

მხედრული — *Mxedruli*,  
ჴოცოცხი, მსყრყჴი — *Xucuri*  
*The Georgian Alphabets*\*

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## 1 Introduction

This is a short documentation of the two alphabets used by Georgian and some of its neighbouring languages from the Kartvelian language family. The first alphabet is called *Mxedruli*. Some letters used by Old Georgian or other languages such as Ossetian are also included. The second alphabet is called *Xucuri*. Whereas *Mxedruli* does differentiate majuscules and minuscules, *Xucuri* distinguishes between majuscules (also called *Mrg(v)lovani*) and minuscules (*Იtxovani*). However, in opposition to the Roman, Greek and Cyrillic alphabets in a text either majuscules or minuscules are used. They cannot be combined. *Xucuri* is now restricted to religious use.

It is implemented using METAFONT and can be used in L<sup>A</sup>T<sub>E</sub>X or T<sub>E</sub>X-documents. The font are of a rather simple design (cf. section 3) and surely may be improved. I would be very happy if any suggestions, improvements, corrections, extensions, enhancements etc. could be forwarded to me<sup>1</sup>. Thank you very much!

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\*With improvements by Jan De Lameillieure, Berlin and Mark Leisher, Las Cruces, New Mexico

<sup>1</sup>By e-mail: [johannes.heinecke@wanadoo.fr](mailto:johannes.heinecke@wanadoo.fr). I try to realize suggestions etc. as quick as possible. So please check my WWW-Homepage for the newest  $\beta$ -release: <http://pagesperso-orange.fr/heinecke/mxedruli/>

## 2 The fonts and their usage

### 2.1 *Mxedruli*

The tables below show the names of the *Mxedruli* letters, followed by the letter in normal and bold shape and in a “capital”<sup>2</sup> mode. Within a  $\LaTeX$ -document they can be activated by `\mxedr` (normal), `\mxedb` (bold) `\mxedi` (italics) or `\mxedc` analogously to standard  $\LaTeX$  font commands such as `\rm`, `\bf`, `\it` or `\sc` respectively. Therefore the `mxedruli.sty` stylefile must be loaded for standard font selection and NFSS2.<sup>3</sup> Please refer to section 5 in order to install the fonts. They are provided for 300dpi printers, if you need different solutions section 6 describes how you can produce the `.pk`-files required.

Within  $\LaTeX$  the font size commands have also effect on the *Mxedruli* letters. Finally, in the last column, the required  $\LaTeX$  or  $\TeX$ -input to produce the *Mxedruli* letter is shown.

(As I designed some new letters I had to reposition the ‘ჭ’ (`.+c`) from its original position<sup>4</sup> ‘171 to ‘014. On ‘171 (y) the new letter ‘ჯ’ (*schwa*) is installed now. This is mainly important for those users, who address the letters directly by using the  $\TeX$  `\charnnn` or the  $\LaTeX$  `\symbol{nnn}` commands respectively. If you address the letter as described here, nothing has changed compared to previous versions.)

For those (Kartvelian) languages, which use *Mxedruli* together with diacritics<sup>5</sup> an umlaut (“”), a circumflex (“^”) and a macron (“=”) have been defined. They can be used as in normal  $\LaTeX$ -documents by the `\"char` (umlaut on *char*), `\^char` (circumflex) or `\=char` (macron) command respectively, e.g. `{\mxedr \"o}` yields ‘*ö*’, `{\mxedr \^a}` yields ‘*á*’, and `{\mxedr \=u}` yields ‘*ū*’.

The table in sections 2.1.1 and 2.2.1 contains in the leftmost column the corresponding Unicode-code<sup>6</sup> Please note that the letter-names do slightly differ to the names used in the Unicode name table. This is due to different conventions.

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<sup>2</sup>As there are no capital letters in *mxedruli* the letters are scaled to the same height for headlines etc.

<sup>3</sup>NFSS1 is supported too. Due to the lack of NFSS1 however, I could not test, whether the NFSS1 routines work satisfactorily.

<sup>4</sup>As coded in versions anterior to 2.1

<sup>5</sup>Sometimes also used in Kartvelian dialectology or descriptive linguistics of Caucasian languages in Georgian, in order to provide a phonetic transcription without recurring to the Internal Phonetic Alphabet.

<sup>6</sup>Cf. <http://www.unicode.org/charts/>.

## 2.1.1 Standard letters

Name	<i>Mxedruli</i>				Transcription	input	Unicode
	normal	bold	italics	capital			
an	ა	ა	ა	ა	a	a	10D0
ban	ბ	ბ	ბ	ბ	b	b	10D1
<i>or</i>	ბ	ბ	ბ			b1	
gan	გ	გ	გ	გ	g	g	10D2
don	დ	დ	დ	დ	d	d	10D3
en	ე	ე	ე	ე	e	e	10D4
vin	ვ	ვ	ვ	ვ	v	v	10D5
zen	ზ	ზ	ზ	ზ	z	z	10D6
tan	თ	თ	თ	თ	t	t	10D7
in	ი	ი	ი	ი	i	i	10D8
kan	კ	კ	კ	კ	k	.k	10D9
las	ლ	ლ	ლ	ლ	l	l	10DA
man	მ	მ	მ	მ	m	m	10DB
nar	ნ	ნ	ნ	ნ	n	n	10DC
on	ო	ო	ო	ო	o	o	10DD
par	პ	პ	პ	პ	p	.p	10DE
žan	ჟ	ჟ	ჟ	ჟ	ž	+z	10DF
ran	რ	რ	რ	რ	r	r	10E0
san	ს	ს	ს	ს	s	s	10E1
tar	ტ	ტ	ტ	ტ	t	.t	10E2
un	უ	უ	უ	უ	u	u	10E3
par	ფ	ფ	ფ	ფ	p	p	10E4
kan	ყ	ყ	ყ	ყ	k	k	10E5
gan	გ	გ	გ	გ	g	.g	10E6
qar	ყ	ყ	ყ	ყ	q	q <sup>7</sup>	10E7
šan	შ	შ	შ	შ	š	+s	10E8
čin	ჩ	ჩ	ჩ	ჩ	č	+c	10E9
can	ც	ც	ც	ც	c	c	10EA
dzil	ძ	ძ	ძ	ძ	j/dz	j	10EB
čil	ჭ	ჭ	ჭ	ჭ	ç	.c	10EC
çar	ჭ	ჭ	ჭ	ჭ	ç	.+c	10ED
xan	ხ	ხ	ხ	ხ	x	x	10EE
džan	ჯ	ჯ	ჯ	ჯ	dž	+j	10EF
ha	ჰ	ჰ	ჰ	ჰ	h	h	10F0

<sup>7</sup>Although the transcription of ‘q’ is *q* the T<sub>E</sub>X-input will remain ‘q’ for the letter *qar* as it appears with a far more frequent than *qar* (‘š’) which is coded as ‘q1’.

## 2.1.2 Other letters

Name	<i>Mxedruli</i>				Transcription	input	Unicode
	normal	bold	italics	capital			
qar	ჟ	<b>ჟ</b>	<i>ჟ</i>	ჟ	q	q1	10F4
hē	ჲ	<b>ჲ</b>	<i>ჲ</i>	ჲ	ē, eĭ	e0	10F1
ho	ჳ	<b>ჳ</b>	<i>ჳ</i>	ჳ	ō, oy	o1	10F5
jo	ი	<b>ი</b>	<i>ი</i>	ი	ĭ	i1	10F2
wi	ჴ	<b>ჴ</b>	<i>ჴ</i>	ჴ	w	w	10F3
fi	ჶ	<b>ჶ</b>	<i>ჶ</i>	ჶ	f	f	10F6
schwa	ჷ	<b>ჷ</b>	<i>ჷ</i>	ჷ	ə, y	y	10F7
elifi	ჸ	<b>ჸ</b>	<i>ჸ</i>	ჸ	'	a1	10F8
æ	ჹ	<b>ჹ</b>	<i>ჹ</i>	ჹ	æ	e1	

The letters *qar*, *hē*, *ho*, *jo*, *wi* and *fi* are seldomly used or archaic letters (*fi* may be used to transcribe latin *f*). *Schwa* and *elifi* are mainly used in Mingrelian or Svan, whereas *æ* is used to write the Ossetian language using Mxedruli.

## 2.1.3 Digits

<i>Mxedruli</i>			input
normal	bold	capital	
1	<b>1</b>	1	1
2	<b>2</b>	2	2
3	<b>3</b>	3	3
4	<b>4</b>	4	4
5	<b>5</b>	5	5

<i>Mxedruli</i>			input
normal	bold	capital	
6	<b>6</b>	6	6
7	<b>7</b>	7	7
8	<b>8</b>	8	8
9	<b>9</b>	9	9
0	<b>0</b>	0	0

## 2.1.4 Punctuation

<i>Mxedruli</i>			input
normal	bold	capital	
.	.	.	.
,	,	,	,
!	!	!	!
?	?	?	?
=	=	=	=
-	-	-	-
-	-	-	--
-	-	-	---
/	/	/	/
\	\	\	\char92

<i>Mxedruli</i>			input
normal	bold	capital	
:	:	:	:
;	;	;	;
+	+	+	+
(	(	(	(
)	)	)	)
[	[	[	[
]	]	]	]
"	"	"	' '
"	"	"	' '

## 2.2 *Xucuri*

The following tables show the names and the coding of the *Xucuri* alphabets (*Mrgvlovani* and *Იutxovani*). These fonts do not have any diacritics. Further, for the time being, it only consists of the normal series.<sup>8</sup>

Within a  $\LaTeX$ -document they can be activated by `\xucr`. If used within a  $\LaTeX$ -document together with the style file provided (`xucuri.sty`) the  $\LaTeX$  size commands will also work. ( $\LaTeX 2_{\epsilon}$  is supported together with NFSS2, as is  $\LaTeX 2.09$ )

### 2.2.1 Letters

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<sup>8</sup>If there is a demand for italics and bold versions, I will gladly provide the driver files required. Please contact me as indicated on page 1.

Name	<i>Xucuri</i>		Transcription	input	Unicode	
	majuscules <i>Mrg(v)lovani</i>	minuscules <i>Ḳutxovani</i>			<i>Mrg(v)lovani</i>	<i>Ḳutxovani</i>
an	Ḃ	Ḃ	a	A, a	10A0	2D00
ban	Ḅ	Ḅ	b	B, b	10A1	2D01
gan	Ḇ	Ḇ	g	G, g	10A2	2D02
don	Ḉ	Ḉ	d	D, d	10A3	2D03
en	Ḑ	Ḑ	e	E, e	10A4	2D04
vin	Ḓ	Ḓ	v	V, v	10A5	2D05
zen	Ḕ	Ḕ	z	Z, z	10A6	2D06
tan	Ḗ	Ḗ	t	T, t	10A7	2D07
in	Ḙ	Ḙ	i	I, i	10A8	2D08
ḡan	Ḛ	Ḛ	ḡ	.K, .k	10A9	2D09
las	Ḝ	Ḝ	l	L, l	10AA	2D0A
man	Ḟ	Ḟ	m	M, m	10AB	2D0B
nar	Ḡ	Ḡ	n	N, n	10AC	2D0C
on	Ḩ	Ḩ	o	O, o	10AD	2D0D
ḡar	Ḫ	Ḫ	ḡ	.P, .p	10AE	2D0E
žan	Ḭ	Ḭ	ž	+Z, +z	10AF	2D0F
ran	Ḱ	Ḱ	r	R, r	10B0	2D10
san	Ḳ	Ḳ	s	S, s	10B1	2D11
ṭar	Ḵ	Ḵ	ṭ	.T, .t	10B2	2D12
un	Ḷ	Ḷ	u	U, u	10B3	2D13
par	Ḹ	Ḹ	p	P, p	10B4	2D14
kan	Ḻ	Ḻ	k	K, k	10B5	2D15
ḡan	Ḽ	Ḽ	ḡ	.G, .g	10B6	2D16
ḡar	Ḿ	Ḿ	ḡ	Ḷ, Ḷ <sup>9</sup>	10B7	2D17
šan	Ḟ	Ḟ	š	+S, +s	10B8	2D18
čin	Ḡ	Ḡ	č	+C, +c	10B9	2D19
can	Ḩ	Ḩ	c	C, c	10BA	2D1A
dzil	Ḫ	Ḫ	j/dz	J, j	10BB	2D1B
čil	Ḵ	Ḵ	ç	.C, .c	10BC	2D1C
čar	Ḷ	Ḷ	č	.+C, .+c	10BD	2D1D
xan	Ḹ	Ḹ	x	X, x	10BE	2D1E
džan	Ḻ	Ḻ	dž	+J, +j	10BF	2D1F
ha	Ḵ	Ḵ	h	H, h	10C0	2D20

<sup>9</sup>Although the transcription of ‘Ḷ’ and ‘Ḷ’ is Ḷ and Ḷ respectively, the TeX-input will remain ‘Ḷ’ and ‘Ḷ’ for the letter *ḡar* as it appears with a far more frequent than *ḡar* (‘Ḷ’, ‘Ḷ’) which is coded as ‘Ḷ1’ and ‘Ḷ1’.

Name	<i>Xucuri</i>		Transcription	T <sub>E</sub> X-input
	majuscules <i>Mrg(v)lovani</i>	minuscules <i>Ḳutxovani</i>		
qar	ჴ	ჴ	q	Q1, q1
hē	ჲ	ჲ	ē, eĭ	E0, e0
ho	Ⴣ	— <sup>10</sup>	ō, oy	O1
jo	ჯ	ჯ	ĭ	I1, i1
wi	ჟ	ჟ	w	W, w

### 2.2.2 Punctuation

Please refer to section 2.1.4 on page 5. Punctuation for *Xucuri* is encoded exactly as for *Mxedruli*

## 2.3 Correspondant letters

This table shows, which character of *Mxedruli* corresponds to which *Xucuri* character. Characters not found here do only occur in one of the alphabets.

	<i>Mxedruli</i>	<i>Xucuri</i>	
		majuscules <i>Mrg(v)lovani</i>	minuscules <i>Ḳutxovani</i>
an	ა	Ⴀ	Ⴁ
ban	ბ	Ⴂ	Ⴃ
gan	გ	Ⴃ	Ⴃ
don	დ	Ⴄ	Ⴅ
en	ე	Ⴅ	Ⴆ
vin	ვ	Ⴆ	Ⴇ
zen	ზ	Ⴇ	Ⴈ
tan	თ	Ⴈ	Ⴉ
in	ი	Ⴉ	Ⴉ
ḵan	ქ	Ⴉ	Ⴊ
las	ლ	Ⴊ	Ⴋ
man	მ	Ⴋ	Ⴋ
nar	ნ	Ⴋ	Ⴌ

<sup>10</sup>The letter *ho* does only have a majuscule form.

	<i>Mxedruli</i>	<i>Xucuri</i>	
		majuscules <i>Mrg(v)lovani</i>	minuscules <i>Იtxovani</i>
on	Ⴆ	Ⴆ	Ⴆ
par	Ⴆ	Ⴆ	Ⴆ
žan	Ⴆ	Ⴆ	Ⴆ
ran	Ⴆ	Ⴆ	Ⴆ
san	Ⴆ	Ⴆ	Ⴆ
tar	Ⴆ	Ⴆ	Ⴆ
un	Ⴆ	Ⴆ	Ⴆ
par	Ⴆ	Ⴆ	Ⴆ
kan	Ⴆ	Ⴆ	Ⴆ
gan	Ⴆ	Ⴆ	Ⴆ
qar	Ⴆ	Ⴆ	Ⴆ
šan	Ⴆ	Ⴆ	Ⴆ
čin	Ⴆ	Ⴆ	Ⴆ
can	Ⴆ	Ⴆ	Ⴆ
dzil	Ⴆ	Ⴆ	Ⴆ
čil	Ⴆ	Ⴆ	Ⴆ
čar	Ⴆ	Ⴆ	Ⴆ
xan	Ⴆ	Ⴆ	Ⴆ
džan	Ⴆ	Ⴆ	Ⴆ
ha	Ⴆ	Ⴆ	Ⴆ
qar	Ⴆ	Ⴆ	Ⴆ
hē	Ⴆ	Ⴆ	Ⴆ
ho	Ⴆ	Ⴆ	—
jo	Ⴆ	Ⴆ	Ⴆ
wi	Ⴆ	Ⴆ	Ⴆ

### 3 Examples

#### 3.1 ვეძნის ტყაოსანი – The Knight in the Tiger’s Skin

The following example are two stanzas from Šota Rustaveli’s *Vep̄xis T̄qaosani* “The Knight in the Tiger’s Skin”.<sup>11</sup>

<sup>11</sup>This example you can find slightly changed in the example file `vexis.tex`.

# ვეპსის ტყაოსანი

## უმთა რუსთაველი

ღმერთსა შემვედრე, ნუთუ კვლა დამხსნას სოფლისა შრომასა,  
ცეცხლს, წყალსა და მიწასა, ჰაერთა თანა შრომასა;  
მომცნეს ფრთენი და ალფერინდე, მივხვდე მას ჩემსა ნდომასა,  
დღისით და ღამით ვხედვიდე მზისა ელვათა კრთომასა.

მზე უშენოდ ვერ იქმედების, რათგან შენ ხარ მასა წილი,  
განაღამცა მას ეახელ მისი ეტლი, არ თუ წბილი!  
მუნა გნახო, მადვე გხახო, განმინათლო გული ჩრდილი,  
თუ სიცოცხლე მწარე მქონდა, სიკვდილიმცა მქონდა ტკბილი!

This was set with the following:

```
\documentclass[12pt]{article}
\usepackage{mxedruli}
\begin{document}
\begin{center}
{\Large\mxedc ve.pxis .tqaosani}

\medskip
{\large\mxedc +sota rustaveli}
\end{center}

\bigskip

\begin{verse}
\begin{mxedr}
.gmertsa +semvedre, nutu .kvla damxsnas soplisa
+sromasa,\\
cecxls, .cqalsa da mi.casa, haerta tana +sromasa;\\
momcnes prteni da a.gvprinde, mivhxvde mas +cemsა
ndomasa,\\
d.gisit da .gamit vhxedvide mzisa elvata .krtomasa.
\end{mxedr}
\end{verse}

\medskip
```

```

mze u+senod ver ikmdebis, ratgan +sen xar masa .cili,\\
gana.gamca mas eaxel misi e.tli, ar tu .cbili!\\
muna gnaxo, madve gsaxo, ganminatlo guli +crdili,\\
tu sicocxle m.care mkonda, si.kvdilimca mkonda .t.kbili!
\end{mxedr}
\end{verse}
\end{document}

```

### 3.2 Another example with different font sizes

The second sample text is due to the lack of some proper text<sup>12</sup> when I prepared this file just taken from the preface of a small Georgian-German dictionary, but it should give another impression how this font – using different sizes and the “capitals”– looks like as well:

## ქართულ-გერმანული ლექსიკონი

შედგენილი:

ო. ხუციშვილის და  
თ. ხატიასვილის მიერ

გამომცემლობა „განათლება“  
თბილისი – 1977

წინამდებარე ქართულ-გერმანულ ლექსიკონში შერჩეულია ქართული ენის ლექსიკიდან სიტყვები, რომლებიც ყველაზე მეტად იხმარება სალაპარაკო ენაში, აგრეთვე მხატვრულ, პოლიტიკურ, მეცნიერულ და სასწავლო ლიტერატურაში. განმარტებულია სიტყვის ყველა ძირითადი მნიშვნელობა და ილუსტრირებულია ნიმუშებით. ვცდილობდით, სათანადო ფრაზეოლოგიზმების მოშველებით განგვემარტა სიტყვის ნიუანსობრივი გაგებანიც.

The input was:

---

<sup>12</sup>If you would send me a sample text, you prepared with these fonts to be included in this documentation, I would be most grateful.







	0	1	2	3	4	5	6	7
'000	፩	፪	፫	፬	፭	፮	፯	፰
'010	፱	፳	፴	፵	፶	፷	፸	
'020	፹	፺					-	
'030								
'040		!						'
'050	(	)		+	,	-	.	/
'060	0	1	2	3	4	5	6	7
'070	8	9	:	;		=		?
'100								
'110								
'120								
'130				[	\	]	^	
'140		፳	፴	፵	፶	፷	፸	፹
'150	፺	፻	፼	፽	፿	፾	፿	፿
'160	፿	፿	፿	፿	፿	፿	፿	፿
'170	፿	፿	፿	-	-			፿

	0	1	2	3	4	5	6	7
'000	፩	፪	፫	፬	፭	፮	፯	፰
'010	፱	፳	፴		፶	፷	፸	
'020	፹	፺	፻	፼	፽	፿	፾	፿
'030	፿		፿		፿	፿	፿	
'040		!						'
'050	(	)		+	,	-	.	/
'060	0	1	2	3	4	5	6	7
'070	8	9	:	;		=		?
'100		፳	፴	፵	፶	፷		፹
'110	፺	፻	፼	፽	፿	፾	፿	፿
'120	፿	፿	፿	፿	፿	፿	፿	፿
'130	፿		፿	[	\	]		
'140		፳	፴	፵	፶	፷		፹
'150	፺	፻	፼	፽	፿	፾	፿	፿
'160	፿	፿	፿	፿	፿	፿	፿	፿
'170	፿		፿	-	-			

## 5 Files

The package consists of the following files:

readme	A very short information file.
inputs/umxed.fd	Font definition files for use with NFSS2.
inputs/uxuc.fd	
inputs/mxedruli.sty	LaTeX Style File.
inputs/xucuri.sty	
mf/mxed.mf	The standard generation file for METAFONT.
mf/mxed10.mf	Driver file for normal <i>Mxedruli</i> . Run METAFONT on this file to generate <i>Mxedruli</i> for any other resolution than 300 dpi.
	As before, but bold <i>Mxedruli</i> .
mf/mxedbf10.mf	As before, but italics <i>Mxedruli</i> .
mf/mxedi10.mf	As before, but capital <i>Mxedruli</i> .
mf/mxedc10.mf	Accents for other Kartvelian languages (Svan).
mf/mxedacc.mf	METAFONT macros etc.
mf/mxedbase.mf	“Capital” letters.
mf/mxedcaps.mf	Digits (can be replaced by Computer Modern digits, cf. below).
mf/mxedd.mf	Letters.
mf/mxedfont.mf	Punctuation (can be replaced by Computer Modern punctuation, cf. below).
mf/mxedp.mf	The standard generation file for METAFONT.
mf/xuc.mf	Driver file for <i>Xucuri</i> . Run METAFONT on this file to generate <i>Xucuri</i> for any other resolution than 300 dpi.
mf/xuc10.mf	
	METAFONT macros etc.
mf/xucbase.mf	<i>Xucuri</i> majuscules.
mf/xucfont.mf	Digits (can be replaced by Computer Modern digits, cf. below).
mf/xucd.mf	<i>Xucuri</i> minuscules.
mf/xucl.mf	Punctuation (can be replaced by Computer Modern punctuation, cf. below).
mf/xucp.mf	afm files for use with type1 fonts
afm/*.afm	type1 vector fonts
type1/*.pbf	An example showing both <i>Xucuri</i> and <i>Mxedruli</i>
alphabets.tex	This documentation.
mxeddoc.ps	A short example of Ossetic text, written in <i>Mxedruli</i> .
ossetic.tex	The first <i>Mxedruli</i> -example of this documentation.
vepxis.tex	

To install the fonts etc., please copy all .mf-files from the mf-directory to the appropriate directory of your TeX-system. Further, the files from the inputs-directory must be copied into the directory where LaTeX can find them.

## 5.1 Debian package

If you are on a Ubuntu platform (at least Ubuntu 10.04 or 12.04), you can install the necessary files (style-files and type1 fonts) via the debian package

```
sudo dpkg -i mxedruli-3.4.deb
```

## 6 Using METAFONT

If you are going to regenerate the fonts, there are two possibilities, using the Computer Modern digits and punctuation (which are far nicer) or the digits and punctuation provided in `mxedd.mf` and `mxedp.mf` or `xucp.mf` respectively.

In the first case you should use the following command in a UN\*X environment:<sup>13</sup>

```
mf '&cmmf \mode=your_mode;' input mxed10
```

Else you use plain METAFONT by:

```
mf '\mode=your_mode;' input mxed10
```

(Other sizes are generated by:

```
mf '&cmmf \mode=your_mode; mag=magstepn' input mxed10
```

or

```
mf '\mode=your_mode; mag=magstepn' input mxed10
```

respectively.) *your\_mode* has to be replaced by the mode your printer requires, e.g. `localmode` or `laserjet`, *n* by a valid magstep (1, 2, 3, 4, 5 or half).

In either case `mf` must be followed by `gftopk` to generate the `.pk`-files. Please refer to the documentation of `gftopk` for further information on postprocessing METAFONT output.

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<sup>13</sup>Do so analogously for `mxedbf10`, `mxedi10`, `mxedc10` and `xuc10` respectively.

## 7 License

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