

The `fix-cm` package^{*}

Frank Mittelbach, David Carlisle, Chris Rowley, Walter Schmidt[†]

2020/11/24

This file is maintained by the L^AT_EX Project team.
Bug reports can be opened (category `latex`) at
<https://latex-project.org/bugs.html>.

Abstract

`fix-cm` improves the definitions of the Computer Modern font families.

Contents

1	Introduction	2
2	Using EC fonts (T1 encoding) makes my documents look different	2
2.1	What <code>fix-cm</code> does	2
2.2	How to load the package	3
2.3	Usage notes	3
3	Implementation	4
3.1	Preliminaries	4
3.2	T1 encoding	4
3.3	TS1 encoding	8
3.4	OT1 encoding	11
3.5	OML and OMS encoded math fonts	13
3.6	L ^A T _E X symbols	14

^{*}This file has version number v1.1t, last revised 2020/11/24.

[†]Walter wrote `fix-cm`

1 Introduction

!! To use the `fix-cm` package, load it *before* `\expandafter \cmd@to@cs \string \documentclass`, and use the command `\expandafter \cmd@to@cs \string \RequirePackage` to do so, rather than the normal `\expandafter \cmd@to@cs \string \usepackage`:

```
\RequirePackage{fix-cm}  
\documentclass ...
```

2 Using EC fonts (T1 encoding) makes my documents look different

No I'm not trying to collect any cites from the news group discussion on this topic. In a nutshell, if one adds

```
\usepackage[T1]{fontenc}
```

to a document that uses the Computer Modern typefaces, then not only the T1 encoding is used but the fonts used in the document look noticeably different. This is due to the fact that the EC fonts have more font series designs, e.g. a 14.4pt bold etc and those get used in the standard `.fd` files, while with Computer Modern (in OT1 encoding) such sizes were scaled versions of smaller sizes—with a noticeable different look and feel.

So we provide a package `fix-cm` to ensure that comparable definitions are used. In addition to that, the package `fix-cm` also enables continuous scaling of the CM fonts. This package was written by Walter Schmidt.

2.1 What `fix-cm` does

Loading the package `fix-cm` changes the font definitions of the Computer Modern fonts, in order to achieve the following effects:

- The appearance of the T1 and TS1 encoded CM fonts (aka 'EC') is made as similar as possible to the traditional (OT1 encoded) ones. Particularly, a number of broken or ugly design sizes are no longer used, the look of the bold sans serif typeface at large sizes is considerably improved, and mismatches between the text fonts and the corresponding math fonts are avoided. As a side effect, PostScript and PDF documents may become smaller, because fewer fonts need to be embedded.
- The Computer Modern fonts are made available with arbitrary sizes.
- Only those design sizes of the fonts will be used, that are normally available in Type1 format, too. You need not load the extra package `cmmib57` for this purpose.

The package acts on the following font families:

- The text font families `cmr`, `cmss`, `cmtt` and `cmvtt` with OT1, T1 and TS1 encoding.

- The default math fonts used by L^AT_EX, i.e., the font families `cmm` with encoding OML and `cms` with encoding OMS.
- The symbols used by the package `latexsym`, i.e., the font family `lasy`.

Note that the package does *not* act on:

- Font families such as CM Fibonacci, CM Dunhill etc., which are provided for experimental purposes or for fun only.
- CM text fonts with character sets other than Latin, e.g., Cyrillic. Loading of the required font and encoding definitions while the fonts are not actually used, would not be a good idea. This should be addressed by particular packages or by changing the standard FDs of these fonts.
- Extra math fonts such as the AMS symbol fonts. While they match the style of Computer Modern, they are frequently used in conjunction with other font families, too. Thus, `fix-cm` is obviously not the right place to make sure that they can be scaled continuously. Ask the maintainers of these fonts to provide this feature, which is badly needed!
- The math extension font `cmex`. Whether or not this font should be scaled is a question of its own, and there are other packages (`exscale`, `amsmath`, `amsfonts`) to take care of it.

2.2 How to load the package

!! The package should be loaded *before* `\expandafter \cmd@to@cs \string \documentclass`, using the command `\RequirePackage{fix-cm}`, rather than the normal `\expandafter \cmd@to@cs \string \usepackage`. Rationale: If the package is loaded in the preamble, a preceding package or even the code of the document class may have used any of the CM fonts already. However, the definitions of those fonts, that are already in use, cannot be changed any more.

2.3 Usage notes

In contrast to what you may expect, `fix-cm` does *not* ensure that line and page breaks stay the same, when you switch an existing document from OT1 to T1 encoding. The package does not turn off all of the additional design sizes in the EC fonts collection: Those, that contribute considerably to the typographical quality and do not conflict with the math fonts, are—indeed—used.

!! Be careful when using arbitrary, non-standard font sizes with applications that need bitmap fonts: You may end up with lots of possibly huge `.pk` files. Also, `Metafont` chokes sometimes on extremely small or large sizes, because of arithmetic problems.

`fix-cm` supersedes the experimental packages `cmsd` and `fix-ec`, which are no longer distributed.

The packages `type1cm` and `type1ec` must not be loaded additionally; they enable only continuous scaling.

3 Implementation

3.1 Preliminaries

The L^AT_EX kernel does not declare the font encoding TS1. However, we are going to set up font definitions for this encoding, so we have to declare it now.

```
1 <fix-cm>
2 \input{ts1enc.def}
```

In case the package is loaded in the preamble, any of the CM fonts may have been used already and cannot be redefined. Yet we try to intercept at least the problem that is most likely to occur, i.e., a hidden `\expandafter \cmd@to@cs \string \normalfont .` Most of the standard definitions are ok, but those for T1 encoding and 10.95 pt need to be removed:

```
3 \expandafter \let \csname T1/cmr/m/n/10.95\endcsname \relax
4 \expandafter \let \csname T1/cmss/m/n/10.95\endcsname \relax
5 \expandafter \let \csname T1/cmtt/m/n/10.95\endcsname \relax
6 \expandafter \let \csname T1/cmvtt/m/n/10.95\endcsname \relax
```

fix-cm may still fail, if the EC fonts are preloaded in the L^AT_EX format file. This situation is, however, very unlikely and could occur only with a customized format.

The remainder of the package is enclosed in a group, where the catcodes are guaranteed to be appropriate for the processing of font definitions.

```
7 \begingroup
8 \nfss@catcodes
```

3.2 T1 encoding

CM Roman

```
9 \DeclareFontFamily{T1}{cmr}{}
10 \DeclareFontShape{T1}{cmr}{m}{n}{
11     <-6>      ecrm0500
12     <6-7>     ecrm0600
13     <7-8>     ecrm0700
14     <8-9>     ecrm0800
15     <9-10>    ecrm0900
16     <10-12>   ecrm1000
17     <12-17>   ecrm1200
18     <17->     ecrm1728
19 }{}
20 \DeclareFontShape{T1}{cmr}{m}{sl}{
21     <-6>      ecsl0500
22     <6-7>     ecsl0600
23     <7-8>     ecsl0700
24     <8-9>     ecsl0800
25     <9-10>    ecsl0900
26     <10-12>   ecsl1000
27     <12-17>   ecsl1200
28     <17->     ecsl1728
29 }{}
30 \DeclareFontShape{T1}{cmr}{m}{it}{
31     <-8>      ecti0700
```

```

32      <8-9>    ecti0800
33      <9-10>   ecti0900
34      <10-12>  ecti1000
35      <12-17>  ecti1200
36      <17->    ecti1728
37      }{}
38 \DeclareFontShape{T1}{cmr}{m}{sc}{
39      <-6>      eccc0500
40      <6-7>     eccc0600
41      <7-8>     eccc0700
42      <8-9>     eccc0800
43      <9-10>    eccc0900
44      <10-12>   eccc1000
45      <12-17>   eccc1200
46      <17->     eccc1728
47      }{}
48 \DeclareFontShape{T1}{cmr}{m}{ui}{
49      <-8>      ecui0700
50      <8-9>     ecui0800
51      <9-10>    ecui0900
52      <10-12>   ecui1000
53      <12-17>   ecui1200
54      <17->     ecui1728
55      }{}
56 \DeclareFontShape{T1}{cmr}{b}{n}{
57      <-6>      ecrb0500
58      <6-7>     ecrb0600
59      <7-8>     ecrb0700
60      <8-9>     ecrb0800
61      <9-10>    ecrb0900
62      <10-12>   ecrb1000
63      <12-17>   ecrb1200
64      <17->     ecrb1728
65      }{}
66 \DeclareFontShape{T1}{cmr}{bx}{n}{
67      <-6>      ecxb0500
68      <6-7>     ecxb0600
69      <7-8>     ecxb0700
70      <8-9>     ecxb0800
71      <9-10>    ecxb0900
72      <10-12>   ecxb1000
73      <12->     ecxb1200
74      }{}
75 \DeclareFontShape{T1}{cmr}{bx}{sl}{
76      <-6>      ecbl0500
77      <6-7>     ecbl0600
78      <7-8>     ecbl0700
79      <8-9>     ecbl0800
80      <9-10>    ecbl0900
81      <10-12>   ecbl1000
82      <12->     ecbl1200
83      }{}
84 \DeclareFontShape{T1}{cmr}{bx}{it}{
85      <-8>      ecbi0700

```

```

86         <8-9>    ecbi0800
87         <9-10>   ecbi0900
88         <10-12>  ecbi1000
89         <12->    ecbi1200
90     }{}
91 \DeclareFontShape{T1}{cmr}{bx}{sc}{
92         <-6>      ecxc0500
93         <6-7>     ecxc0600
94         <7-8>     ecxc0700
95         <8-9>     ecxc0800
96         <9-10>    ecxc0900
97         <10-12>   ecxc1000
98         <12->     ecxc1200
99     }{}
100 %

```

CM Sans

```

101 \DeclareFontFamily{T1}{cmss}{}
102 \DeclareFontShape{T1}{cmss}{m}{n}{
103     <-9>      ecss0800
104     <9-10>    ecss0900
105     <10-12>   ecss1000
106     <12-17>  ecss1200
107     <17->     ecss1728
108 }{}
109 \DeclareFontShape{T1}{cmss}{m}{sl}{
110     <-9>      ecsi0800
111     <9-10>    ecsi0900
112     <10-12>   ecsi1000
113     <12-17>   ecsi1200
114     <17->     ecsi1728
115 }{}
116 \DeclareFontShape{T1}{cmss}{m}{it}{
117     {<->ssub*cmss/m/sl}{}
118 \DeclareFontShape{T1}{cmss}{m}{sc}{
119     {<->sub*cmr/m/sc}{}
120 \DeclareFontShape{T1}{cmss}{sbc}{n}{
121     <->      ecssdc10
122 }{}
123 \DeclareFontShape{T1}{cmss}{bx}{n}{
124     <-10>     ecsx0900
125     <10->     ecsx1000
126 }{}
127 \DeclareFontShape{T1}{cmss}{bx}{sl}{
128     <-10>     ecso0900
129     <10->     ecso1000
130 }{}
131 \DeclareFontShape{T1}{cmss}{bx}{it}{
132     {<->ssub*cmss/bx/sl}{}

```

The following substitutions are not provided in the default .fd files. I have included them, so that you can easily use the EC fonts with the default bold series being **b** rather than **bx**.

```

133 \DeclareFontShape{T1}{cmss}{b}{n}

```

```

134      {<->ssub*cmss/bx/n}{  

135 \DeclareFontShape{T1}{cmss}{b}{sl}  

136      {<->ssub*cmss/bx/sl}{  

137 \DeclareFontShape{T1}{cmss}{b}{it}  

138      {<->ssub*cmss/bx/sl}{  


```

CM Typewriter

```

139 \DeclareFontFamily{T1}{cmtt}{\hyphenchar \font\m@ne}  

140 \DeclareFontShape{T1}{cmtt}{m}{n}{  

141     <-9>      ectt0800  

142     <9-10>    ectt0900  

143     <10-12>   ectt1000  

144     <12-17>   ectt1200  

145     <17->     ectt1728  

146     }{  

147 \DeclareFontShape{T1}{cmtt}{m}{it}{  

148     <-9>      ecit0800  

149     <9-10>    ecit0900  

150     <10-12>   ecit1000  

151     <12-17>   ecit1200  

152     <17->     ecit1728  

153     }{  

154 \DeclareFontShape{T1}{cmtt}{m}{sl}{  

155     <-9>      ecst0800  

156     <9-10>    ecst0900  

157     <10-12>   ecst1000  

158     <12-17>   ecst1200  

159     <17->     ecst1728  

160     }{  

161 \DeclareFontShape{T1}{cmtt}{m}{sc}{  

162     <-9>      ectc0800  

163     <9-10>    ectc0900  

164     <10-12>   ectc1000  

165     <12-17>   ectc1200  

166     <17->     ectc1728  

167     }{  

168 \DeclareFontShape{T1}{cmtt}{bx}{n}  

169     {<->sub * cmtt/m/n}{  

170 \DeclareFontShape{T1}{cmtt}{bx}{it}  

171     {<->sub * cmtt/m/it}{  

172 \DeclareFontShape{T1}{cmtt}{bx}{sl}  

173     {<->sub * cmtt/m/sl}{  


```

Substitutions not provided in the default .fd files:

```

174 \DeclareFontShape{T1}{cmtt}{b}{n}  

175     {<->sub * cmtt/m/n}{  

176 \DeclareFontShape{T1}{cmtt}{b}{it}  

177     {<->sub * cmtt/m/it}{  

178 \DeclareFontShape{T1}{cmtt}{b}{sl}  

179     {<->sub * cmtt/m/sl}{  


```

CM Typewriter (var.)

```

180 \DeclareFontFamily{T1}{cmvtt}{  


```

```

181 \DeclareFontShape{T1}{cmvtt}{m}{n}{
182     <-9>      ecvt0800
183     <9-10>    ecvt0900
184     <10-12>   ecvt1000
185     <12-17>   ecvt1200
186     <17->     ecvt1728
187 }{}
188 \DeclareFontShape{T1}{cmvtt}{m}{it}{
189     <-9>      ecvi0800
190     <9-10>    ecvi0900
191     <10-12>   ecvi1000
192     <12-17>   ecvi1200
193     <17->     ecvi1728
194 }{}

```

3.3 TS1 encoding

CM Roman

```

195 \DeclareFontFamily{TS1}{cmr}{\hyphenchar\font\m@ne}
196 \DeclareFontShape{TS1}{cmr}{m}{n}{
197     <-6>      tcrm0500
198     <6-7>     tcrm0600
199     <7-8>     tcrm0700
200     <8-9>     tcrm0800
201     <9-10>    tcrm0900
202     <10-12>   tcrm1000
203     <12-17>   tcrm1200
204     <17->     tcrm1728
205 }{}
206 \DeclareFontShape{TS1}{cmr}{m}{sl}{
207     <-6>      tcsl0500
208     <6-7>     tcsl0600
209     <7-8>     tcsl0700
210     <8-9>     tcsl0800
211     <9-10>    tcsl0900
212     <10-12>   tcsl1000
213     <12-17>   tcsl1200
214     <17->     tcsl1728
215 }{}
216 \DeclareFontShape{TS1}{cmr}{m}{it}{
217     <-8>      tcti0700
218     <8-9>     tcti0800
219     <9-10>    tcti0900
220     <10-12>   tcti1000
221     <12-17>   tcti1200
222     <17->     tcti1728
223 }{}
224 \DeclareFontShape{TS1}{cmr}{m}{ui}{
225     <-8>      tcui0700
226     <8-9>     tcui0800
227     <9-10>    tcui0900
228     <10-12>   tcui1000
229     <12-17>   tcui1200
230     <17->     tcui1728

```



```

231     }{}
232 \DeclareFontShape{TS1}{cmr}{b}{n}{
233     <-6>      tcrb0500
234     <6-7>     tcrb0600
235     <7-8>     tcrb0700
236     <8-9>     tcrb0800
237     <9-10>    tcrb0900
238     <10-12>   tcrb1000
239     <12-17>   tcrb1200
240     <17->     tcrb1728
241 }{}
242 \DeclareFontShape{TS1}{cmr}{bx}{n}{
243     <-6>      tcbx0500
244     <6-7>     tcbx0600
245     <7-8>     tcbx0700
246     <8-9>     tcbx0800
247     <9-10>    tcbx0900
248     <10-12>   tcbx1000
249     <12->     tcbx1200
250 }{}
251 \DeclareFontShape{TS1}{cmr}{bx}{sl}{
252     <-6>      tcbl0500
253     <6-7>     tcbl0600
254     <7-8>     tcbl0700
255     <8-9>     tcbl0800
256     <9-10>    tcbl0900
257     <10-12>   tcbl1000
258     <12->     tcbl1200
259 }{}
260 \DeclareFontShape{TS1}{cmr}{bx}{it}{
261     <-8>      tcbi0700
262     <8-9>     tcbi0800
263     <9-10>    tcbi0900
264     <10-12>   tcbi1000
265     <12->     tcbi1200
266 }{}

```

CM Sans

```

267 \DeclareFontFamily{TS1}{cmss}{\hyphenchar\font\m@ne}
268 \DeclareFontShape{TS1}{cmss}{m}{n}{
269     <-9>      tcss0800
270     <9-10>    tcss0900
271     <10-12>   tcss1000
272     <12-17>   tcss1200
273     <17->     tcss1728
274 }{}
275 \DeclareFontShape{TS1}{cmss}{m}{it}
276     {<->ssub*cmss/m/sl}{}
277 \DeclareFontShape{TS1}{cmss}{m}{sl}{
278     <-9>      tcsi0800
279     <9-10>    tcsi0900
280     <10-12>   tcsi1000
281     <12-17>   tcsi1200

```

```

282         <17->    tcsi1728
283     }{}
284 \DeclareFontShape{TS1}{cmss}{sbc}{n}{
285         <->      tcssdc10
286     }{}
287 \DeclareFontShape{TS1}{cmss}{bx}{n}{
288         <-10>    tcsx0900
289         <10->    tcsx1000
290     }{}
291 \DeclareFontShape{TS1}{cmss}{bx}{sl}{
292         <-10>    tcso0900
293         <10->    tcso1000
294     }{}
295 \DeclareFontShape{TS1}{cmss}{bx}{it}
296     {<->ssub*cmss/bx/sl}{}

```

Substitutions not provided in the default .fd files:

```

297 \DeclareFontShape{TS1}{cmss}{b}{n}
298     {<->ssub*cmss/bx/n}{}
299 \DeclareFontShape{TS1}{cmss}{b}{sl}
300     {<->ssub*cmss/bx/sl}{}
301 \DeclareFontShape{TS1}{cmss}{b}{it}
302     {<->ssub*cmss/bx/sl}{}

```

CM Typewriter

```

303 \DeclareFontFamily{TS1}{cmtt}{\hyphenchar \font\m@ne}
304 \DeclareFontShape{TS1}{cmtt}{m}{n}{
305         <-9>      tctt0800
306         <9-10>    tctt0900
307         <10-12>   tctt1000
308         <12-17>   tctt1200
309         <17->     tctt1728
310     }{}
311 \DeclareFontShape{TS1}{cmtt}{m}{it}{
312         <-9>      tcit0800
313         <9-10>    tcit0900
314         <10-12>   tcit1000
315         <12-17>   tcit1200
316         <17->     tcit1728
317     }{}
318 \DeclareFontShape{TS1}{cmtt}{m}{sl}{
319         <-9>      tcst0800
320         <9-10>    tcst0900
321         <10-12>   tcst1000
322         <12-17>   tcst1200
323         <17->     tcst1728
324     }{}
325 \DeclareFontShape{TS1}{cmtt}{bx}{n}
326     {<->sub * cmtt/m/n}{}
327 \DeclareFontShape{TS1}{cmtt}{bx}{it}
328     {<->sub * cmtt/m/it}{}
329 \DeclareFontShape{TS1}{cmtt}{bx}{sl}
330     {<->sub * cmtt/m/sl}{}

```

Substitutions not provided in the default .fd files:

```

331 \DeclareFontShape{TS1}{cmtt}{b}{n}{
332     {<->sub * cmtt/m/n}{}}
333 \DeclareFontShape{TS1}{cmtt}{b}{it}{
334     {<->sub * cmtt/m/it}{}}
335 \DeclareFontShape{TS1}{cmtt}{b}{sl}{
336     {<->sub * cmtt/m/sl}{}}
```

CM Typewriter (var.)

```

337 \DeclareFontFamily{TS1}{cmvtt}{}
338 \DeclareFontShape{TS1}{cmvtt}{m}{n}{
339     <-9>      tcv0800
340     <9-10>    tcv0900
341     <10-12>   tcv1000
342     <12-17>   tcv1200
343     <17->     tcvi1728
344     }{}
345 \DeclareFontShape{TS1}{cmvtt}{m}{it}{
346     <-9>      tcvi0800
347     <9-10>    tcvi0900
348     <10-12>   tcvi1000
349     <12-17>   tcvi1200
350     <17->     tcvi1728
351     }{}
```

3.4 OT1 encoding

CM Roman

```

352 \DeclareFontFamily{OT1}{cmr}{\hyphenchar\font45 }
353 \DeclareFontShape{OT1}{cmr}{m}{n}{
354     <-6>      cmr5
355     <6-7>     cmr6
356     <7-8>     cmr7
357     <8-9>     cmr8
358     <9-10>    cmr9
359     <10-12>   cmr10
360     <12-17>   cmr12
361     <17->     cmr17
362     }{}
363 \DeclareFontShape{OT1}{cmr}{m}{sl}{
364     <-9>      cmsl8
365     <9-10>    cmsl9
366     <10-12>   cmsl10
367     <12->     cmsl12
368     }{}
369 \DeclareFontShape{OT1}{cmr}{m}{it}{
370     <-8>      cmti7
371     <8-9>     cmti8
372     <9-10>    cmti9
373     <10-12>   cmti10
374     <12->     cmti12
375     }{}
376 \DeclareFontShape{OT1}{cmr}{m}{sc}{
```

```

377         <->      cmcsc10
378     }{}
379 \DeclareFontShape{OT1}{cmr}{m}{ui}{
380         <->      cmu10
381     }{}
382 \DeclareFontShape{OT1}{cmr}{b}{n}{
383         <->      cmb10
384     }{}
385 \DeclareFontShape{OT1}{cmr}{bx}{n}{
386         <-6>      cmbx5
387         <6-7>     cmbx6
388         <7-8>     cmbx7
389         <8-9>     cmbx8
390         <9-10>    cmbx9
391         <10-12>   cmbx10
392         <12->     cmbx12
393     }{}
394 \DeclareFontShape{OT1}{cmr}{bx}{sl}{
395         <->      cmbxsl10
396     }{}
397 \DeclareFontShape{OT1}{cmr}{bx}{it}{
398         <->      cmbxti10
399     }{}
400 \DeclareFontShape{OT1}{cmr}{bx}{ui}{
401         {<->sub*cmr/m/ui}{}}

```

CM Sans

```

402 \DeclareFontFamily{OT1}{cmss}{\hyphenchar\font45 }
403 \DeclareFontShape{OT1}{cmss}{m}{n}{
404         <-9>      cmss8
405         <9-10>    cmss9
406         <10-12>   cmss10
407         <12-17>   cmss12
408         <17->     cmss17
409     }{}
410 \DeclareFontShape{OT1}{cmss}{m}{it}{
411         {<->sub*cmss/m/sl}{}}
412 \DeclareFontShape{OT1}{cmss}{m}{sl}{
413         <-9>      cmssi8
414         <9-10>    cmssi9
415         <10-12>   cmssi10
416         <12-17>   cmssi12
417         <17->     cmssi17
418     }{}
419 \DeclareFontShape{OT1}{cmss}{m}{sc}{
420         {<->sub*cmr/m/sc}{}}
421 \DeclareFontShape{OT1}{cmss}{m}{ui}{
422         {<->sub*cmr/m/ui}{}}
423 \DeclareFontShape{OT1}{cmss}{sbc}{n}{
424         <->      cmssdc10
425     }{}
426 \DeclareFontShape{OT1}{cmss}{bx}{n}{
427         <->      cmssbx10

```

```

428     }{}
429 \DeclareFontShape{OT1}{cmss}{bx}{ui}{
430     {<->sub*cmr/bx/ui}{}}

```

CM Typewriter

```

431 \DeclareFontFamily{OT1}{cmtt}{\hyphenchar \font\m@ne}
432 \DeclareFontShape{OT1}{cmtt}{m}{n}{
433     <-9>      cmtt8
434     <9-10>    cmtt9
435     <10-12>   cmtt10
436     <12->     cmtt12
437 }{}
438 \DeclareFontShape{OT1}{cmtt}{m}{it}{
439     <->      cmitt10
440 }{}
441 \DeclareFontShape{OT1}{cmtt}{m}{sl}{
442     <->      cmslitt10
443 }{}
444 \DeclareFontShape{OT1}{cmtt}{m}{sc}{
445     <->      cmtcsc10
446 }{}
447 \DeclareFontShape{OT1}{cmtt}{m}{ui}{
448     {<->ssub*cmtt/m/it}{}}
449 \DeclareFontShape{OT1}{cmtt}{bx}{n}{
450     {<->ssub*cmtt/m/n}{}}
451 \DeclareFontShape{OT1}{cmtt}{bx}{it}{
452     {<->ssub*cmtt/m/it}{}}
453 \DeclareFontShape{OT1}{cmtt}{bx}{ui}{
454     {<->ssub*cmtt/m/it}{}}

```

CM Typewriter (var.)

```

455 \DeclareFontFamily{OT1}{cmvtt}{\hyphenchar\font45 }
456 \DeclareFontShape{OT1}{cmvtt}{m}{n}{
457     <->      cmvtt10
458 }{}
459 \DeclareFontShape{OT1}{cmvtt}{m}{it}{
460     <->      cmvtti10
461 }{}

```

3.5 OML and OMS encoded math fonts

```

462 \DeclareFontFamily{OML}{cmm}{\skewchar\font127 }
463 \DeclareFontShape{OML}{cmm}{m}{it}{
464     <-6>      cmmi5
465     <6-7>     cmmi6
466     <7-8>     cmmi7
467     <8-9>     cmmi8
468     <9-10>    cmmi9
469     <10-12>   cmmi10
470     <12->     cmmi12
471 }{}
472 \DeclareFontShape{OML}{cmm}{b}{it}{<-6>cmuib5<6-8>cmuib7<8->cmuib10}{}}
473 \DeclareFontShape{OML}{cmm}{bx}{it}{

```

```

474      {<->ssub*cmm/b/it}{ }
475 \DeclareFontFamily{OMS}{cmsy}{\skewchar\font48 }
476 \DeclareFontShape{OMS}{cmsy}{m}{n}{
477     <-6>      cmsy5
478     <6-7>     cmsy6
479     <7-8>     cmsy7
480     <8-9>     cmsy8
481     <9-10>    cmsy9
482     <10->     cmsy10
483 }{ }
484 \DeclareFontShape{OMS}{cmsy}{b}{n}{<-6>cmbsy5<6-8>cmbsy7<8->cmbsy10}{ }

```

3.6 L^AT_EX symbols

```

485 \DeclareFontFamily{U}{lasy}{ }
486 \DeclareFontShape{U}{lasy}{m}{n}{
487     <-6>      lasy5
488     <6-7>     lasy6
489     <7-8>     lasy7
490     <8-9>     lasy8
491     <9-10>    lasy9
492     <10->     lasy10
493 }{ }
494 \DeclareFontShape{U}{lasy}{b}{n}{
495     <-10>     ssub * lasy/m/n
496     <10->     lasyb10
497 }{ }
498 \endgroup
499 </fix-cm>

```