    \setbox0\hbox{\kerning{#1}{#2}\xdef\thekern{\number\result}}%
    \showboxes{#1}%
```

This could be another application.

```
%       \quad
%     w: \the\scaletoem{\width{#1}},
%     bb: \the\scaletoem{\bbleft{#1}}/%
%         \the\scaletoem{\bbright{#1}},
%         \the\scaletoem{\number\numexpr\width{#1}-\bbright{#1}\relax}
%     h: \height{#1}/\bbtop{#1}, \bbbottom{#1}/\depth{#1}\par
}
```

\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' ≠ ',').

```
\setcommand\showboxes#1{%
  \leavevmode
  \color{texcolor}%
```

We have to record the width of the glyph.

```
  \setbox0\hbox{{\color{textcolor}#1}}%
  \global\tempdim=\wd0\relax
  \kern-\fboxrulei
```

1. *The TEX box:* Print a frame in color `texcolor`. This frame shows the glyph as TEX sees it.

```
    \mtl@layer{TeX-boxes}{%
      \hbox{%
        \lower\dimexpr \dp0 + \fboxrulei\relax
        \hbox{%
          \vbox{%
            \hrule height\fboxrulei
            \hbox{%
              \vrule width\fboxrulei height \dimexpr\ht0 + 2\fboxrulei\relax
              \phantom{\unhcopy0}%
              \vrule width\fboxrulei
            }%
            \hrule height\fboxrulei}}%
    }%
```

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.

```
    \kern-\wd0
    \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.

```
    \kern\dimexpr\scaletoem{\bbleft{#1}}-\tempdim-\fboxruleii\relax
```

3. *The bounding box:* will be printed in color bbcolor.

```
    \mtl@layer{bounding-boxes}{%
      {\color{bbcolor}%
      \hbox{%
        \lower\dimexpr-\scaletoem{\bbbottom{#1}}+\fboxruleii\relax
        \hbox{%
          \vbox{%
            \hrule height\fboxruleii
            \hbox to \dimexpr\scaletoem{\numexpr
                        \bbright{#1}-\bbleft{#1}\relax}+2\fboxruleii\relax{%
              \vrule height \dimexpr\scaletoem{\numexpr
                                \bbtop{#1}-\bbbottom{#1}\relax}%
                     width\fboxruleii
              \hfill
              \vrule width\fboxruleii}%
            \hrule height\fboxruleii}}%
      }%
      \kern-\dimexpr\fboxruleii+\fboxrulei\relax
    }%
```

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.

```
    \kern\scaletoem{\numexpr\width{#1}-\bbright{#1}\relax}%
    \mtl@layer{TeX-boxes}{%
      {\ifnum\thekern<0
         \color{kerncolor}%
         \kern\scaletoem{\thekern}%
         \lower\kernboxheight\hbox{\vrule width -\dimexpr\scaletoem{\thekern}\relax
                                          height \kernboxheight}%
         \kern\scaletoem{\thekern}%
       \else
         \color{texcolor}%
         \ifnum\thekern=0 \else
           \lower\kernboxheight
           \hbox{%
             \vbox{%
%            \hrule height\fboxrulei
             \hbox{%
               \vrule height \kernboxheight width\fboxrulei
               \kern\dimexpr\scaletoem{\thekern}-2\fboxrulei\relax
               \vrule width\fboxrulei
             }%
            \hrule height\fboxrulei}}%
         \fi
       \fi
      }%
    }%
%  \kern-\fboxrulei
    }
```

\printlogo

```
\newbox\logobox
\def\printlogo{%
  \setbox\logobox=\hbox{\vbox{%
    \MakePercentComment
```

This is the Kepler MM font used in the logo.

```
    \def\logofont{pkpri9e10}
    \transformfont{\logofont}{\reencodefont{8r}{\fromafm{pkpmmri8a10}}}
    \font\thelogofont=\logofont\space at 82pt
```

This would load the italic Palatino font instead.

```
%\def\logofont{pplri}
%\transformfont{\logofont8r}{\reencodefont{8r}{\fromafm{\logofont8a}}}
%\edef\logofont{\logofont8r}
%\font\thelogofont=\logofont\space at 78pt
```

Load the font.

```
    \thelogofont
```

Protrusion values (overdone for didactic reasons).

```
    \lpcode\font`M=96
    \rpcode\font`e=46
```

Now we can generate the logo.

```
    \pdfliteral direct{/SXS gs}%
    \showlogo{Microtype}%
%    \rlap{\normalfont\normalsize\raisebox{55pt}{\footnotemark[1]}}%
%    \kern5pt\\[3\baselineskip]
%  \long\def\@makefntext##1{%
%    \leftskip 0pt
%    \parindent 0pt
%    \everypar{\parindent 0pt}%
%    \leavevmode\hbox to 15pt{\@thefnmark\hss}##1}
%  \footnotetext[1]{This graphic displays on a
%    \togglelayer{canvas}{canvas} the \togglelayer{characters}{characters},
%    their \togglelayer{bounding-boxes}{bounding boxes}
%    and \togglelayer{TeX-boxes}{\TeX\ boxes}.}
  }}%
  \edef\logodimens{width \the\wd\logobox height \the\ht\logobox depth \the\dp\logobox}
  \immediate\pdfobj{<</Type/ExtGState /CA 0.6 /ca 0.6 /BM/Normal >>}%
  \immediate\pdfxform
            attr {/Group <</Type/Group /S/Transparency /I true /CS/DeviceRGB >>}
            resources {/Properties <<\mtl@resources>>
                       /ExtGState << /SXS \the\pdflastobj\space 0 R >> }
            \logobox
%  \vskip-2.5\baselineskip
%  \leavevmode
%  \togglelayer{characters}{%
%    \pdfrefxform\pdflastxform
%  }%
   \pdfannot\logodimens{%
       /Subtype/Widget /FT/Btn /T(Logo)
       %/F 4 % why did I say this?
       /AP << /N \the\pdflastxform\space 0 R >>
       /AA << /E << /S/SetOCGState /State[/Toggle \mtl@characters] >>
              /X << /S/SetOCGState /State[/Toggle \mtl@characters] >>
              /D << /S/SetOCGState /State[/Toggle \csname mtl@bounding-boxes\endcsname] >>
              /U << /S/SetOCGState /State[/Toggle \csname mtl@TeX-boxes\endcsname] >>
           >> }%
  \vspace{3\baselineskip}
}
\IfFileExists{pkpmmri8a10.afm}\relax{\def\printlogo{\MT@warning{File pkpmmri8a10.afm not found.
  \MessageBreak Cannot create logo}}}
```

Our font.

```
\pdfmapline{+pkpmmri8r10 KeplMM-It_385_575_10_ " TeXBase1Encoding ReEncodeFont " <8r.enc <pkpmmri8a10.pfb}
```

Define colours (`thered` and `thegreen` are copied from `microtype.dtx`).

```
\def\mtdefinecolors{
 \definecolor{thered}{rgb}{0.65,0.04,0.07}
 \definecolor{thegreen}{rgb}{0.06,0.44,0.08}
 \colorlet{texcolor}{thegreen!50}  % TeX boxes
 \colorlet{kerncolor}{texcolor}    % negative kerns
 \colorlet{bbcolor}{thered!50}     % bounding box
 \colorlet{bgcolor}{black!8}       % canvas
 \colorlet{blcolor}{black!50}      % baseline
 \colorlet{textcolor}{black!40}    % text
}
```

Use with `microtype.dtx`

```
\ifx\documentclass\@twoclasseserror
  \usepackage[xcdraw]{xcolor}
  \mtdefinecolors
```

```
\else
```

A.2 Document

Now we can start the document.

```
\documentclass[10pt,a4paper]{ltxdoc}
\providecommand\MakePercentComment{\relax}
\expandafter\def\csname ver@microtype.dtx\endcsname{2999/99/99}
```

Re-use the preamble from `microtype.dtx`.

```
\usepackage{microtype-doc}
\usepackage{attachfile}
\makeatletter
\pdfcatalog{/OCProperties << /OCGs [\mt@objects] /D << /Order [\mt@order] >> >>}
\makeatother
\begin{document}
```

You are currently reading this.

```
\DocInput{microtype-logo.dtx}
\newpage
And here it is:\vspace{6\baselineskip}
\begin{center}
  \printlogo
\end{center}
\expandafter\enddocument
\fi
```

That's it.

```
⟨/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}
```

```
\ifx\lssample\undefined
⟨*lssample⟩
```

Upon popular request, here's how I've created the letterspacing illustration. [23]

B.1 Macros

Rule width and image height and depth.

```
\makeatletter
\newdimen\lsamount
\newdimen\lsrule
\lsrule=0.2pt
\def\lsheight{8pt}
\def\lsdepth{12pt}
```

23 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).

```
\def\lsfont{\fontfamily{paca}\selectfont}
```

Loop over all letters in ⟨*#2*⟩, letterspacing them by ⟨*#1*⟩.

```
\def\dols#1#2{\lsamount=#1\relax \dolss#2\enddols}
\def\dolss#1#2\enddols{%
  \ifx\empty#2\empty\divide\lsamount 2\fi
  \ls{#1}%
  \ifx\empty#2\empty\else \dolss#2\enddols \fi
}
```

One `tikz` picture for each letter.

```
\def\ls#1{%
  \begin{tikzpicture}[remember picture,line width=\lsrule]
    \tikzstyle{every node}=[inner sep=0pt]
```

The bounding box.

```
    \mts@layer{stuff}{%
      \node[draw=thegrey,
            fill=theshade,
            outer sep=\lsrule,
            anchor=base,
            font=\lsfont]{\phantom{#1}};
    }
```

The letter.

```
    \node[anchor=base,font=\lsfont](#1){#1};
```

Two auxiliary coordinates.

```
    \path (#1.south west) ++(+.5\lsrule,-.5\lsrule) coordinate (#1L);
    \path (#1.base east)  ++(-.5\lsrule,-\lsdepth)  coordinate (#1R);
    \mts@layer{stuff}{%
```

Now draw the normal character width,

```
      \draw[color=thered!75,
            fill=thered!30,
            outer sep=\lsrule]
            (#1L) rectangle (#1R);
      \ifdim\lsamount>0pt
        \path (#1.base east) ++(+.5\lsamount,-6pt) coordinate (#1_ls);
        \path (#1R) ++(\lsamount+\lsrule,+\lsdepth) coordinate (#1E);
```

and the letter space.

```
        \draw[color=thered,
              fill=thered!50,
              outer sep=\lsrule]
              (#1R) ++(+\lsrule,+0pt) rectangle (#1E);
      \fi
    }
  \end{tikzpicture}%
  \ignorespaces
}
```

Draw the interword space.

```
\def\lssp#1#2#3#4{%
  \begin{tikzpicture}[remember picture,line width=\lsrule,inner sep=0pt]
    \mts@layer{stuff}{%
      \tikzstyle{every draw}=[anchor=bottom]
      \coordinate(#1space) at (#2/2,\lsdepth/2);
      \coordinate(#1stretch) at (#2+#3/2,+0pt);
      \coordinate(#1shrink) at (#2-#4/2,+0pt);
      \draw[color=thegreen,fill=thegreen!50,use as bounding box]
            (0,0) rectangle ++(+#2,+\lsdepth);
      \draw[color=thegreen,fill=thegreen!30]
            (+#2,-\lsrule) rectangle ++(+#3,-4pt+\lsrule);
      \draw[color=thegreen,fill=thegreen!50]
            (+#2,-\lsrule) rectangle ++(-#4,-4pt+\lsrule);
      \draw[->,line width=0.3pt,shorten <=0.5\lsrule,color=thegreen!50]
```

```
            (+#2,-2pt-.5\lsrule) -- ++(+#3,+0pt);
      \draw[->,line width=0.3pt,shorten <=0.5\lsrule,color=thegreen!30]
            (+#2,-2pt-.5\lsrule) -- ++(-#4,+0pt);
    }%
  \end{tikzpicture}%
  \ignorespaces
}
```

Layers.

```
\def\mts@layer#1#2{\pdfliteral page{/OC/#1 BDC}#2\pdfliteral page{EMC}}
\def\mtsx@layer#1#2{\pdfliteral page{/OC/stuff BDC /OC/#1 BDC}#2\pdfliteral page{EMC EMC}}
\ifx\mt@objects\@undefined\let\mt@objects\@empty\fi
\ifx\mt@order  \@undefined\let\mt@order  \@empty\fi
\xdef\mt@order{\mt@order[(Sheep)}
\let\mts@resources\@empty
\def\mts@register#1{%
  \immediate\pdfobj{<< /Type/OCG /Name(#1) >>}
  \expandafter\xdef\csname mts@#1\endcsname{\the\pdflastobj\space 0 R }
  \xdef\mt@objects{\mt@objects\csname mts@#1\endcsname}
  \xdef\mt@order{\mt@order\csname mts@#1\endcsname}
  \xdef\mts@resources{\mts@resources/#1 \csname mts@#1\endcsname}}
\mts@register{stuff}
\mts@register{tracking}
\mts@register{ispace}
\mts@register{ospace}
\mts@register{istretch}
\mts@register{ishrink}
\mts@register{ostretch}
\mts@register{oshrink}
\mts@register{okern}
\mts@register{ligature}
\mts@register{_compatibility}
\xdef\mt@order{\mt@order]}
```

Anchor point for the arrow in the code.

```
\newcommand\anchorarrow[1]{%
  \tikz[remember picture,overlay]\node(#1_c){};}
```

Add an arrow from code to image.

```
\newcommand\add@arrow[5][left]{%
  \tikz[remember picture,overlay,bend angle=14,looseness=0.75,>=latex]{%
    \mtsx@layer{#3}{\draw[->,thick,color=the#2](#4) to[bend #1] (#5);}}%
}
```

Toggle layer.

```
\def\toggle@layer#1#2#3{%
  \pdfstartlink
    user{/Subtype/Link
         /BS << /Type/Border/W 0 >> /H/O
%         /BS << /Type/Border/W 1 /S/D /D[4 1] >>
%         /C[0.7 0.7 0.7] /H/O
         /Contents(Click to Toggle!)
         /A << /S/SetOCGState
               /State[/Toggle \csname mts@#1\endcsname] >> }%
  \rlap{#2}%
  {\fboxsep=0pt \fboxrule=0pt
   \mtsx@layer{stuff}{%
     \rlap{\fcolorbox{white}{white}{\vphantom{kg}\color{the#3}#2}}}%
   \mtsx@layer{#1}{%
     \fcolorbox{white}{the#3!50}{\vphantom{kg}\color{white}#2}}%
  }%
  \pdfendlink
}
\newcommand\showarrow[2][]{%
  \ifx\relax#1\relax\def\@tempa{#2}\else\def\@tempa{#1}\fi
  \toggle@layer{\@tempa}{{\itshape #2}}}
```

The environment for our illustration.

```
\def\ls@sample#1{{%
  \parskip  4pt \parindent 0pt
  \par
  \vskip4pt
  {\leftskip 15pt
   \mt@pseudo@marg{\color{theblue}Click on the image to show the kerns
      and spacings involved. Click on emphasised words in the text below
      to reveal the relation of image and code.\strut}
   \mt@layer{_compatibility}{%
      \mt@place{\rlap{\hskip-\marginparwidth \color{white}%
        \vrule width\dimexpr\hsize+\marginparwidth\relax height\mt@unvdimen}}
      \mt@pseudo@marg{\color{thered}%
        If you had a \acronym{PDF} viewer that understands
        \acronym{PDF}\,{\smaller1.5}, you could hide the arrows selectively.}}
   \vskip-\mt@unvdimen}%
  \vskip-4pt
  \setlength\fboxsep{4pt}%
  \leavevmode
  \pdfstartlink
    user{/Subtype/Link
         /BS << /Type/Border/W 0 >> /H/O
         /A << /S/SetOCGState
               /State[/Toggle \mts@stuff] >> }%
    \fcolorbox{theframe}{theshade}%
      {\fontsize{34}{38}\selectfont #1}%
  \pdfendlink
  \par\medskip
  }%
  \edef\x{\pdfpageresources{/Properties <<\mts@resources>>}}\x
}
```

Now define the illustration to be used in the document.

```
\def\lssample{%
  \ls@sample{%
    \dols{0pt}{Stop}
      \lssp{o}{0.45em}{0.25em}{0.15em}
    \dols{0.16em}{{st}ealing}\hskip-\dimexpr 0.08em+\lsrule\relax
      \lssp{i}{13.82pt}{4.65pt}{2.08pt}
    \dols{0.16em}{sheep}
    \dols{0pt}{!}
  }%
```

Don't forget to add the arrows.

```
  \vspace{-\baselineskip}
  \add@arrow{red}      {tracking}{lsamount_c.east}{a_ls}
  \add@arrow{red}      {okern}   {okernend_c.east}{p_ls}
  \add@arrow{green}    {ospace}  {ospace_c.east}  {ospace}
  \add@arrow{green}    {ispace}  {ispace_c.center}{ispace}
  \add@arrow{green!75} {istretch}{istretch_c.east}{istretch.north}
  \add@arrow{green!75} {ishrink} {ishrink_c.west} {ishrink.north}
  \add@arrow{green!75} {ostretch}{ostretch_c.east}{ostretch.north}
  \add@arrow{green!75} {oshrink} {oshrink_c.east} {oshrink.north}
  \add@arrow[right]{grey}{ligature}{nolig_c.east} {st.center}
}
\fi
```

This is for use with `microtype.dtx`

```
\ifx\documentclass\@twoclasseserror
  \usepackage{tikz}
\else
```

B.2 Document

```
\documentclass[10pt,a4paper]{ltxdoc}
\expandafter\def\csname ver@microtype.dtx\endcsname{2999/99/99}
```

Re-use the preamble from `microtype.dtx`.

```
\usepackage{microtype-doc}
\usepackage{attachfile}
\usepackage{tikz}
\makeatletter
\pdfcatalog{/OCProperties << /OCGs [\mt@objects]
                             /D << /Order [\mt@order] /BaseState/OFF >> >> }
\makeatother
\begin{document}
```

You are currently reading this.

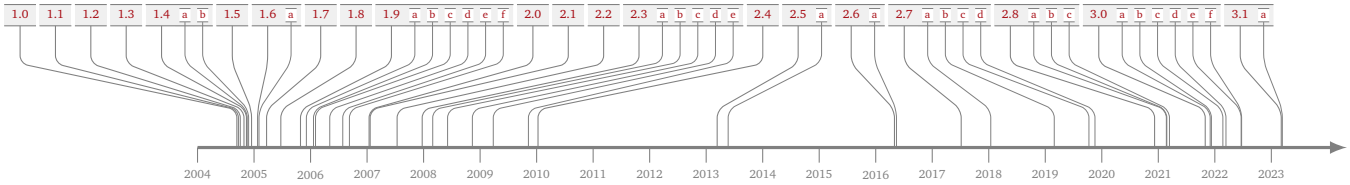
```
\DocInput{microtype-lssample.dtx}
```

Now show what we are able to do.

```
\noindent
 Since a picture is worth a thousand words, probably even more if, in our
 case, it depicts a couple of letterspaced words, let's bring one to sum up
 these somewhat confusing options. Suppose you had the following settings
 (which I would in no way recommend; they are only for illustrative purposes):
\begin{verbatim}
\SetTracking
  [ no ligatures  = {"\anchorarrow{nolig}"f},
    spacing       = {60"\anchorarrow{ispace}"0*,"%
                       "-1"\anchorarrow{istretch}"00*, "\anchorarrow{ishrink}"},
    outer spacing = {4"\anchorarrow{ospace}"50,"%
                       "2"\anchorarrow{ostretch}"50,1"\anchorarrow{oshrink}"50},
    outer kerning = {"\anchorarrow{okernbegin}"*,"%
                       \anchorarrow{okernend}"*} ]
  { encoding = * }
  { 1"\anchorarrow{lsamount}"60 }
\end{verbatim}
 and then write:
\begin{verbatim}
Stop \textls{stealing sheep}!
\end{verbatim}
 this is the (typographically dubious) outcome:

 \lssample

\noindent
 While the word `Stop' is not letterspaced, the space between the letters in
 the other two words is expanded by the \showarrow[tracking]{tracking~amount}{red}
 of 160/1000\,em\,=\allowbreak\,0.16\,em.
 The \showarrow[ispace]{inner~space}{green} within the letterspaced text is
 increased by 60\%, while its \showarrow[istretch]{stretch}{green} amount is
 decreased by 10\% and the \showarrow[ishrink]{shrink}{green} amount is left
 untouched.
 The \showarrow[ospace]{outer~space}{green} (of 0.45\,em) immediately before the
 piece of text may \showarrow[ostretch]{stretch}{green} by 0.25\,em and
 \showarrow[oshrink]{shrink}{green} by 0.15\,em.
 Note that there is no outer space after the text, since the exclamation mark
 immediately follows; instead, the default \showarrow[okern]{outer~kern}{red}
 of half the letterspace amount (0.08\,em) is added.
 Furthermore, one \showarrow{ligature}{grey} wasn't broken up, because we
 neglected to specify the `|s|' in the |no ligatures| key.

\expandafter\enddocument
\fi
```

⟨*/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 *Harald Harders*) 77
remove 8-bit characters from the configuration files (suggested by *Harald Harders*) 140
Protrusion: add factors for some more characters 148
settings for Adobe Minion (contributed by *Harald Harders*) 149
`\DeclareCharacterInheritance`: new command: possibility to specify character inheritance 110
`\MT@declare@sets`: remove spaces around set name 96
`\MT@find@file`: fix: also check whether the file for the base font family has already been loaded . . 77
`\MT@get@basefamily`: only remove suffixes 'x' or 'j' 78
`\MT@get@listname@`: don't check for empty attributes list 78
`\MT@ifempty`: fix: use category code 12 for the percent character (reported by *Tom Kink*) 20
`\MT@is@number`: numbers may also be specified in hexadecimal or octal (suggested by *Harald Harders*) 84
`\MT@pdftex@no`: fix: version check (reported by *Harald Harders*) 15
`\MT@permute`: don't use sets for empty encoding . . 113
`\MT@setup@expansion`: issue an error instead of a warning, when pdfTEX version is too old for `autoexpand` 129
`\MT@split@codes`: fix: allow zero and negative values 44
`\MT@use@set`: remove spaces around set name 101

2004/10/03 **Version 1.2**

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Font sets: new: `allmath` and `basicmath` 136
Protrusion: add settings for Computer Modern Roman and Adobe Garamond in `TS1` encoding 179
add settings for Computer Modern Roman math symbols 183
`\MT@familyalias`: define alias font name as an alternative, not as a replacement 40
`\MT@get@basefamily`: also remove 'w' (swash capitals) 78
`\MT@get@highlevel`: check whether defaults have changed 97
`\MT@get@inh@list`: fix: set inheritance list `\globally` to `\@empty` 80
`\MT@get@listname@`: alternatively check for alias font name 78
`\MT@get@size`: additional magic to catch some errors 99
`\MT@get@size@@`: hijack `\set@fontsize` instead of `\@setfontsize` 99
`\MT@loop`: fix: new macro, used instead of `\loop` . . 24
`\MT@maybe@do`: also check for alias font name 40
`\MT@permute@@@@@@`: more sanity checks for `\SetProtrusion` and `\SetExpansion` 114
`\MT@setupfont`: also search for alias font file 37
fix: call `\@@enc@update` if necessary 37

2004/10/27 **Version 1.3**

General: fix: specifying `load` option does no longer require to give a `name`, too 107
Font aliases: declare `aer`, `zer` and `hfor` as aliases of `cmr` 137
`\MT@fix@catcode`: check some category codes (compatibility with `german`) 5
`\MT@load@list`: check whether list exists 76

2004/11/12 **Version 1.4**

General: check for `pdfcprot` 30
don't use scratch registers in global definitions . . 81
use `\pickup@font` instead of `\define@newfont` as the hook for `\MT@setupfont` 90
use one instead of five counters 26
Protrusion: tweak quote characters for `cmr` variants

(OT1, T1, lmr) 154
\microtypesetup: fix: set the correct levels, and remember them; warning when enabling an option

2004/11/17 **Version 1.4a**

General: new option: final 119
\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 *Christoph Bier*) . . 121
optimisation: use less \expandafters and \csnames 19
Protrusion: harmonise dashes in upshape and italic (cmr, pad, ppl) 148
slanted like italics 159
\MT@checklist@family: fix: don't try alias family name if encoding failed 41
\MT@get@basefamily: fix: failed for font names of the

2004/12/15 **Version 1.5**

General: defaults: step: 4 (suggested by *Hàn Thế Thành*) 119
new option: selected, by default false (suggested by *Hàn Thế Thành*) 117
Documentation: add 'Short history' U32
Inheritance: remove \ss from T1 list, add \DJ 141
Protrusion: settings for Bitstream Charter 149
\DeclareMicrotypeAlias: remove spaces around arguments 102
\MT@cfg@catcodes: reset catcode of '=' (compatibility with Turkish babel) 77
\MT@fix@catcode: reset catcode of '^' (compatibility with chemsym) 5

disabled in package options 123
\SetExpansion: fix: specifying extra options does no longer require to give a name, too 104

when reading files (reported by *Michael Hoppe*) 77

form abczz (reported by *Georg Verweyen*) 78
\MT@get@slot: don't define \MT@char globally (save stack problem) 81
\MT@ifdimen: don't set \MT@count globally (save stack problem) 21
\MT@setup@PDF: new message if \pdfoutput is changed 127
\MT@use@set: don't use undeclared font sets 101

\MT@get@highlevel: don't test defaults if called after begin document 97
\MT@scale@factor: warning for factors outside limits 46
\MT@scale@to@em: don't use \lpcode and \rpcode for the calculation 45
\MT@set@ex@codes: allow non-selected font expansion 59
\MT@set@pr@codes: adjust protrusion factors before setting the inheriting characters 42
\MT@setup@expansion: defaults: calculate step as min(stretch,shrink)/5 128
defaults: turn off expansion for DVI output 127
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2005/01/24 **Version 1.6**

General: defaults: turn off expansion for old pdfTeX versions 121
load a font if none is selected 36
new option: factor, by default 1000 119
restructure dtx file 136
test whether \pickup@font has changed 93
test whether numeric options receive a number 120
use e-TeX's \ifcsname and \ifdefined if defined 20
Protrusion: add italic uppercase Greek letters . . . 159
improve settings for numbers (pointed out by *Peter Muthesius*) 150

tune CMR math letters (OML encoding) 184
\MT@get@charwd: use e-TeX's \fontcharwd, if available 45
\MT@get@inh@list: correct message if selected is false 80
\MT@set@ex@codes: introduce factor option 59
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\MT@setup@expansion: disable automatic expansion for old pdfTeX versions 129
\MT@use@set: retain current set if new set is undeclared 101
\MT@vinfo: new macro instead of \ifMT@verbose . . . 6

2005/02/02 **Version 1.6a**

Documentation: add table of fonts with tailored protrusion settings U21
\MT@get@slot: completely redone, hopefully more robust (compatible with frenchpro; problem

reported by *Bernard Gaulle*) 81
\MT@pdftex@no: new macro 14
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2005/03/23 **Version 1.7**

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disallow automatic expansion if pdfTeX too old 110
fix: remove space after `autoexpand` . . . 110
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shorter command names . . . 26
warning when running in draft mode . . . 126
Documentation: add hint about compatibility . . . U27
remove table of match order (now table 1 on page 79) . . . U11
Protrusion: fix: remove \ from OT1, add `\textbackslash` to T1 encoding . . . 151
`\LoadMicrotypeFile`: new command (suggested by *Andreas Bühmann*) . . . 102
`\Microtype@Hook`: new command for font package authors . . . 122
`\microtypesetup`: fix: warning also when setting to (no)`compatibility` . . . 123
`\MT@begin@catcodes`: also use inside configuration commands . . . 78
`\MT@cfg@catcodes`: reset catcode of ':' (compatibility with `french*` packages) . . . 77
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`\MT@get@listname@`: use `\@tfor` (*Andreas Bühmann*'s idea) . . . 78
`\MT@get@slot`: remove backslash hack . . . 81
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test whether \⟨*encoding*⟩\⟨...⟩ is defined . . . 81
`\MT@if@list@exists`: don't define `\MT@pr@c@name` etc. `\globally`, here and elsewhere . . . 80
`\MT@ifdimen`: comparison with 1 to allow size smaller than 1 (suggested by *Andreas Bühmann*) . . . 21
`\MT@increment`: use e-TeX's `\numexpr` if available . . 26
`\MT@is@composite`: new macro: construct command for composite character; no uncontrolled expansion . . . 88
`\MT@scale`: new macro: use e-TeX's `\numexpr` if available . . . 26
`\MT@set@ex@codes`: two versions of this macro . . . 59
`\MT@split@name`: don't define `\MT@encoding` &c. `\globally` . . . 39
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`\MT@try@order`: always check for size, too (suggested by *Andreas Bühmann*) . . . 79
fix: also check for *//*⟨*series*⟩*/*⟨*shape*⟩*//* (reported by *Andreas Bühmann*) . . . 79
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2005/06/23 **Version 1.8**

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if font substitution has occurred, set up the substitute font, not the selected one . . . 90
new option: `config` to load a different main configuration file . . . 121
new option: `unit`, by default `character` . . . 120
Documentation: add example for `factor` option . U12
add example of how to get rid of a widow (suggested by *Adam Kucharczyk*) . . . U14
add hint about error messages . . . U28
Font aliases: declare `pxr` and `txr` as aliases of `ppl` resp. `ptm` . . . 138
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`\add@accent`: fix: disable micro-typographic setup inside `\add@accent` (reported by *Stephan Hennig*) 92
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`\MT@check@rlist`: made recursive . . . 115
`\MT@curr@list@name`: new macro: current list type and name . . . 89
`\MT@declare@sets`: warning when redefining a set . 96
`\MT@define@set@key@`: use comma lists instead of token lists . . . 96
`\MT@find@file`: no longer wrap names in commands 77
`\MT@fix@fontdimen@six`: new macro: test whether `\fontdimen` 6 is defined . . . 39
`\MT@get@charwd`: warning for missing (resp. zero-width) characters . . . 45
`\MT@get@listname@`: made recursive . . . 78
`\MT@get@slot`: fix: expand active characters . . . 81
test whether \⟨*encoding*⟩\⟨...⟩ is defined made more robust . . . 81
`\MT@get@unit`: new macro: get unit for codes . . . 48
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`\MT@is@letter`: warning for non-ASCII characters . 84
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`\MT@permute@@@@@@`: add ranges to the beginning of the lists . . . 114
`\MT@scale`: fix: remove spaces in ε-TeX variant (reported by *Mark Rossi*) . . . 26
`\MT@setupfont@hook`: restore `\%` and `\#` when `hyperref` is loaded . . . 29
restore `csquotes`'s active characters . . . 29
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`\MT@split@codes`: get character width once only . . 44
`\MT@use@set`: fix: remove braces in first line . . . 101
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2005/10/28 **Version 1.9**

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\SetProtrusion: value 'relative' renamed to 'character' for key unit 109
allow context-specific font setup 90
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fix: use true as the default value 117
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Font aliases: declare qpl and qtm (qfonts, TEX Gyre) as aliases of ppl resp. ptm 138
Font sets: add OT4 encoding to text sets 136
add T5 encoding to text sets 136
Inheritance: add list for OT4 142
add list for T5 (requested by *Hàn Thế Thành*) .. 143
Protrusion: fix: remove uppercase Greek letters from T1 encoded CMR 152
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settings for T5 encoded Computer Modern Roman 148
\DisableLigatures: new command: disable ligatures (requires pdfTEX 1.30) 103
\microtypecontext: new command: change setup context in the document 94
\MT@checklist@family: fix: add two missing \expandafters 41
\MT@detokenize@c: fix the ε-TEX version 20
\MT@exp@two@n: new macros: less \expandafters .. 19
\MT@get@opt: new key 'preset' to set all characters to the specified value before loading the lists 48
\MT@is@active: redone: use \set@display@protect 85
\MT@is@letter: using \catcode should be more efficient than inspecting the \meaning 84
\MT@maybe@do: redone 40
\MT@rem@from@clist: new macro: remove an item from a comma list 24
\MT@scale@factor: generalised 46
\MT@setup@expansion: disable expansion if both step and shrink are zero 129
warning if user requested zero step 128
\MT@toks: use instead of \toks@ 16
\SetProtrusion: (et al.) new key: font 104

2005/12/05 **Version 1.9a**

General: '⟨*file name*⟩/⟨*line number*⟩' as default list name 107
new option: defersetup, by default true 118
remove superfluous test whether \pickup@font has changed 93
Documentation: add explanation for error message in DVI mode U29
add explanation for error message with non-Type 1 fonts U29
Font aliases: declare mdbch (mathdesign) as an alias of bch 139
Protrusion: fix: remove '_' from OT1 encoding ... 153
settings for T5 encoded Charter 148
\microtypesetup: inside the preamble, accepts all package options 123
\MT@check@font@cx: optimise context-sensitive setup 93
\MT@define@set@key@: don't expand variables immediately (requested by *Georg Verweyen*) 96
\MT@get@highlevel: no longer check whether defaults have changed 97
\MT@ifdefined@c@T: new macros: true case only .. 20
\MT@ifint: use \pdfmatch if available 20
\MT@ifstreq: use \pdfstrcmp if available 22
\MT@in@clist: fix 23
\MT@info@missing@char: info instead of warning (after *Michael Hoppe* reported that the 'fl' ligature is missing in Palatino SC) 46
\MT@is@feature: new macro: check for pdfTEX feature 26
\MT@map@clist@n: following LATEX3 23
\MT@permute@@@@@: don't define permutations for unused encodings 113
\MT@rem@from@clist: fix 24
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2006/01/20 **Version 1.9b**

General: compatibility with listings: sanitise more catcodes (reported by *Holger Uhr*) 31
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Documentation: activate expansion in the distributed PDF U1
add samples of micro-typographic features U3
\MT@features: use throughout the package to adjust to beta-ness 26
\MT@ifdimen: use \pdfmatch if available 21
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2006/02/02 **Version 1.9c**

Documentation: add example of how to increase protrusion of footnote markers (suggested by *Georg Verweyen*) U22
Protrusion: settings for URW Garamond 149
\MT@define@code@key@font: fix: context was ignored 106
\MT@define@code@key@size: fix: embrace \MT@tempsize in \csname (bug introduced in v1.9b) 106

2006/05/05 **Version 1.9d**

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  add QX encoding to text sets 136
Inheritance: add list for QX encoding (contributed by *Maciej Eder*) 143
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  settings for Euro symbols (Adobe, ITC, marvosym) 195
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\DeclareCharacterInheritance: fix: empty context 110
\MT@detokenize@n: new macro: use \detokenize if available 20
\MT@get@ex@opt: fix: evaluate preset 60
\MT@get@font@dimen: warning for zero fontdimen . 46
\MT@get@opt: optimise: don't reset when preset option is set 48
  set list name before presetting 48
\MT@is@active: support for Unicode (inputenc/utf8) 85
\MT@setupfont@hook: restore \% and \# when tex4ht is loaded (reported by *Peter Dyballa*) 29
\SetProtrusion: (et al.) optimise: unify keys for mandatory argument 104
  (et al.) split keys of optional and mandatory argument 104

2006/07/28 **Version 1.9e**

General: fix: default value for activate: true . . . 117
Documentation: add hint about unknown encodings U27
  include LPPL 267
Font aliases: declare zeur and zeus (eulervm) as aliases of eur resp. eus (euler) 139
Inheritance: adapt to marvosym's changed encoding 145
Protrusion: complete settings for Euler Fraktur and Script fonts 194
  fix: forgotten comma in mt-mvs.cfg; adapt to marvosym's changed encoding 195
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\DeclareCharacterInheritance: new key 'inputenc' to set the input encoding 110
\MT@rem@from@clist: model after \@removeelement 24
\MT@setup@: empty \MT@setup@ after use (compatibility with the combine class) 27
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2006/09/09 **Version 1.9f**

Protrusion: fix: euler-vm did not load euler settings 191
\MT@curr@list@name: fix: \MessageBreak must not be expanded 89
\MT@gdef@n: new macros: global variants 19
\MT@get@inh@list: fix: input encoding must be set after the inheritance list has been parsed 80
\MT@glet: new macro 19
\MT@reset@context: only reset context if it has actually been changed 94
\MT@set@inh@list: fix: forgotten comma in the features list 111
\MT@set@named@keys: new macro: set name first, simplify parsing of optional argument 106
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