

IMPLEMENTATION NOTES AND MANIFEST

MICHAEL SHARPE

1. INTRODUCTION

1.1. Issues using rtxmi from the txfonts collection. This font supplies all the non-alphabetic glyphs (ie, everything except A–Z and a–z) in the OML encoding, but, not using the same names as in `oml.etc`. To get around this, we must base fontinst constructions not on its afm, but instead, use what may be thought of as an anonymous metric file constructed from its tfm via

```
tftopl -charcode-format=octal rtxmi rtxmi
```

so that `rtxmi.pl` identifies slots only by octal codes, not names, and identifies the encoding as `FONTSPECIFIC`, which usually means “as specified in the header of `rtxmi.pfb`.” By including in the fontinst driver script a line

```
\declareencoding{FONTSPECIFIC}{oml}
```

we force the slots in `rtxmi` to be interpreted using the names in `oml.etc` so that, at the end, we have no problems using `oml` as the encoding for composite fonts built from `rtxmi`.

The original version of txfonts made use of whatever Times font was installed in TeX Live, and as a non-free font, it was not available for modification. In this updated version, we use instead the alphabetic glyphs from TeXGyreTermes or LinLibertine, each of which presents no licensing issues. This allows us to make optical sizes of the math italic and symbol fonts, with a boost to the appearance and readability of subscripts, sub-subscripts and superscripts. (Unfortunately the STIX math italic letters are much heavier than Times, by nearly 15% in stem thickness of uppercase letters, and do not make a good substitute.)

2. MAKING 7pt AND 5pt VERSIONS

- The strokes in 7pt type are (mostly) relatively thicker than those in the 10pt type;
- the side-bearings are a bit bigger in 7pt type—about 30em on the left and about 20em on the right;
- the 7pt glyphs are (relatively) wider than those in the 10pt size.

What we seek is a way to transform 10pt glyphs into 7pt glyphs using some simple FontForge transformations. The following seems to work fairly well:

- Open the .pfb in FontForge—you need to have the .afm or the .pfm in the same folder to get the correct metrics;
- select all glyphs (CRTL-A) and select from the Element menu, Style/Change glyph—this brings up a window with 3 tabs, the first named Stems, where you should select Separate ratios for horizontal and vertical stems and check the box marked Activate diagonal stem processing, then enter 100%+o for Horizontal Stems and 108%+o for Vertical Stems;
- press OK, which should thicken all non-horizontal stems in the font, but most likely cause some validation issues which must be dealt with before proceeding;
- select the menu item Element/Validate/Validate to check for problems—there may be many, and the simplest way to proceed is to right click on one of them and choose the contextual menu items at the bottom of the list, one by one;

- some glyphs may require manual adjustments to smaller stems to make them more uniform—the glyphs M, W, V needed help in my case;
- assuming your font validates, the next step is the menu item Element/Style/Change Glyph, and in this round we choose the second tab, named Horizontal, selecting Uniform scaling..., entering 107%+o for the Counter Size, then press OK;
- validate the transformed font, just as described above, and, after it validates, select the menu item File/Generate Fonts to export the result to a new pfb/afm combination, say xxx7, from which you may generate a tfm using
`afm2tfm xxx7 -0 xxx7`

Iterating the same sequence of operations starting from `xxx7.sfd` will produce fonts and metric files suitable for 5pt.

3. CONVERTING LIBERTINE

Making Libertine text italic and Greek glyphs into math italic and Greek glyphs requires some preparation. In a number of cases, we want to substitute (virtually) Greek glyphs from Libertine into a math italic (or mia) font. As the Greek glyphs are not encoded, we proceed as follows:

```
afm2tfm fxlri -T libertinealt.enc -v fxlri-alt rfxlri-alt
```

which creates `rfxlri-alt.tfm` and `fxlri-alt.vpl` containing the Greek glyphs in the order they should be for TeX, and which outputs, for the map file, the line

```
rfxlri-alt LinLibertineI " LibertineAltEncoding ReEncodeFont " <libertinealt.enc
```

and then

```
tftopl rfxlri-alt rfxlri-alt
```

makes `rfxlri-alt.pl`, from which fontinst may construct `rfxlri-altmtx`. The other `-alt` versions were constructed in a similar manner.

There is a tfm in the TeXLive distribution named `fxlri-8r.tfm` which provides the `fxlri` in 8r encoding, which of course includes all the Roman letters. To get an equivalent for 7pt and 5pt requires us to open the original `fxlri.pfb,afm` in FontForge and subject them to the two stages of thickening and extending described above. The result should be

```
fxlri-7letters.{pfb,afm}
fxlri-5letters.{pfb,afm}
fxlzi-7letters.{pfb,afm}
fxlzi-5letters.{pfb,afm}
```

from which we produce four corresponding tfm files using, eg,

```
afm2tfm fxlri-7letters
```

which must be referenced in the `ntx.map` file with four lines like

```
fxlri-7letters LinLibertineI7 <fxlri-7letters.pfb
```

The same fonts are now used with a different encoding to tease out Greek letters and some other unencoded glyphs like alternate versions of J, g, v and y. Note that these are not available in the semibold font—we have to resort to other tricks for that. First, run four commands similar to

```
afm2tfm fxlri-7letters -T libertinealt.enc -v fxlri-7alt
```

which produces `fxlri-7alt.tfm` (must be referenced in the map file) and `fxlri-7alt.vpl` which will be used only in the creation of the virtual font `nxmlm7.tfm,vf` by fontinst.

3.1. Making bold J and bold v. These glyphs are missing in `fxlzi.pfb`, the semibold Linux Libertine that matched bold TX better than bold Linux Libertine, which seems to be a quite different font, more like bold Palatino. So, we take the `Jcircumflex` glyph and remove the circumflex to make a J and take the `v.alt` glyph from `fxlri` and embolden it by `40em` to make a bold version of the math italic v. From this next font `fxlzi-jv.pfb` with just two glyphs, we make a `tfm` with

```
afm2tfm fxlzi-jv
```

which makes `fxlzi-jv.tfm`, a reference to which we must add to a `.map` file with

```
fxlzi-jv fxlzi-Jv <fxlzi-jv.pfb
```

assuming of course that in the course of making your font, you had given the internal name also as `fxlzi-Jv`. Finally, we have to make versions that work as `7pt` and `5pt` fonts using the same methods as described above, resulting in `fxlzi-jz{5,7}.{pfb,afm,tfm}` for our later use. For each `afm`, make a `tfm` using lines like

```
afm2tfm fxlzi-jv
```

and then, for each `.tfm`, make a `.pl` with

```
tftopl fxlzi-jv fxlzi-jv
```

and so on.

4. ISSUES WITH MATH ITALIC V AND W

Linux Libertine contains a glyph named `v.alt` that is distinct from Greek `\nu`, and that glyph is used as the default math italic v. It is certainly problematic—it just doesn't fit in with other Libertine glyphs, though it is surely distinctive. The recent versions of newtx offer the option `libalvw` which provides substitute glyphs for math italic v and w (based on Linux Libertine upsilon, with some serious modifications) so that one has glyphs that appear to be in the same family, with v distinct from `\nu`.

After constructing the glyphs using FontForge, the same procedure described above for `7pt` and `5pt` sizes was applied, and new virtual fonts constructed.

5. FILES IN THE DISTRIBUTION

This list is current as of June 13, 2012. The following abbreviations are used in the remarks:

FF means FontForge;

EW means “thicken vertical stems by 8% and extend width by a further 7% using FontForge”;

EW² means “perform EW twice”.

PostScript font files:

Size	Date	File	Remarks
706160	May 19	13:58 fxlri-5letters.pfb	EW ² applied to fxlri
700152	May 19	13:58 fxlri-7letters.pfb	EW applied to fxlri
718693	May 19	14:03 fxlzi-5letters.pfb	EW ² applied to fxlzi
711100	May 19	14:01 fxlzi-7letters.pfb	EW applied to fxlzi
7981	May 19	20:33 fxlzi-jv.pfb	alt letters J and v using FF from fxlzi
7993	May 19	20:57 fxlzi-jv5.pfb	alt letters J and v using FF from fxlzi5-letters
7988	May 19	20:58 fxlzi-jv7.pfb	alt letters J and v using FF from fxlzi7-letters
4520	Apr 30	17:46 ntxbexb.pfb	integrals for cmsy7, cmex10, FF-thickened
5904	May 6	15:49 ntxbexmods.pfb	derived from cmex10.pfb, braces FF-thickened
3969	Apr 30	17:46 ntxexb.pfb	derived from cmex10.pfb, braces FF-thickened
5540	May 6	15:53 ntxexmods.pfb	derived from cmex10.pfb, braces FF-thickened
13201	May 16	14:14 rntxbmi.pfb	Alphabetic glyphs from TeXGyreTermes-BI
13273	May 16	14:23 rntxbmi5.pfb	EW ² applied to rntxbmi
13288	May 16	14:21 rntxbmi7.pfb	EW applied to rntxbmi
12935	May 16	11:20 rntxmi.pfb	Alphabetic glyphs from TeXGyreTermes
17791	May 16	14:13 rntxmi5.pfb	EW ² applied to rntxmi
17726	May 16	14:11 rntxmi7.pfb	EW applied to rntxmi
16562	May 15	21:49 rtxbmi5.pfb	EW ² applied to rtxbmi
16605	May 15	21:51 rtxbmi7.pfb	EW applied to rtxbmi
20920	May 15	21:47 rtxmi5.pfb	EW ² applied to rtxmi
21083	May 15	21:44 rtxmi7.pfb	EW applied to rtxmi
28831	May 15	17:43 txbsy5.pfb	EW ² applied to txbsy
28622	May 15	10:58 txbsy7.pfb	EW applied to txbsy
29142	May 15	17:42 txsy5.pfb	EW ² applied to txsy
29124	May 14	18:33 txsy7.pfb	EW applied to txsy

Font metric files:

Size	Date	File	Remarks
1064	May 20	13:21 fxlri-5alt.tfm	from fxlri-5letters with libertinealt.enc
2088	May 20	12:56 fxlri-5letters.tfm	from fxlri-5letters with 8r.enc
1072	May 20	13:15 fxlri-7alt.tfm	from fxlri-7letters with libertinealt.enc
2080	May 20	13:55 fxlri-7letters.tfm	from fxlri-7letters with 8r.enc
1064	May 20	13:21 fxlzi-5alt.tfm	from fxlzi-5letters with libertinealt.enc
2048	May 20	12:56 fxlzi-5letters.tfm	from fxlzi-5letters with 8r.enc
1052	May 20	13:21 fxlzi-7alt.tfm	from fxlzi-7letters with libertinealt.enc
2092	May 20	12:56 fxlzi-7letters.tfm	from fxlzi-7letters with 8r.enc
344	May 19	20:41 fxlzi-jv.tfm	from fxlri-jv.pfb with J.alt, v.alt
344	May 19	21:01 fxlzi-jv5.pfb	from fxlri-jv5.pfb with J.alt, v.alt
344	May 19	21:00 fxlzi-jv7.pfb	from fxlri-jv7.pfb with J.alt, v.alt
1168	May 18	14:00 ntxbex.tfm	from ntxbex.pfb with metric changes
984	May 18	14:00 ntxbex.vf	ditto
728	Apr 30	17:31 ntxbexa.tfm	from txbexa.pfb with metric changes
668	Apr 30	17:31 ntxbexa.vf	ditto
512	May 1	21:16 ntxbexb.tfm	from ntxbexb.pfb
816	May 6	16:13 ntxbexmods.tfm	from ntxbexmods.pfb
1192	May 19	23:12 ntxbexv.tfm	from txbex, braces from ntxbexmods
1020	May 19	23:12 ntxbexv.vf	ditto
2184	May 17	13:23 ntxbmi.tfm	from txbmi with metric changes
1640	May 17	13:23 ntxbmi.vf	ditto
2188	May 17	13:21 ntxbmi1.tfm	from rtxbmi, rntxbmi with metric changes

1636	May	17	13:21	ntxbmi1.vf	ditto
2244	May	19	13:07	ntxbmi5.tfm	from rtxbmi5, rntxbmi5 with metric changes
2276	May	19	13:07	ntxbmi5.vf	
2232	May	19	13:07	ntxbmi7.tfm	from rtxbmi7, rntxbmi7 with metric changes
2160	May	19	13:07	ntxbmi7.vf	
2228	May	18	21:06	ntxbmi5.tfm	from rtxbmi5, rntxbmi5 with metric changes
2272	May	18	21:06	ntxbmi5.vf	
2220	May	19	17:17	ntxbmi7.tfm	from rtxbmi7, rntxbmi7 with metric changes
2156	May	19	17:17	ntxbmi7.vf	
2424	May	4	10:07	ntxbmia.tfm	from txbmia, txb, ntxbexb, rtxbmio, txbsyc, zxxbl7z
1308	May	4	10:07	ntxbmia.vf	
1596	Apr	30	17:31	txbsy.tfm	from txbsy with metric changes
1020	Apr	30	17:31	txbsy.vf	
1512	May	18	16:11	txbsy5.tfm	from txbsy5 with metric changes
1568	May	18	16:11	txbsy5.vf	
1520	May	18	16:47	txbsy7.tfm	from txbsy7 with metric changes
1448	May	18	16:47	txbsy7.vf	
1000	Apr	30	17:31	txbsya.tfm	from txbsya with metric changes
1020	Apr	30	17:31	txbsya.vf	
1008	Apr	30	17:31	txbsyb.tfm	from txbsyb with metric changes
868	Apr	30	17:31	txbsyb.vf	
1100	Apr	30	17:31	txbsyc.tfm	from txbsyc with metric changes
1436	Apr	30	17:31	txbsyc.vf	
1160	May	18	14:00	txex.tfm	from txex with metric changes
984	May	18	14:00	txex.vf	
708	Apr	30	17:31	txexa.tfm	from txexa with metric changes
664	Apr	30	17:31	txexa.vf	
176	May	1	21:16	txexb.tfm	from ntxexb.pfb
800	May	6	16:13	txexmods.tfm	from ntxexmods.pfb
1172	May	19	23:12	txexv.tfm	from txex, braces from ntxexmods
1016	May	19	23:12	txexv.vf	
2172	May	17	13:23	txmi.tfm	from txmi with metric changes
1640	May	17	13:23	txmi.vf	
2184	May	17	13:21	txmi1.tfm	from rtxmi, rntxmi with metric changes
1640	May	17	13:21	txmi1.vf	
2236	May	19	13:06	txmi5.tfm	from rtxmi5, rntxmi5 with metric changes
2276	May	19	13:06	txmi5.vf	
2216	May	19	13:06	txmi7.tfm	from rtxmi7, rntxmi7 with metric changes
2160	May	19	13:06	txmi7.vf	
2220	May	18	21:06	txmi5.tfm	from rtxmi5, rntxmi5 with metric changes
2272	May	18	21:06	txmi5.vf	
2200	May	19	17:17	txmi7.tfm	from rtxmi7, rntxmi7 with metric changes
2156	May	19	17:17	txmi7.vf	
2380	May	3	22:27	txmia.tfm	from txmia, txr, ntxexb, rtxmio, txsyc, zxxrl7z
1304	May	3	22:27	txmia.vf	
1556	Apr	30	17:31	txsy.tfm	from txsy with metric changes
1068	Apr	30	17:31	txsy.vf	
1528	May	18	16:12	txsy5.tfm	from txsy5 with metric changes
1620	May	18	16:12	txsy5.vf	
1504	May	18	16:47	txsy7.tfm	from txsy7 with metric changes
1484	May	18	16:47	txsy7.vf	
984	Apr	30	17:31	txsyia.tfm	from txsyia with metric changes
1020	Apr	30	17:31	txsyia.vf	
996	Apr	30	17:31	txsyb.tfm	from txsyb with metric changes

864	Apr	30	17:31	ntxsyb.vf	
1088	Apr	30	17:31	ntxsyc.tfm	from txsyc with metric changes
1436	Apr	30	17:31	ntxsyc vf	
2876	May	20	14:47	nxlbmi.tfm	from txbmi, fxlzi-8r, fxlzi-jv, rfxlzi-alt
1800	May	20	14:47	nxlbmi vf	
2048	May	20	14:47	nxlbmi5.tfm	from rtxbmi5, fxlzi-5letters, fxlzi-jv5, fxlzi-5alt
2448	May	20	14:47	nxlbmi5 vf	
2036	May	20	14:47	nxlbmi7.tfm	from rtxbmi7, fxlzi-7letters, fxlzi-jv7, fxlzi-7alt
2304	May	20	14:47	nxlbmi7 vf	
2480	May	23	14:16	nxlbmia.tfm	from txbmia, txb, ntxbexb, rtxbmio, rfxlz-alt, zxxbl7z
1420	May	23	14:16	nxlbmia vf	
2852	May	20	14:47	nxlmi.tfm	from txmi, fxlri-8r (Roman), rfxlri-alt (Greek)
1792	May	20	14:47	nxlmi vf	
2008	May	20	14:47	nxlmi5.tfm	from rtxmi5, fxlri-5letters (Roman), rfxlri-5alt (Greek)
2296	May	20	14:47	nxlmi5 vf	
2020	May	20	14:47	nxlmi7.tfm	from rtxmi7, fxlri-7letters (Roman), rfxlri-7alt (Greek)
2296	May	20	14:47	nxlmi7 vf	
2400	May	23	14:16	nxmlia.tfm	from txmia, txr, ntxexb, rtxmio, rfxlr-alt, zxxrl7z
1416	May	23	14:16	nxmlia vf	
884	May	22	20:58	rfxlr-alt.tfm	from fxlr with libertinealt.enc
1072	May	5	10:32	rfxlri-alt.tfm	from fxlri with libertinealt.enc
916	May	22	21:22	rfxlz-alt.tfm	from fxlz with libertinealt.enc
1052	May	19	17:30	rfxlzi-alt.tfm	from fxlzi with libertinealt.enc
592	May	17	13:45	rntxbmi.tfm	from rntxbmi.pfb (Times BI)
760	May	17	13:46	rntxbmi5.tfm	from rntxbmi5.pfb
740	May	17	13:46	rntxbmi7.tfm	from rntxbmi7.pfb
600	May	16	14:49	rntxmi.tfm	from rntxmi (Times Italic)
772	May	17	13:46	rntxmi5.tfm	from rntxmi5.pfb
764	May	17	13:47	rntxmi7.tfm	from rntxmi7.pfb
1112	May	17	13:48	rtxbmi5.tfm	from rtxbmi5.pfb
1100	May	17	13:48	rtxbmi7.tfm	from rtxbmi7.pfb
992	Apr	22	20:44	rtxbmio.tfm	unslanted rtxbmi
1116	May	17	13:48	rtxmi5.tfm	from rtxmi5.pfb
1100	May	17	13:48	rtxmi7.tfm	from rtxmi7.pfb
992	Apr	22	20:41	rtxmio.tfm	unslanted rtxmi
1156	May	18	16:02	txbsy5.tfm	from txbsy5.pfb
1160	May	18	15:52	txbsy7.tfm	from txbsy7.pfb
1172	May	18	16:03	txsy5.tfm	from txsy5.pfb
1156	May	18	15:52	txsy7.tfm	from txsy7.pfb
6812	Apr	22	15:16	t1xbij.tfm	items below (suffix j) from tx with osf
2152	Apr	22	15:16	t1xbij vf	
6892	Apr	22	15:18	t1xbj.tfm	
2176	Apr	22	15:18	t1xbj vf	
7136	Apr	22	15:13	t1xbslj.tfm	
2184	Apr	22	15:13	t1xbslj vf	
6956	Apr	22	15:17	t1xij.tfm	
2148	Apr	22	15:17	t1xij vf	
6716	Apr	22	13:56	t1xrj.tfm	
2168	Apr	22	13:56	t1xrj vf	
6928	Apr	22	15:14	t1xslj.tfm	
2184	Apr	22	15:14	t1xslj vf	
2524	Apr	22	15:16	t1xbij.tfm	
936	Apr	22	15:16	t1xbij vf	
2452	Apr	22	15:18	t1xbj.tfm	

932	Apr	22	15:18	txbj.vf
2680	Apr	22	15:14	txbslj.tfm
940	Apr	22	15:14	txbslj.vf
2584	Apr	22	15:17	txij.tfm
936	Apr	22	15:17	txij.vf
2408	Apr	22	13:55	txrj.tfm
932	Apr	22	13:55	txrj.vf
2636	Apr	22	15:14	txslj.tfm
936	Apr	22	15:14	txslj.vf
4428	Apr	22	15:16	txxbij.tfm
1744	Apr	22	15:16	txxbij.vf
4520	Apr	22	15:18	txxbj.tfm
1740	Apr	22	15:18	txxbj.vf
4724	Apr	22	15:13	txbslj.tfm
1748	Apr	22	15:13	txbslj.vf
4424	Apr	22	15:17	txxij.tfm
744	Apr	22	15:17	txxij.vf
4332	Apr	22	13:56	txxrj.tfm
11740	Apr	22	13:56	txxrj.vf
4536	Apr	22	15:15	txxslj.tfm
1744	Apr	22	15:15	txxslj.vf

Miscellaneous, other than documentation:

Size	Date		File	Remarks
2533	May	22	19:16	libertinealt.enc
1467	Apr	30	17:30	lyintxr.fd
1520	Apr	30	17:30	lyintxss.fd
1516	Apr	30	17:30	lyintxtt.fd
56340	May	23	16:44	newtxmath.sty
3264	May	23	16:48	newtxtext.sty
1914	May	23	10:09	ntx.map
1287	May	19	13:13	omlntxmi.fd
917	May	19	22:21	omlnxlmi.fd
765	May	18	16:10	omsntxsy.fd
561	Apr	30	19:42	omxntxex.fd
572	Apr	30	19:42	omxntxexv.fd
1478	Apr	30	17:30	otintxr.fd
1523	Apr	30	17:30	otintxss.fd
1494	Apr	30	17:30	otintxtt.fd
1449	Apr	30	17:30	tintxr.fd
1504	Apr	30	17:30	tintxss.fd
1500	Apr	30	17:30	tintxtt.fd
1460	Apr	30	17:30	tsintxr.fd
1504	Apr	30	17:30	tsintxss.fd
1483	Apr	30	17:30	tsintxtt.fd
558	Apr	22	15:55	untxexa.fd
957	May	22	22:15	untxmia.fd
558	Apr	30	17:30	untxsya.fd
558	Apr	30	17:30	untxsyb.fd
558	Apr	30	17:30	untxsyc.fd

1460	Apr	30	17:30	untxtt.fd	font definitions for newtx typewriter
1421	Apr	22	15:36	lyintxrj.fd	font definitions for LY1 newtx, osf
1432	Apr	22	15:37	otintxrj.fd	font definitions for OT1 newtx, osf
1404	Apr	22	15:35	tintxrj.fd	font definitions for T1 newtx, osf
1487	Apr	22	12:57	tsintxrj.fd	font definitions for TS1 newtx, osf

6. SOURCES FOR SOME FILES IN THE DISTRIBUTION

For every line in the table below, there is also a bold version—eg, `rntxbmi.sfd`.

Source	Output	Method
TeXGyreTermes	<code>rntxmi.sfd</code>	FF to copy A--Z, a--z
<code>rntxmi.sfd</code>	<code>rntxmi.{pfb,afm}</code>	Generated by FF
<code>rntxmi.afm</code>	<code>rntxmi.tfm</code>	<code>afm2tfm rntxmi rntxmi</code>
<code>rntxmi.sfd</code>	<code>rntxmi-2.sfd</code>	EW
<code>rntxmi-2.sfd</code>	<code>rntxmi7.{pfb,afm}</code>	Generated by FF
<code>rntxmi7.afm</code>	<code>rntxmi7.tfm</code>	<code>afm2tfm rntxmi7 rntxmi7</code>
<code>rntxmi-2.sfd</code>	<code>rntxmi-4.sfd</code>	EW
<code>rntxmi-4.sfd</code>	<code>rntxmi5.{pfb,afm}</code>	Generated by FF
<code>rntxmi5.afm</code>	<code>rntxmi5.tfm</code>	<code>afm2tfm rntxmi5 rntxmi5</code>
<code>rtxmi.{pfb,afm}</code>	<code>rtxmi.sfd</code>	Open pfb+afm in FF
<code>rtxmi.sfd</code>	<code>rtxmi-2.sfd</code>	EW
<code>rtxmi-2.sfd</code>	<code>rtxmi7.{pfb,afm}</code>	Generated from FF
<code>rtxmi7.afm</code>	<code>rtxmi7.tfm</code>	