LaTeX font encodings

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1 Introduction

This document explains the ideas that underpin LaTeX font encodings and the constraints that apply when defining a new encoding; it also lists the encodings that have already been defined.

1.1 Encodings in TeX

TeX (the program) implicitly recognises three sorts of encoding, and all are (in a sense) discussed in the TeXbook [16]:

1. The input encoding, which specifies the meanings of characters in files presented to TeX for processing. The TeXbook suggests that 'your version of TeX will recognise the characters you type on your keyboard' (TeX the program has provision for static translations of input characters).

Such direct use of TeX's facilities is not the way modern LaTeX (or indeed any other TeX macro package) is likely to deal with input encodings. This document does not address the topic of input encodings; the interested reader should examine the LaTeX base package inputenc [21, sec. 7.5.2, p. 357].

2. The token stream that TeX processes internally. This stream of TeX's consciousness is discussed in great detail in the TeXbook.

Again, this document does not address the topic. LaTeX's internal character representation (LICR) is well discussed in [21, sec. 7.11.2, p. 442].

3. The font encoding—i.e., the mapping of character codes to glyphs in the fonts that are used to typeset TeX's output. Again, a set of font encodings is enumerated in the TeXbook, but that set has proved inadequate to the needs of modern multilingual use of LaTeX.

This document explains *why* Knuth's original set of encodings is inadequate to modern conditions, and discusses the issues that surround the design and definition of new font encodings.

Font encodings are important for more than their rôle in mapping the glyphs of the fonts to be used for typesetting: their glyph tables are also the context in which TeX's hyphenation algorithm operates. There are constraints imposed by TeX that affect the way in which new font encodings, for use in a multi-lingual environment, may be structured (see section 3 for details).

1.2 The history of TeX font encodings

Little attention was paid to font encodings prior to the arrival of TeX 3. Up to that time, one used Donald Knuth's fonts (the Computer Modern family, using the encodings we now refer to as `OT1` and the `OM` series), or one was on one's own.

The Computer Modern text encoding raises problems in unmodified TeX, because hyphenation cannot break words containing `\accent` commands. Even in those Western European languages for which the `OT1` encoding has symbols for the necessary `\accent`-based diacritics, this shortcoming ruins typesetting of running text.

With the advent of TEX 3, with its ability to switch between hyphenation pattern sets, it was clear that the situation could not continue. Thus a group at the TUG Annual General Meeting in Cork, Ireland, specified a uniform encoding for 256-glyph fonts, that contains accented letters and non-ASCII letters necessary to express most Western European languages (and some Eastern European ones) without recourse to the `\accent` command.

This "Cork" encoding has since been realised in a series of fonts designed with Metafont, in at least one font series that is available both in Adobe Type 1 format and in OpenType format, and in a number of virtual-font mappings of other font series.

Since the time of the Cork meeting, much effort has been devoted to the design of encodings for text fonts to use with TEX, and the Cork encoding influenced the design of many such encodings.

Encodings for mathematical fonts have, in contrast, changed little since Knuth's contributions. A TUG Technical Working Group was established at the Cork meeting, whose aim was to define a set of 256-glyph encodings to regularise and extend Knuth's originals, using ideas from several other fonts that had appeared since, and from the known needs of researchers in mathematics and the mathematical sciences.

Independently, a first proposal (the so-called *Aston proposal*) was worked out by Justin Ziegler together with Frank Mittelbach and other members of the LATEX Project team [24]. A first implementation of this propsal was realized by Matthias Clasen und Ulrik Vieth [6, 7].

However, the slow progress of these Mathematical encodings has been overtaken by the addition (in the last decade or so) of a large number of mathematical symbols to Unicode [3]; one can expect further changes so that new public mathematical font encodings will most likely be delayed still further.

1.3 Further information

For a general introduction to LATEX, including the new features of LATEX 2_ε, you should read *LATEX: A Document Preparation System*, Leslie Lamport, Addison Wesley, 2nd ed, 1994.

A more detailed description of the new features of LATEX, including an overview of more than 200 packages and nearly 1000 ready to run examples, is to be found in *The LATEX Companion second edition* by Frank Mittelbach and Michel Goossens [21].

The LATEX project sponsored a report on Mathematical font encodings, which is worth reading for its insight into the problems of defining the way in which math is used: see [24, 6, 7].

The LATEX font selection scheme is based on TEX, which is described by its developer in *The TEXbook*, Donald E. Knuth, Addison Wesley, 1986, revised in 1991 to include the features of TEX 3.

For more information about TEX and LATEX, please contact your local TEX Users Group, or the international TEX Users Group (`http://www.tug.org`).

2 Existing font encodings

This section lists the encodings currently assigned; for each encoding, we list the registered (LATEX) name, the assigned purpose of the encoding, and the

author. Further details may list the code positions used in the encoding, the *variable slots* (see below), an example font (for which a listing will be provided later in the document if the relevant fonts are present), and a source for further reference.

While the characteristic feature of an encoding is that each font encoded according to the encoding should have the same glyph set, there are some encodings (notably `OT1` and its descendants) in which a few glyph code slots differ in their contents in different fonts.

2.1 Naming conventions

Names for encoding schemes are strings of up to three letters (all upper case) plus digits.

The LaTeX Project reserves the use of encoding names starting with the following letters: `T` (standard 256-long text encodings), `TS` (symbols that are designed to extend a corresponding `T` encoding), `X` (text encodings that do not conform to the strict requirements for `T` encodings), `M` (standard 256-long mathematical encodings), `S` (other symbol encodings), `A` (other special applications), `OT` (standard 128-long text encodings), and `OM` (standard 128-long mathematical encodings).

Please do not use the above starting letters for non-portable encodings. If new standard encodings emerge then we shall add them in a later release of LaTeX.

Encoding schemes which are local to a site or a system should start with `L`, experimental encodings intended for wide distribution will start with `E`, whilst `U` is for Unknown or Unclassified encodings.

> *We recommend that new encoding names should not be introduced unless careful consideration and discussion in the user community has confirmed the need for the encoding. If encodings have to change from font to font, a number of problems arise, so it is best to develop encodings that can be used with a large number of fonts in parallel. This allows documents to be typeset using different fonts without problems.*
>
> *The `TS1` encoding is a good example of a* bad *encoding (even though it was developed with the best intentions) as a huge number of fonts can only implement parts of it. Similarly, the fact that the few sets of available mathematical fonts (beside Computer Modern Math) nearly all implement slightly different encodings is a huge source of problems. Don't add to this if possible!*

2.2 128^{+} glyph encodings (text)

The 'OT' series of font encodings start with Donald Knuth's original text encoding, that used for the text fonts in the earliest releases of TeX itself. The 'O' of the encoding designator may be taken as signifying 'original', or just 'old'.

LaTeX name:	`OT1`
Public name:	TeX text
Author:	Donald Ervin Knuth
Glyph slots used:	0x00–0x7F
Variable slots:	0x0B–0x0F, 0x24, 0x3C, 0x3E, 0x5C, 0x7B–0x7D
Font example:	`cmr10` ; encoding table on page 19
Further reference:	[16, p.427]

Donald Knuth designed his font encoding (and hence his fonts) in a very different environment from that which now pervades the TEX world: his (mainframe) computer had very little memory, there was little experience in (or demand for) for multilingual technical typesetting, and as a result it was appropriate to sacrifice uniformity for efficiency.

Thus Knuth's original fonts differ slightly in some encoded slots: for example, the glyphs `<`, `>`, `\`, `{`, and `}` are only available in the typewriter fonts and the $ and £ signs share the same position (in different font shapes).

This means that direct selection of these slots can produce unpredictable results, e.g., typing `<` or `\symbol{'74}` in a document can yield '¿'.

LaTeX name:	`OT2`
Public name:	UW cyrillic encoding
Author:	University of Washington
Glyph slots used:	0x00–0x7F
Variable slots:	—
Font example:	`wnr10` ; encoding table on page 20
Further reference:	[2]

Support for this encoding is available in the Cyrillic bundle although for all practical purposes it is better to use one of the `T2` encodings.

LaTeX name:	`OT3`
Public name:	UW IPA encoding
Author:	University of Washington
Glyph slots used:	0x00–0x7f
Variable slots:	—
Font example:	`wsuipa10` ; encoding table on page 20
Further reference:	[8, p.149]

The `OT3` encoding was never really used with LaTeX 2_ε following the introduction of the TIPA system which offers much better support for IPA. In particular, no `ot3enc.def` file was ever produced.

LaTeX name:	`OT4`
Public name:	Polish text encoding
Author:	B. Jackowski and M. Ryćko
Glyph slots used:	0x00–0x7F, 0x81, 0x82, 0x86, 0x8A, 0x8B, 0x91, 0x99, 0x9B, 0xA1, 0xA2, 0xA6, 0xAA, 0xAB, 0xAE, 0xAF, 0xB1, 0xB9, 0xBB, 0xD3, 0xF3, 0xFF
Variable slots:	0x0B–0x0F, 0x24, 0x3C, 0x3E, 0x5C, 0x7B–0x7D
Font example:	`plr10` ; encoding table on page 21
Further reference:	—

While Knuth included the means of typesetting the 'lost L' (Ł) in his `OT1` encoding, he omitted the ogonek (˛), a diacritic mark that is also needed in Polish text; hence the appearance, well before the `T1` encoding, of fonts using this encoding.

LaTeX name:	OT5
Public name:	Not currently allocated
Author:	—
Glyph slots used:	—
Variable slots:	—
Font example:	
Further reference:	—

LaTeX name:	OT6
Public name:	Armenian text encoding
Author:	Serguei Dachian
Glyph slots used:	0x03–0x0F, 0x13–0x7F
Variable slots:	—
Font example:	artmr10
Further reference:	—

This encoding was allocated to permit use of Dachian's Armenian fonts in a standard LaTeX environment.

Because of license issues the artmr fonts are not necessarily included in distributed TeX installations (and for this reason the corresponding encoding table is not shown below). However, the fonts and the support macros can be found on the CTAN archives (look for armtex).

2.3 256 glyph encodings (text)

LaTeX name:	T1
Public name:	Cork encoding
Author:	Euro TeX conference at Cork
Glyph slots used:	0x00–0xFF
Variable slots:	—
Font example:	ecrm1000 ; encoding table on page 22
Further reference:	[10, p.514], [15, p.99]

The Cork encoding was developed so that advantage could be taken of the (then) new facilities of TeX 3, allowing hyphenation of most Western European (and some Eastern European) languages in an unmodified version of TeX.

The encoding was developed in the absence of any extant effort at font design, but instances written in Metafont (the 'EC' fonts), and more recently Adobe Type 1 instances of the same fonts have become available.

Substantial (but incomplete) instances have also been developed, which use virtual fonts. These latter instances map either Knuth's original (OT1-encoded) fonts, or commercial fonts that contain the Adobe 'standard' set of 224 glyphs.

LaTeX name:	`T2A, T2B, T2C`
Public name:	Cyrillic encodings
Author:	The CyrTUG font team
Glyph slots used:	0x00–0xFF
Variable slots:	— (within each encoding)
Font example:	`larm1000` ; encoding table on page 23
Further reference:	[4]

There are too many glyphs in the full Cyrillic complement of languages for all of them to be covered by a single LaTeX-compliant encoding (the lower half of each `T2` encoding is identical to that of `T1`, in order that each should be a conforming LaTeX encoding — see section 3). The approach taken is therefore to develop a single encoding, `X2` (see 2.5) which contains all the glyphs needed for the full set of languages, and then to derive the three LaTeX-complaint `T2`-family encodings using the `X2` set together with that of `T1`.

LaTeX name:	`T3`
Public name:	IPA encoding
Author:	FUKUI Rei, University of Tokyo
Glyph slots used:	0x00–0xFF
Variable slots:	—
Font example:	`tipa10` ; encoding table on page 26
Further reference:	[12, p.102]

The `T3` encoding (and associated macros) provides the glyphs required in phonetic description according to current International Phonetic Association recommendations [18].

The `T3` encoding does *not fulfil* the requirements for `T` encodings— the name is a historical accident. The correct name would be `X3`, but due to the fact that this font family has been used under its current encoding name for a long time, the name will not change for compatibility reasons.

LaTeX name:	`T4`
Public name:	African Latin (fc)
Author:	Jörg Knappen
Glyph slots used:	0x00–0xFF
Variable slots:	0x24
Font example:	`fcr10` ; encoding table on page 27
Further reference:	[14]

The African Latin fonts contain in their lower half (0–127) the same characters as the European Latin (T1-encoded) Fonts, while in their upper half (128–255) they contain letters and symbols for African languages that use extended Latin alphabets. Due to lack of space, Jörg had to play the unfortunate trick of assigning `\textdollar` and `\textsterling` the same position; users should take these characters from the text companion font, if they are needed. Instead of defining a lot of new control sequences for the single letters, there are three accent-like control sequences with general purpose: `\m` (Modified-1), `\M` (Modified-2) and `\B` (Barred). Most standard LaTeX encoding-dependent commands work. However, the Icelandic special letters

are not available and 'best replacements' for `\Th`, `\th`, and `\dh` are used (barred T and d resp.).

LaTeX name:	`T5`
Public name:	Vietnamese encoding
Author:	Werner Lemberg and Vladimir Volovich
Glyph slots used:	0x00–0xFF
Variable slots:	—
Font example:	`vnr10` ; encoding table on page 28
Further reference:	[17]

The `T5` encoding was developed for Vietnamese. Again, this encoding *does not* conform to the requirements for a `T`-encoding because its large number of accented letters prevent the `\lccode` and `\uccode` mapping requirements for `T` encodings from being fulfilled. However, since the Vietnamese language does not use word division in typesetting so that this requirement is actually not important for this particular language. Since every glyph used in Vietnamese text is internally represented as LICR macros, the commands `\MakeUppercase` and `\MakeLowercase` still work as expected (as they change the case of the ASCII characters in LICR definitions).

LaTeX name:	`T6`
Public name:	Armenian
Author:	—
Glyph slots used:	—
Variable slots:	—
Font example:	
Further reference:	—

This encoding is reserved to permit future expansion of Armenian TeX to use 256-character (hyphenatable) fonts.

LaTeX name:	`T7`
Public name:	Greek encoding
Author:	—
Glyph slots used:	—
Variable slots:	—
Font example:	
Further reference:	—

The name is already reserved for a 256 glyph greek encoding. The encoding itself hasn't been defined so far.

2.4 256⁻ glyph encodings (text symbols)

LaTeX name:	TS1
Public name:	Text Companion encoding (Cork)
Author:	Jörg Knappen
Glyph slots used:	0x00–0x0D, 0x12, 0x15, 0x16, 0x18–0x1D, 0x20, 0x24, 0x27, 0x2A, 0x2C–0x3A, 0x3C–0x3E, 0x4D, 0x4F, 0x57, 0x5B, 0x5D–0x60, 0x62–0x64, 0x6C–0x6E, 0x7E–0xBF, 0xD6, 0xF6
Variable slots:	—
Font example:	tcrm1000 ; encoding table on page 29
Further reference:	[15]

The text symbol encoding offers access to symbolic glyphs that are commonly used in text (for a variety of reasons), and whose style should vary with the text that surrounds them.

Unfortunately, the TS1 encoding was developed without reference to the glyphs available in existing commercial fonts. As a result, only font families explicitly developed for TeX (i.e., typically originating with METAFONT) actually contain all glyphs required by the TS1 encoding. Most other font families (whether free or commercial) often only provide half of the set (compare the two tables for TS1 on pages 29 and 30). To improve this situation somewhat, NFSS provides a way to define encoding subsets on a per family basis in the textcomp package (which package offers support for the TS1 encoding).

LaTeX name:	TS3
Public name:	IPA symbol encoding
Author:	FUKUI Rei, University of Tokyo
Glyph slots used:	0x00–0x0A, 0x20–0x49, 0x50–0x56, 0x70–0x7B
Variable slots:	—
Font example:	tipx10 ; encoding table on page 31
Further reference:	[12]

The TS3 encoding (together with the T3 encoding) provides the glyphs for typesetting phonetic transcriptions following the guidelines of the International Phonetic Association [18]. Support is offered through the tipa package.

2.5 256 glyph encodings (text extended)

LaTeX name:	X2
Public name:	Cyrillic glyph container
Author:	The CyrTUG font team
Glyph slots used:	0x00–0xFF
Variable slots:	—
Font example:	rxrm1000 ; encoding table on page 32
Further reference:	[4]

This encoding specifies the glyph container for Cyrillic characters, which is used in specifying the T2A, T2B and T2C encodings.

2.6 128$^+$ glyph encodings (mathematics)

LaTeX name:	`OML`
Public name:	TeX math italic
Author:	Donald Ervin Knuth
Glyph slots used:	0x00–0x7F
Variable slots:	—
Font example:	`cmmi10` ; encoding table on page 33
Further reference:	[16, p.430]

The `OML` encoding contains italic Latin and Greek letters for use in mathematical formulas (typically used for variables) together with some symbols.

LaTeX name:	`OMS`
Public name:	TeX math symbol
Author:	Donald Ervin Knuth
Glyph slots used:	0x00–0x7F
Variable slots:	—
Font example:	`cmsy10` ; encoding table on page 33
Further reference:	[16, p.431]

The `OMS` encoding contains basic mathematical symbols, together with an uppercase "calligraphic" Latin alphabet.

LaTeX name:	`OMX`
Public name:	TeX math extension
Author:	Donald Ervin Knuth
Glyph slots used:	0x00–0x7F
Variable slots:	—
Font example:	`cmex10` ; encoding table on page 34
Further reference:	[16, p.432]

`OMS` encodes mathematical symbols with variable sizes, such as the $\sum$ sign, which changes its size if used in displayed formulas, and the construction parts for brackets, braces and radicals, etc., which can stretch to accommodate the thing they're enclosing.

2.7 256 glyph encodings (mathematics)

So far there are no 256 glyph mathematical encodings. A proposal is given in [24].

2.8 Other encodings

LaTeX name:	`C..`
Public name:	CJK encodings
Author:	Werner Lemberg
Glyph slots used:	0x00–0xFF
Variable slots:	—
Font example:	
Further reference:	[5]

The CJK package defines a number of encodings which access Chinese, Japanese and Korean fonts.

LaTeX name:	`E..`
Public name:	Experimental encodings
Author:	—
Glyph slots used:	0x00–0xFF
Variable slots:	all
Font example:	
Further reference:	[21, p.416]

As the name indicates, encodings starting with the letter `E` are intended for experimental encodings, that are still likely to change.

LaTeX name:	`L..`
Public name:	Local encoding (site dependent)
Author:	—
Glyph slots used:	0x00–0xFF
Variable slots:	all
Font example:	
Further reference:	[21, p.416]

'Local' encodings provide the means to develop representation techniques that are suited to a particular TeX environment. While the developer has freedom to specify their encoding as he or she pleases, there is a strong incentive to obey the LaTeX rules for encodings, since it will otherwise be difficult to compose text using the encoding.

At least it was the intention that `L..` encodings are local and site dependent. However, a number of such encodings became generally used without ever getting a different name allocated.

LaTeX name:	`LY1`
Public name:	Y&Y 256 glyph encoding
Author:	Berthold Horn
Glyph slots used:	0x00–0x08, 0x0C, 0x10, 0x12–0xFF
Variable slots:	*believed none*
Font example:	`ptmr8y` ; encoding table on page 35
Further reference:	[21, p.416]

This is an alternative to the `T1` encoding developed by Y&Y and used in their commercial TeX implementation.

LaTeX name:	`LV1`
Public name:	MicroPress encoding
Author:	Michael Vulis
Glyph slots used:	*unknown*
Variable slots:	*unknown*
Font example:	
Further reference:	[21, p.416]

This is an encoding developed by MicroPress and used for some of their fonts.

LaTeX name:	`LGR`
Public name:	Greek 256 glyph encoding
Author:	*unknown*
Glyph slots used:	0x00–0xFF
Variable slots:	*believed none*
Font example:	`grmn1000` ; encoding table on page 36
Further reference:	[21, p.575]

Currently the main encoding in use for the Greek language.

This encoding doesn't conform to the restrictions for `T`-encodings described in section 3 on page 13 as it doesn't have ASCII glyphs at all.

LaTeX name:	`PD1`
Public name:	PDF DocEncoding
Author:	Adobe
Glyph slots used:	0x08–0x0A, 0x0C, 0x0D, 0x18–0x7E, 0x80–0x9E, 0xA0–0xAE, 0xB0–0xFF
Variable slots:	—
Font example:	
Further reference:	[1], [13]

The `PD1` encoding is a virtual encoding with 256 glyphs needed to produce bookmarks and similar text in PDF document generated with pdfLaTeX. The encoding is "virtual" because by design there are no TeX fonts that cover `PD1`. Details can be found in appendix D.1 of [1].

LaTeX name:	`PU`
Public name:	PDF Unicode Encoding
Author:	Adobe
Glyph slots used:	—
Variable slots:	—
Font example:	
Further reference:	[1], [13]

Another virtual encoding (with more than 600 characters) for Unicode-encoded bookmarks in PDF documents.

LaTeX name:	`U`
Public name:	Unknown encoding
Author:	—
Glyph slots used:	potentially 0x00-0xFF
Variable slots:	all
Font example:	`wasy10` ; encoding table on page 37
Further reference:	[21, p.416]

This encoding should be used for fonts that resist classification, e.g., when it is clear that there will never be more than one font using the same encoding.

3 Restrictions

3.1 Required glyphs for general text encodings

Encodings that are supposed to be used with LaTeX for 'general purpose text fonts' need to have certain fixed glyphs in certain encoding slots. A 'general purpose text font' is one intended for arbitrary natural language text and not just within special environments (such as the phonetic alphabet) or just for typesetting individual symbols (e.g., the text companion font with encoding `TS1`).

This is the case for the following glyphs that have to be in their ASCII positions for general purpose text encodings:

Glyph	Position	Glyph	Position	Glyph[1]	Position
!	33	:	58	<	60
'	39	;	59	>	62
(	40	=	61	|	124
)	41	?	63		
*	42	@	64		
+	43	A ... Z	65 to 90		
,	44	[	91		
-	45	]	93		
.	46	`	96		
/	47	a ... z	97 to 122		
0 ... 9	48 to 57				

In addition the following glyphs have to be present somewhere[2] in the encoding together with corresponding ligature programs to generate them:

Glyph	Ligature program
“	``
”	''
–	--
—	---

This is $33 + 2 * 26 = 85$ positions "required", which leaves 171 positions free.

If there are free slots available then adding all or some of the diacritics would be the best way to fill them.

If there are insufficient slots for the characters needed, a possible technique is to create a subsidiary encoding, and to move non-letter characters to it. Since only "letters" take part in the hyphenation algorithm, this technique doesn't affect the appearance of the typeset result.

3.2 The constraints on upper/lower case tables

Due to some technical restrictions of TeX related to hyphenation it is not possible in LaTeX to use more than one `\lccode` or `\uccode` table. Therefore all encodings need to share these two tables which are defined to be those of the `T1` encoding.

[1] The requirement for these three glyphs is violated in the Latin alphabet `OT` encodings.

[2] The position in this case is not important as they are generated from ligature programs.

The T1 encoding has some nasty peculiarities which make certain slot positions more or less unusable for other encodings if this restriction is to be obeyed. This is unfortunate but since T1 is well established and the basis for a large number of languages it seemed better to live with this situation instead of trying to replace T1 with a slightly better standard (with the result that for a long time different LaTeX installations would not be able to communicate with each other because of incompatible font sets).

The positions that are problematic are as follows.

25 (ı)	uppercase maps strangely (same as for 105, i)
26 (ȷ)	uppercase maps strangely (same as for 106, j)
27 (ff)	lowercase maps to itself which makes this slot subject to hyphenation (used to support OT1 encoding)
157 (İ)	lowercase maps strangely (same as for 73, I)
158 (đ)	uppercase maps strangely (same as for 240, ð)

One way to use such slots is to fill them with ligature glyphs as TeX will not consult these tables for glyphs constructed through ligatures programs but instead uses the entries for the individual glyphs used to produce the ligature.

A complete listing of the uppercase/lowercase mapping tables is to be found in section B (page 38).

4 Encoding specific commands

An encoding specific command is one that generates a glyph (or glyphs), to produce a graphic effect that may be implemented differently in different encodings. The encoding specific command automatically changes its implementation when the encoding changes in the course of the document. Encoding specific commands figure in LaTeX's internal character representation (LICR) and are also discussed in [21, sec. 7.11.2, p. 442].

The following table only covers the encoding specific commands from the OT1 and T1 encodings. Other encodings may specify additional encoding specific commands. In the table, the first 15 commands are 'accent-like' and need as an argument the character to be accented. For example, `\v{c}` is the LICR for 'č'.

`\‘`	OT1,T1	‘	(grave)
`\’`	OT1,T1	’	(acute)
`\^`	OT1,T1	^	(circumflex)
`\~`	OT1,T1	~	(tilde)
`\"`	OT1,T1	¨	(umlaut)
`\H`	OT1,T1	″	(Hungarian umlaut)
`\r`	OT1,T1	°	(ring)
`\v`	OT1,T1	ˇ	(haček)
`\u`	OT1,T1	˘	(breve)
`\t`	OT1,T1	‿	(tie)
`\=`	OT1,T1	¯	(macron)
`\.`	OT1,T1	˙	(dot)
`\b`	OT1,T1	_	(underbar)
`\c`	OT1,T1	¸	(cedilla)
`\d`	OT1,T1	̣	(dot under)
`\k`	T1	˛	(ogonek)
`\AE`	OT1,T1	Æ	

\DH	T1	Ð	
\DJ	T1	Đ	
\L	OT1,T1	Ł	
\NG	T1	Ŋ	
\OE	OT1,T1	Œ	
\O	OT1,T1	Ø	
\SS	OT1,T1	SS	
\TH	T1	Þ	
\ae	OT1,T1	æ	
\dh	T1	ð	
\dj	T1	đ	
\guillemotleft	T1	«	(guillemet)
\guillemotright	T1	»	(guillemet)
\guilsinglleft	T1	‹	(guillemet)
\guilsinglright	T1	›	(guillemet)
\i	OT1,T1	ı	
\j	OT1,T1	ȷ	
\l	OT1,T1	ł	
\ng	T1	ŋ	
\oe	OT1,T1	œ	
\o	OT1,T1	ø	
\quotedblbase	T1	„	
\quotesinglbase	T1	‚	
\ss	OT1,T1	ß	
\textasciicircum	OT1,T1	^	
\textasciitilde	OT1,T1	~	
\textbackslash	OT1,T1	\	
\textbar	OT1,T1	|	
\textbraceleft	OT1,T1	{	
\textbraceright	OT1,T1	}	
\textcompwordmark	OT1,T1		(invisible)
\textdollar	OT1,T1	$	
\textemdash	OT1,T1	—	
\textendash	OT1,T1	–	
\textexclamdown	OT1,T1	¡	
\textgreater	OT1,T1	>	
\textless	OT1,T1	<	
\textquestiondown	OT1,T1	¿	
\textquotedbl	T1	"	
\textquotedblleft	OT1,T1	“	
\textquotedblright	OT1,T1	”	
\textquoteleft	OT1,T1	‘	
\textquoteright	OT1,T1	’	
\textregistered	OT1,T1	®	
\textsection	OT1,T1	§	
\textsterling	OT1,T1	£	
\texttrademark	OT1,T1	™	
\textunderscore	OT1,T1	_	
\textvisiblespace	OT1,T1	␣	
\th	T1	þ	

5 Encodings for Unicode based TEX systems

The preceding text has assumed a classic TeX system that is restricted to the use of fonts with at most 256 characters. In order to accommodate all the characters needed for different languages and mathematics it is necessary to have multiple encodings as described above, and LATEX needs to be aware of the encoding used for each font.

Unicode aims to provide a single encoding that removes most of the need to switch encodings, apart from very specialist use for non-standard characters. Rather than assign codes in the range 0–256 (hex FF) Unicode codes are in the range 0–1,114,111 (hex 10FFFF), although not all slots are available for distinct characters for technical reasons. Unicode offers the possibility to use a single input encoding (usually UTF-8) for all documents and to use essentially the same Unicode encoding for all fonts, so removing the need to switch encodings in different contexts.

Omega was perhaps the first widely used TEX extension that supported Unicode. Currently the two actively supported systems that are present in most modern TEX distributions are XeTEX and LuaTEX.

When used with these extended TEX engines, LATEX's font system can refer to Unicode fonts (typically OpenType fonts installed system-wide on your operating system rather than fonts specifically encoded/installed for TEX). Currently the usual method of accessing these fonts is through the contributed fontspec package. This uses as encoding `TU`: "TEX Unicode" (historically two experimental encodings `EU1` and `EU2` were used, depending on the engine, but these are deprecated). The exact rules for LATEX encodings for Unicode engines have not yet been finalised in terms of the (usual) requirement that each slot should be defined. (This is not realistic for a Unicode font, as almost all fonts address subsets of the full range.) It is rare to need to specify the `TU` encoding a document as the fontspec package sets up the correct encoding when loaded.

The restrictions described in section 3 do not apply, or need to be modified in a Unicode based engine. Clearly the lowercase table (and hyphenation patterns) can not be restricted to the values used for `T1` and do only refer to the first 256 characters.

When the LATEX format is made LATEX sets up the lowercase table and classifies characters as letter- or non-letter-based on `T1` if a classic TEX or pdfTEX is being used. If a Unicode based TEX is detected, the values are instead based on the classification and lower-case mappings provided by the Unicode Character Database [23]. The LATEX team have written a generic loader bundle, unicode-data, which provides the mechanism to load this information directly from the Unicode Character Database data files and which is read when a Unicode-compliant engine is detected during format-building.

Similarly in the default configuration files used by modern TEX distribution, the hyphenation files for each supported language are written in UTF-8 encoding, using Unicode code points for all letters, then if a classic TEX system is detected, some additional macros are loaded to convert these files to 256-character encodings where possible, and assuming the `T1` lowercase table. For Unicode engines no conversion takes place. (The hyphenation patterns for a small number of languages require that some punctuation characters have non-zero c values. This are set during pattern reading, and may at some stage in the future use the e-TEX `\savinghyphcodes` mechanism to avoid any need to manipulate `\lccode` in the document.)

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Appendices

A Example code tables

This appendix contains a table of each font mentioned as an "example" font above, providing that the font was available when the document was processed with LaTeX. (LaTeX generates a warning message for each font it fails to find.)

A.1 Text encodings

cmr10, OT1	*´0*	*´1*	*´2*	*´3*	*´4*	*´5*	*´6*	*´7*	
´00x	Γ	Δ	Θ	Λ	Ξ	Π	Σ	Υ	″0x
´01x	Φ	Ψ	Ω	ff	fi	fl	ffi	ffl	
´02x	ı	ȷ	`	´	ˇ	˘	¯	˚	″1x
´03x	¸	ß	æ	œ	ø	Æ	Œ	Ø	
´04x	˙	!	”	#	$	%	&	’	″2x
´05x	(	)	*	+	,	-	.	/	
´06x	0	1	2	3	4	5	6	7	″3x
´07x	8	9	:	;	¡	=	¿	?	
´10x	@	A	B	C	D	E	F	G	″4x
´11x	H	I	J	K	L	M	N	O	
´12x	P	Q	R	S	T	U	V	W	″5x
´13x	X	Y	Z	[	“	]	^	˙	
´14x	‘	a	b	c	d	e	f	g	″6x
´15x	h	i	j	k	l	m	n	o	
´16x	p	q	r	s	t	u	v	w	″7x
´17x	x	y	z	–	—	˝	~	¨	
	″8	″9	″A	″B	″C	″D	″E	″F	

wnr10, OT2	´0	´1	´2	´3	´4	´5	´6	´7	
´00x	Њ	Љ	Џ	Э	І	Є	Ђ	Ћ	″0x
´01x	њ	љ	џ	э	і	є	ђ	ћ	
´02x	Ю	Ж	Й	Ё	Ѵ	Ѳ	S	Я	″1x
´03x	ю	ж	й	ё	ѵ	ѳ	s	я	
´04x	¨	!	”	Ѣ	˘	%	´	’	″2x
´05x	(	)	*	ѣ	,	-	.	/	
´06x	0	1	2	3	4	5	6	7	″3x
´07x	8	9	:	;	«	ı	»	?	
´10x	ˇ	A	Б	Ц	Д	Е	Ф	Г	″4x
´11x	Х	И	J	К	Л	М	Н	О	
´12x	П	Ч	Р	С	Т	У	В	Щ	″5x
´13x	Ш	Ы	З	[	“	]	Ь	Ъ	
´14x	‘	a	б	ц	д	е	ф	г	″6x
´15x	х	и	j	к	л	м	н	о	
´16x	п	ч	р	с	т	у	в	щ	″7x
´17x	ш	ы	з	–	—	№	ь	ъ	
	″8	″9	″A	″B	″C	″D	″E	″F	

wsuipa10, OT3	´0	´1	´2	´3	´4	´5	´6	´7	
´00x	ɐ	ɑ	ɑ	ɒ	ʌ	ƀ	ƀ	ƀ	″0x
´01x	ɓ	β	ɕ	ɕ	ɕ	ɗ	ɗ	ɗ	
´02x	ɗ	ɖ	ʤ	ð	ᴅ	ə	ɚ	ɘ	″1x
´03x	ɛ	ɜ	ɜ˞	ɞ	ɡ	ɡ	ɢ	ɣ	
´04x	ɣ	ɤ	hʊ	ħ	ɦ	ɧ	ɥ	ɨ	″2x
´05x	ɨ	ɪ	ɪ	ɬ	ɻ	ɬ	ɬ	ɬ	
´06x	ɭ	ɮ	ʎ	ʞ	ɱ	ɯ	ɯ	ɲ	″3x
´07x	ŋ	ɳ	ɴ	⊙	ɵ	ɔ	ɷ	ɷ	
´10x	ɷ	ɸ	ɸ	ɸ	ɾ	ɾ	ɽ	ɹ	″4x
´11x	ɻ	ɻ	ʀ	ʁ	ʂ	ʃ	ʃ	σ	
´12x	ʈ	ʧ	ʇ	θ	ʉ	ʊ	ʊ	ᴜ	″5x
´13x	ʉ	ʋ	ʍ	χ	ʎ	ʏ	ʒ	ʒ	
´14x	ʒ	ʒ	ʔ	ʕ	ƅ	ʔ	ʕ	˽	″6x
´15x	ˈ	ˌ	ˈ	˥	˩	˧	˦	˨	
´16x	ˑ	ː	˙˙	˓	˄	˅	˂	˃	″7x
´17x	˚	˚	˳	~	~	˷	˲	ˆ	
	″8	″9	″A	″B	″C	″D	″E	″F	

plr10, OT4	*´0*	*´1*	*´2*	*´3*	*´4*	*´5*	*´6*	*´7*	
´00x	Γ	Δ	Θ	Λ	Ξ	Π	Σ	Υ	″0x
´01x	Φ	Ψ	Ω	ff	fi	fl	ffi	ffl	
´02x	ı	ȷ	`	´	ˇ	˘	¯	˚	″1x
´03x	¸	ß	æ	œ	ø	Æ	Œ	Ø	
´04x	˝	!	”	#	$	%	&	’	″2x
´05x	(	)	*	+	,	-	.	/	
´06x	0	1	2	3	4	5	6	7	″3x
´07x	8	9	:	;	¡	=	¿	?	
´10x	@	A	B	C	D	E	F	G	″4x
´11x	H	I	J	K	L	M	N	O	
´12x	P	Q	R	S	T	U	V	W	″5x
´13x	X	Y	Z	[	“	]	ˆ	˙	
´14x	‘	a	b	c	d	e	f	g	″6x
´15x	h	i	j	k	l	m	n	o	
´16x	p	q	r	s	t	u	v	w	″7x
´17x	x	y	z	–	—	″	˜	¨	
´20x		Ą	Ć				Ę		″8x
´21x			Ł	Ń					
´22x		Ś							″9x
´23x		Ź		Ż					
´24x		ą	ć				ę		″Ax
´25x			ł	ń			«	»	
´26x		ś							″Bx
´27x		ź		ż					
´30x									″Cx
´31x									
´32x				Ó					″Dx
´33x									
´34x									″Ex
´35x									
´36x				ó					″Fx
´37x								„	
	″8	″9	″A	″B	″C	″D	″E	″F	

ecrm1000, T1	*´0*	*´1*	*´2*	*´3*	*´4*	*´5*	*´6*	*´7*	
´00x	`	´	ˆ	˜	¨	˝	˚	ˇ	˝0x
´01x	˘	¯	˙	¸	˛	,	‹	›	
´02x	“	”	„	«	»	–	—		˝1x
´03x	ı	ȷ	ff	fi	fl	ffi	ffl		
´04x	␣	!	"	#	$	%	&	’	˝2x
´05x	(	)	*	+	,	-	.	/	
´06x	0	1	2	3	4	5	6	7	˝3x
´07x	8	9	:	;	<	=	>	?	
´10x	@	A	B	C	D	E	F	G	˝4x
´11x	H	I	J	K	L	M	N	O	
´12x	P	Q	R	S	T	U	V	W	˝5x
´13x	X	Y	Z	[	\	]	ˆ	_	
´14x	‘	a	b	c	d	e	f	g	˝6x
´15x	h	i	j	k	l	m	n	o	
´16x	p	q	r	s	t	u	v	w	˝7x
´17x	x	y	z	{	|	}	˜	-	
´20x	Ă	Ą	Ć	Č	Ď	Ě	Ę	Ğ	˝8x
´21x	Ĺ	Ľ	Ł	Ń	Ň	Ŋ	Ő	Ŕ	
´22x	Ř	Ś	Š	Ş	Ť	Ţ	Ű	Ů	˝9x
´23x	Ÿ	Ź	Ž	Ż	IJ	İ	đ	§	
´24x	ă	ą	ć	č	ď	ě	ę	ğ	˝Ax
´25x	ĺ	ľ	ł	ń	ň	ŋ	ő	ŕ	
´26x	ř	ś	š	ş	ť	ţ	ű	ů	˝Bx
´27x	ÿ	ź	ž	ż	ij	¡	¿	£	
´30x	À	Á	Â	Ã	Ä	Å	Æ	Ç	˝Cx
´31x	È	É	Ê	Ë	Ì	Í	Î	Ï	
´32x	Đ	Ñ	Ò	Ó	Ô	Õ	Ö	Œ	˝Dx
´33x	Ø	Ù	Ú	Û	Ü	Ý	Þ	SS	
´34x	à	á	â	ã	ä	å	æ	ç	˝Ex
´35x	è	é	ê	ë	ì	í	î	ï	
´36x	ð	ñ	ò	ó	ô	õ	ö	œ	˝Fx
´37x	ø	ù	ú	û	ü	ý	þ	ß	
	˝8	˝9	˝A	˝B	˝C	˝D	˝E	˝F	

larm1000, T2A	*´0*	*´1*	*´2*	*´3*	*´4*	*´5*	*´6*	*´7*	
´00x	`	´	ˆ	˜	¨	˝	°	ˇ	″0x
´01x	˘	¯	˙	¸	˛	I	⟨	⟩	
´02x	“	”	‚	„	…	–	—		″1x
´03x	o	ı	j	ff	fi	fl	ffi	ffl	
´04x	␣	!	"	#	$	%	&	’	″2x
´05x	(	)	*	+	,	-	.	/	
´06x	0	1	2	3	4	5	6	7	″3x
´07x	8	9	:	;	<	=	>	?	
´10x	@	A	B	C	D	E	F	G	″4x
´11x	H	I	J	K	L	M	N	O	
´12x	P	Q	R	S	T	U	V	W	″5x
´13x	X	Y	Z	[	\	]	^	_	
´14x	‘	a	b	c	d	e	f	g	″6x
´15x	h	i	j	k	l	m	n	o	
´16x	p	q	r	s	t	u	v	w	″7x
´17x	x	y	z	{	|	}	~	-	
´20x	Ґ	Ғ	Ҕ	Ћ	Ђ	Ж	Ҙ	Љ	″8x
´21x	Ї	Қ	Ҝ	Ќ	Æ	Ң	Ҥ	S	
´22x	Ө	Ҫ	Ў	Ү	Ұ	Х	Ц	Ч	″9x
´23x	Ҷ	Є	Ә	Њ	Ё	№	¤	§	
´24x	ґ	ғ	ҕ	ћ	h	ж	ҙ	љ	″Ax
´25x	ї	қ	ҝ	ќ	æ	ң	ҥ	s	
´26x	ө	ҫ	ў	ү	ұ	х	ц	ч	″Bx
´27x	ҷ	є	ә	њ	ё	„	«	»	
´30x	А	Б	В	Г	Д	Е	Ж	З	″Cx
´31x	И	Й	К	Л	М	Н	О	П	
´32x	Р	С	Т	У	Ф	Х	Ц	Ч	″Dx
´33x	Ш	Щ	Ъ	Ы	Ь	Э	Ю	Я	
´34x	а	б	в	г	д	е	ж	з	″Ex
´35x	и	й	к	л	м	н	о	п	
´36x	р	с	т	у	ф	х	ц	ч	″Fx
´37x	ш	щ	ъ	ы	ь	э	ю	я	
	″8	″9	″A	″B	″C	″D	″E	″F	

lbrm1000, T2B	*´0*	*´1*	*´2*	*´3*	*´4*	*´5*	*´6*	*´7*	
´00x	`	´	ˆ	˜	¨	˝	˚	ˇ	″0x
´01x	˘	¯	˙	¸	˛	I	⟨	⟩	
´02x	“	”	˛	˷	˘	–	—		″1x
´03x	o	ı	ȷ	ff	fi	fl	ffi	ffl	
´04x	␣	!	"	#	$	%	&	’	″2x
´05x	(	)	*	+	,	-	.	/	
´06x	0	1	2	3	4	5	6	7	″3x
´07x	8	9	:	;	<	=	>	?	
´10x	@	A	B	C	D	E	F	G	″4x
´11x	H	I	J	K	L	M	N	O	
´12x	P	Q	R	S	T	U	V	W	″5x
´13x	X	Y	Z	[	\	]	ˆ	_	
´14x	‘	a	b	c	d	e	f	g	″6x
´15x	h	i	j	k	l	m	n	o	
´16x	p	q	r	s	t	u	v	w	″7x
´17x	x	y	z	{	|	}	˜	-	
´20x	Ғ	Ғ	Ғ	Ҕ	Ћ	Ж	ð	З	″8x
´21x	Љ	Қ	Л	Ҟ	Ј	Ң	Н	Ҥ	
´22x	Ө	Ҁ	Ў	У	Х	Ҳ	Ҳ	Ч	″9x
´23x	Ҷ	Њ	Ә	Є	Ё	№	¤	§	
´24x	ғ	ғ	ғ	ҕ	h	ж	ð	з	″Ax
´25x	љ	қ	л	ҟ	ј	ң	н	ҥ	
´26x	ө	ҁ	ў	у	х	ҳ	ҳ	ч	″Bx
´27x	ҷ	њ	ә	є	ё	„	«	»	
´30x	А	Б	В	Г	Д	Е	Ж	З	″Cx
´31x	И	Й	К	Л	М	Н	О	П	
´32x	Р	С	Т	У	Ф	Х	Ц	Ч	″Dx
´33x	Ш	Щ	Ъ	Ы	Ь	Э	Ю	Я	
´34x	а	б	в	г	д	е	ж	з	″Ex
´35x	и	й	к	л	м	н	о	п	
´36x	р	с	т	у	ф	х	ц	ч	″Fx
´37x	ш	щ	ъ	ы	ь	э	ю	я	
	″8	″9	″A	″B	″C	″D	″E	″F	

lcrm1000, T2C	*´0*	*´1*	*´2*	*´3*	*´4*	*´5*	*´6*	*´7*	
´00x	`	´	ˆ	˜	¨	˝	˚	ˇ	″0x
´01x	˘	¯	˙	¸	˛	I	⟨	⟩	
´02x	“	”	‾	‟	‚	–	—		″1x
´03x	ı	ȷ	ff	fi	fl	ffi	ffl		
´04x	␣	!	"	#	$	%	&	’	″2x
´05x	(	)	*	+	,	-	.	/	
´06x	0	1	2	3	4	5	6	7	″3x
´07x	8	9	:	;	<	=	>	?	
´10x	@	A	B	C	D	E	F	G	″4x
´11x	H	I	J	K	L	M	N	O	
´12x	P	Q	R	S	T	U	V	W	″5x
´13x	X	Y	Z	[	\	]	^	_	
´14x	‘	a	b	c	d	e	f	g	″6x
´15x	h	i	j	k	l	m	n	o	
´16x	p	q	r	s	t	u	v	w	″7x
´17x	x	y	z	{	|	}	~	-	
´20x	Ԥ	Ԧ	Ԩ	Ԫ	Ԭ	Ԯ	Ԯ	Ӡ	″8x
´21x	Ӎ	Ӄ	Ӆ	Ӄ	Ӆ	Ӊ	Ӎ	Ӊ	
´22x	Ө	Ҽ	Ҿ	Ҍ	Ӣ	Ӽ	Ӌ	Ө	″9x
´23x	Ӌ	Ԋ	Ә	Ҕ	Ё	№	¤	§	
´24x	ԥ	ԧ	ԩ	ԫ	h	ԯ	ԯ	ӡ	″Ax
´25x	ӎ	ӄ	ӆ	k	ӆ	ӊ	ӎ	ӊ	
´26x	ө	ҽ	ҿ	ҍ	ӣ	ӽ	ӌ	ө	″Bx
´27x	ӌ	ԋ	ə	ҕ	ё	„	«	»	
´30x	А	Б	В	Г	Д	Е	Ж	З	″Cx
´31x	И	Й	К	Л	М	Н	О	П	
´32x	Р	С	Т	У	Ф	Х	Ц	Ч	″Dx
´33x	Ш	Щ	Ъ	Ы	Ь	Э	Ю	Я	
´34x	а	б	в	г	д	е	ж	з	″Ex
´35x	и	й	к	л	м	н	о	п	
´36x	р	с	т	у	ф	х	ц	ч	″Fx
´37x	ш	щ	ъ	ы	ь	э	ю	я	
	″8	″9	″A	″B	″C	″D	″E	″F	

tipa10, T3	*´0*	*´1*	*´2*	*´3*	*´4*	*´5*	*´6*	*´7*	
´00x	ˋ	´	ˆ	˜	¨	˝	°	ˇ	″0x
´01x	˘	¯	˙	˚	¸	˛	`	´	
´02x	^	¬	␣	¤	)	(	‿	⁀	″1x
´03x	×	ɪ	ȷ	₊	₋	₸	₹	₱	
´04x	′	!	ˈ	˓	˒	ˑ	~	’	″2x
´05x	(	)	*	+	,	-	.	/	
´06x	ħ	i	ʌ	ɜ	ɥ	ɐ	ɒ	ɤ	″3x
´07x	ɵ	ɘ	ː	ˑ	‿	=	⁀	?	
´10x	ə	ɑ	ɓ	ɕ	ð	ɛ	ɸ	ɣ	″4x
´11x	ɦ	ɪ	ɟ	ʁ	ʎ	ɱ	ŋ	ɔ	
´12x	ʔ	ʕ	ɾ	ʃ	θ	ʊ	ʊ	ɯ	″5x
´13x	χ	ʏ	ʒ	[	ˁ	]	˥	˩	
´14x	‘	a	b	c	d	e	f	g	″6x
´15x	h	i	j	k	l	m	n	o	
´16x	p	q	r	s	t	u	v	w	″7x
´17x	x	y	z	‖	|	ǂ	˷	ˌ	
´20x	_	ˍ	╲	╲	╲	ˎ	ˊ	ˊ	″8x
´21x	/	ˍ	ˍ	╲	╲	╲	ˎ	ˊ	
´22x	/	/	∣	∥	↓	↑	↗	↘	″9x
´23x	˩	˥	˷	˜	ˈ	″	˷	˷	
´24x	ƀ	đ	ɖ	ƈ	ᴇ	g	ɭ	ɻ	″Ax
´25x	ɟ	ɻ	ɬ	ʎ	ɤ	ɧ	ɳ	æ	
´26x	ω	ɷ	ʃ	ʈ	ƚ	ʦ	ɥ	ɥ	″Bx
´27x	ʒ	ƨ	ъ	ъ	ʔ	˂	˃	∣	
´30x	ᴀ	ƈ	ʗ	ʠ	ɔ˞	ɐ	ɜ	ɜ˞	″Cx
´31x	ɤ	ɢ	ʃ	ʜ	ɪ	ɟ	ƙ	ʟ	
´32x	ɧ	ɷ	ɓ	ɋ	ɾ	ɹ	ƭ	œ	″Dx
´33x	ɬ	ʧ	ᴜ	ɔ	ʔ	ʕ	ʐ	ɒ	
´34x	ʙ	ɓ	ɗ	ɖ	ʄ	ɢ	æ	ç	″Ex
´35x	ħ	ɟ	ƒ	ɬ	ɬ	ɭ	ɯ	ɳ	
´36x	ɴ	ɲ	ʘ	ɾ	ɹ	ɻ	ʀ	œ	″Fx
´37x	ø	ʂ	ʈ	ʍ	ʐ	ʑ	þ	ʰʊ	
	″8	″9	″A	″B	″C	″D	″E	″F	

fcr10, T4	*´0*	*´1*	*´2*	*´3*	*´4*	*´5*	*´6*	*´7*	
´00x	`	´	ˆ	˜	¨	˝	˚	ˇ	″0x
´01x	˘	¯	˙	¸	˛	,	‹	›	
´02x	“	”	„	«	»	–	—		″1x
´03x	ı	ȷ	ff	fi	fl	ffi	ffl		
´04x	␣	!	"	#	$	%	&	’	″2x
´05x	(	)	*	+	,	-	.	/	
´06x	0	1	2	3	4	5	6	7	″3x
´07x	8	9	:	;	<	=	>	?	
´10x	@	A	B	C	D	E	F	G	″4x
´11x	H	I	J	K	L	M	N	O	
´12x	P	Q	R	S	T	U	V	W	″5x
´13x	X	Y	Z	[	\	]	^	_	
´14x	‘	a	b	c	d	e	f	g	″6x
´15x	h	i	j	k	l	m	n	o	
´16x	p	q	r	s	t	u	v	w	″7x
´17x	x	y	z	{	|	}	~	-	
´20x	Ƀ	Đ	Ɛ	Ǝ	Ƒ	Ğ	Ɣ	Ħ	″8x
´21x	Ƙ	Ɲ	Ɔ	Ń	ſ	Ŋ	Ʊ	Ƴ	
´22x	Ć	Ƥ	Š	Ṅ	N̲	Ș	Ʒ	Ƭ	″9x
´23x	Ė	Ę	Ʈ	Ƭ	ʩ	ʄ	đ	ʼn	
´24x	ɓ	ƈ	ɛ	ə	ʃ	ě	ɣ	ħ	″Ax
´25x	ƙ	ɲ	ɔ	ń	ʃ	ŋ	ʊ	ƴ	
´26x	ć	ƥ	š	ṅ	n̲	ș	ʒ	ƭ	″Bx
´27x	ė	ę	ſ	ƭ	ˮ	¡	¿	’	
´30x	Ƚ	Ị	Ɛ̃	Ã	Ḿ	Õ	Æ	Ç	″Cx
´31x	È	É	Ê	Ë	E̲	Ē	Ẽ	Ĩ	
´32x	Đ	Ñ	Ò	Ȯ	Ô	Õ	Ö	Œ	″Dx
´33x	Ø	Ọ	O̲	Ō	Ǒ	Ụ	Ũ	ˊ	
´34x	ɩ	ị	ɛ̃	ã	ḿ	õ	æ	ç	″Ex
´35x	è	é	ê	ë	e̲	ē	ẽ	ĩ	
´36x	ɖ	ñ	ò	ȯ	ô	õ	ö	œ	″Fx
´37x	ø	ọ	o̲	ō	ǒ	ụ	ũ	ß	
	″8	″9	″A	″B	″C	″D	″E	″F	

vnr10, T5	*´0*	*´1*	*´2*	*´3*	*´4*	*´5*	*´6*	*´7*	
´00x	̀	́	̂	̃	̈	̇	̊	̌	″0x
´01x	̑	̄	̇	̧	̊	̧	‹	›	
´02x	“	”	„	«	»	–	—	∎	″1x
´03x	̨	ı	̉Y	ỷ	Ỵ	ỵ	Đ	đ	
´04x	̵	!	"	#	$	%	&	’	″2x
´05x	(	)	*	+	,	-	.	/	
´06x	0	1	2	3	4	5	6	7	″3x
´07x	8	9	:	;	<	=	>	?	
´10x	@	A	B	C	D	E	F	G	″4x
´11x	H	I	J	K	L	M	N	O	
´12x	P	Q	R	S	T	U	V	W	″5x
´13x	X	Y	Z	[	\	]	̂	_	
´14x	‘	a	b	c	d	e	f	g	″6x
´15x	h	i	j	k	l	m	n	o	
´16x	p	q	r	s	t	u	v	w	″7x
´17x	x	y	z	{	|	}	̃	-	
´20x	À	Á	Ã	Å	Ạ	Â	Ầ	Ấ	″8x
´21x	Ẫ	Ẩ	Ậ	Ă	Ằ	Ắ	Ẵ	Ẳ	
´22x	Ặ	È	É	Ẽ	Ẻ	Ẹ	Ê	Ề	″9x
´23x	Ế	Ễ	Ể	Ệ	Ì	Í	Ĩ	Ỉ	
´24x	à	á	ã	å	ạ	â	ầ	ấ	″Ax
´25x	ẫ	ẩ	ậ	ă	ằ	ắ	ẵ	ẳ	
´26x	ặ	è	é	ẽ	ẻ	ẹ	ê	ề	″Bx
´27x	ế	ễ	ể	ệ	ì	í	ĩ	ỉ	
´30x	Ị	Ò	Ó	Õ	Ỏ	Ọ	Ô	Ồ	″Cx
´31x	Ố	Ỗ	Ổ	Ộ	Ơ	Ờ	Ớ	Ỡ	
´32x	Ở	Ợ	Ù	Ú	Ũ	Ủ	Ụ	Ư	″Dx
´33x	Ừ	Ứ	Ữ	Ử	Ự	Ỳ	Ý	Ỹ	
´34x	ị	ò	ó	õ	ỏ	ọ	ô	ồ	″Ex
´35x	ố	ỗ	ổ	ộ	ơ	ờ	ớ	ỡ	
´36x	ở	ợ	ù	ú	ũ	ủ	ụ	ư	″Fx
´37x	ừ	ứ	ữ	ử	ự	ỳ	ý	ỹ	
	″8	″9	″A	″B	″C	″D	″E	″F	

A.2 Text symbol encodings

The full table for TS1 as provided by European Computer Modern family:

tcrm1000, TS1	*′0*	*′1*	*′2*	*′3*	*′4*	*′5*	*′6*	*′7*	
′00x	`	´	ˆ	˜	¨	˝	˚	ˇ	″0x
′01x	˘	¯	˙	¸	˛	'			
′02x			"			—	—		″1x
′03x	←	→	‿	⁀	‸	‿			
′04x	ƀ				$			'	″2x
′05x			*		,	=	.	/	
′06x	0	1	2	3	4	5	6	7	″3x
′07x	8	9			⟨	–	⟩		
′10x									″4x
′11x						ʊ		◯	
′12x								Ω	″5x
′13x				⟦		⟧	↑	↓	
′14x	`		⋆	○|○	†				″6x
′15x					𝒻	∞	♪		
′16x									″7x
′17x							~	=	
′20x	‿	˘	″	‟	†	‡	‖	‰	″8x
′21x	•	℃	$	¢	f	₡	₩	₦	
′22x	₲	₱	£	₨	⁈	¡	đ	™	″9x
′23x	‰	¶	₿	№	℅	℮	○	℠	
′24x	{	}	¢	£	¤	¥	¦	§	″Ax
′25x	¨	©	ª	ↄ	¬	℗	®	¯	
′26x	°	±	²	³	´	µ	¶	·	″Bx
′27x	※	¹	º	√	¼	½	¾	€	
′30x									″Cx
′31x									
′32x							×		″Dx
′33x									
′34x									″Ex
′35x									
′36x							÷		″Fx
′37x									
	″8	″9	″A	″B	″C	″D	″E	″F	

In contrast typical PostScript fonts usually have incomplete implementations of `TS1` sometimes missing more than half of the glyphs:

ptmr8c, TS1	*´0*	*´1*	*´2*	*´3*	*´4*	*´5*	*´6*	*´7*	
´00x	`	´	ˆ	˜	¨	˝	°	ˇ	″0x
´01x	˘	¯	˙	¸	˛	,			
´02x			„			—	—		″1x
´03x	■	■	■	■	■	■			
´04x	■				$			'	″2x
´05x			*		,	■	.	/	
´06x	■	■	■	■	■	■	■	■	″3x
´07x	■	■			■	–	■		
´10x									″4x
´11x						■		■	
´12x								■	″5x
´13x				⟦		⟧	■	■	
´14x	`		■	■	■				″6x
´15x					■	■	■		
´16x									″7x
´17x							~	■	
´20x	˘	ˇ	˝	`	†	‡	‖	‰	″8x
´21x	•	°C	■	■	*f*	■	■	■	
´22x	■	■	■	■	■	■	■	™	″9x
´23x	■	■	■	■	■	■	■	■	
´24x	■	■	¢	£	¤	¥	¦	§	″Ax
´25x	¨	©	ª	■	¬	■	®	¯	
´26x	°	±	2	3	´	µ	¶	·	″Bx
´27x	■	1	º	■	¼	½	¾	€	
´30x									″Cx
´31x									
´32x							×		″Dx
´33x									
´34x									″Ex
´35x									
´36x							÷		″Fx
´37x									
	″8	″9	″A	″B	″C	″D	″E	″F	

tipx10, TS3	*´0*	*´1*	*´2*	*´3*	*´4*	*´5*	*´6*	*´7*	
´00x	ˍ	ˌ	ˎ	ˏ	˚	˞	˟	↓	″0x
´01x	↑	→	↔						
´02x									″1x
´03x									
´04x	ɑ̥	ɑ	ɐ	ɟ	ɕ	ʃ	ɕ	ɗ	″2x
´05x	ɗ	ɖ	e̥	ɛ̥	ɣ	ʏ	ɣ	ɦ̥	
´06x	ɧ	ɪ	ɟ	ʃ	ɱ	ɲ	ŋ	ɸ	″3x
´07x	ɸ	⊙	ɸ	ɷ	ɸ	ɸ	ɬ	ɬ	
´10x	ɮ	ƨ	ƨ	ɛ	ɓ	ƙ	ǀ	ǁ	″4x
´11x	ǂ	ƚ							
´12x	ƀ	ƀ	ƀ	ƀ	ʔ	ʔ	ʔ		″5x
´13x									
´14x									″6x
´15x									
´16x	∀	Ɑ	Δ	F	K	Ж	ſ	M	″7x
´17x	P	Q	Я	∩					
	″8	″9	″A	″B	″C	″D	″E	″F	

A.3 Extended text encodings

rxrm1000, X2	´0	´1	´2	´3	´4	´5	´6	´7	
´00x	`	´	ˆ	˜	¨	˝	°	ˇ	″0x
´01x	˘	¯	˙	¸	˛	I	⟨	⟩	
´02x	“	”	‾	‾	‾	–	—		″1x
´03x	₀	`	´	-	δ	δ	Ӈ	ӈ	
´04x	␣	!	"	#	$	%	&	’	″2x
´05x	(	)	*	+	,	-	.	/	
´06x	0	1	2	3	4	5	6	7	″3x
´07x	8	9	:	;	<	=	>	?	
´10x	@	Æ	Ђ	Ћ	Ҽ	Ҿ	Ќ	Ќ	″4x
´11x	Ӆ	I	J	Љ	Ӎ	Њ	Ԛ	Ԝ	
´12x	Ҏ	Q	Ҭ	S	Ҵ	Ҷ	Ч	W	″5x
´13x	Ѣ	Ѫ	V	[	\	]	^	_	
´14x	‘	æ	ђ	ћ	ҽ	ҿ	ќ	ќ	″6x
´15x	ӆ	i	j	љ	ӎ	њ	ԛ	ԝ	
´16x	ҏ	q	ҭ	s	ҵ	ҷ	ч	w	″7x
´17x	ѣ	ѫ	v	{		}	~	-	
´20x	Ґ	Ғ	Ӷ	Ҕ	Һ	Ӂ	Ҙ	Ӡ	″8x
´21x	Ї	Ҟ	Ҡ	Ҝ	Ӆ	Ң	Ҥ	Ӊ	
´22x	Ө	Ҫ	Ў	Ү	Ұ	Ҳ	Ҳ	Ҷ	″9x
´23x	Ҷ	Є	Ә	Ҽ	Ё	№	¤	§	
´24x	ґ	ғ	ӷ	ҕ	h	ӂ	ҙ	ӡ	″Ax
´25x	ї	ҟ	ҡ	ҝ	ӆ	ң	ҥ	ӊ	
´26x	ө	ҫ	ў	ү	ұ	ҳ	ҳ	ҷ	″Bx
´27x	ҷ	є	ә	ҽ	ё	„	«	»	
´30x	А	Б	В	Г	Д	Е	Ж	З	″Cx
´31x	И	Й	К	Л	М	Н	О	П	
´32x	Р	С	Т	У	Ф	Х	Ц	Ч	″Dx
´33x	Ш	Щ	Ъ	Ы	Ь	Э	Ю	Я	
´34x	а	б	в	г	д	е	ж	з	″Ex
´35x	и	й	к	л	м	н	о	п	
´36x	р	с	т	у	ф	х	ц	ч	″Fx
´37x	ш	щ	ъ	ы	ь	э	ю	я	
	″8	″9	″A	″B	″C	″D	″E	″F	

A.4 Mathematical encodings

cmmi10, OML	´0	´1	´2	´3	´4	´5	´6	´7	
´00x	Γ	Δ	Θ	Λ	Ξ	Π	Σ	Υ	″0x
´01x	Φ	Ψ	Ω	α	β	γ	δ	ϵ	
´02x	ζ	η	θ	ι	κ	λ	μ	ν	″1x
´03x	ξ	π	ρ	σ	τ	υ	ϕ	χ	
´04x	ψ	ω	ε	ϑ	ϖ	ϱ	ς	φ	″2x
´05x	$\leftharpoonup$	$\leftharpoondown$	$\rightharpoonup$	$\rightharpoondown$	‘	’	$\triangleright$	$\triangleleft$	
´06x	0	1	2	3	4	5	6	7	″3x
´07x	8	9	.	,	<	/	>	$\star$	
´10x	∂	A	B	C	D	E	F	G	″4x
´11x	H	I	J	K	L	M	N	O	
´12x	P	Q	R	S	T	U	V	W	″5x
´13x	X	Y	Z	$\flat$	$\natural$	$\sharp$	$\smile$	$\frown$	
´14x	ℓ	a	b	c	d	e	f	g	″6x
´15x	h	i	j	k	l	m	n	o	
´16x	p	q	r	s	t	u	v	w	″7x
´17x	x	y	z	$\imath$	$\jmath$	$\wp$	$\vec{}$	$\frown$	
	″8	″9	″A	″B	″C	″D	″E	″F	

cmsy10, OMS	´0	´1	´2	´3	´4	´5	´6	´7	
´00x	$-$	$\cdot$	$\times$	$*$	$\div$	$\diamond$	$\pm$	$\mp$	″0x
´01x	$\oplus$	$\ominus$	$\otimes$	$\oslash$	$\odot$	$\bigcirc$	$\circ$	$\bullet$	
´02x	$\asymp$	$\equiv$	$\subseteq$	$\supseteq$	$\leq$	$\geq$	$\preceq$	$\succeq$	″1x
´03x	$\sim$	$\approx$	$\subset$	$\supset$	$\ll$	$\gg$	$\prec$	$\succ$	
´04x	$\leftarrow$	$\rightarrow$	$\uparrow$	$\downarrow$	$\leftrightarrow$	$\nearrow$	$\searrow$	$\simeq$	″2x
´05x	$\Leftarrow$	$\Rightarrow$	$\Uparrow$	$\Downarrow$	$\Leftrightarrow$	$\nwarrow$	$\swarrow$	$\propto$	
´06x	$\prime$	∞	$\in$	$\ni$	$\triangle$	$\triangledown$	/	ı	″3x
´07x	$\forall$	$\exists$	$\neg$	$\emptyset$	$\Re$	$\Im$	$\top$	$\bot$	
´10x	$\aleph$	$\mathcal{A}$	$\mathcal{B}$	$\mathcal{C}$	$\mathcal{D}$	$\mathcal{E}$	$\mathcal{F}$	$\mathcal{G}$	″4x
´11x	$\mathcal{H}$	$\mathcal{I}$	$\mathcal{J}$	$\mathcal{K}$	$\mathcal{L}$	$\mathcal{M}$	$\mathcal{N}$	$\mathcal{O}$	
´12x	$\mathcal{P}$	$\mathcal{Q}$	$\mathcal{R}$	$\mathcal{S}$	$\mathcal{T}$	$\mathcal{U}$	$\mathcal{V}$	$\mathcal{W}$	″5x
´13x	$\mathcal{X}$	$\mathcal{Y}$	$\mathcal{Z}$	$\cup$	$\cap$	$\uplus$	$\wedge$	$\vee$	
´14x	$\vdash$	$\dashv$	$\lfloor$	$\rfloor$	$\lceil$	$\rceil$	{	}	″6x
´15x	$\langle$	$\rangle$	$\mid$	$\parallel$	$\updownarrow$	$\Updownarrow$	$\backslash$	$\wr$	
´16x	$\surd$	$\amalg$	∇	$\int$	$\sqcup$	$\sqcap$	$\sqsubseteq$	$\sqsupseteq$	″7x
´17x	§	†	‡	¶	♣	♢	♡	♠	
	″8	″9	″A	″B	″C	″D	″E	″F	

cmex10, OMX	′0	′1	′2	′3	′4	′5	′6	′7	
′00x	(	)	[	]	⌊	⌋	⌈	⌉	″0x
′01x	{	}	⟨	⟩	∣	∥	/	\	
′02x	(	)	(	)	[	]	⌊	⌋	″1x
′03x	⌈	⌉	{	}	⟨	⟩	/	\	
′04x	(	)	[	]	⌊	⌋	⌈	⌉	″2x
′05x	{	}	⟨	⟩	/	\	/	\	
′06x	⎛	⎞	⎡	⎤	⎣	⎦	∣	∣	″3x
′07x	⎛	⎞	⎡	⎤	⎧	⎫	∣	∣	
′10x	⎝	⎠	∣	∣	⟨	⟩	⊔	⨆	″4x
′11x	∮	∮	⊙	⊙	⊕	⊕	⊗	⊗	
′12x	∑	∏	∫	∪	∩	⊎	∧	∨	″5x
′13x	∑	∏	∫	∪	∩	⊎	∧	∨	
′14x	∐	∐	^	⌢	⌢	~	~	~	″6x
′15x	[	]	⌊	⌋	⌈	⌉	{	}	
′16x	√	√	√	√	√	∣	⌜	∥	″7x
′17x	↑	↓	⌢	⌣	⌣	⌣	⇑	⇓	
	″8	″9	″A	″B	″C	″D	″E	″F	

A.5 Other encodings

ptmr8y, LY1	´0	´1	´2	´3	´4	´5	´6	´7	
´00x					/	·	˝	˛	″0x
´01x	fl				fi				
´02x	ı		`	´	ˇ	˘	¯	°	″1x
´03x	¸	ß	æ	œ	ø	Æ	Œ	Ø	
´04x		!	"	#	$	%	&	’	″2x
´05x	(	)	*	+	,	-	.	/	
´06x	0	1	2	3	4	5	6	7	″3x
´07x	8	9	:	;	<	=	>	?	
´10x	@	A	B	C	D	E	F	G	″4x
´11x	H	I	J	K	L	M	N	O	
´12x	P	Q	R	S	T	U	V	W	″5x
´13x	X	Y	Z	[	\	]	^	_	
´14x	‘	a	b	c	d	e	f	g	″6x
´15x	h	i	j	k	l	m	n	o	
´16x	p	q	r	s	t	u	v	w	″7x
´17x	x	y	z	{	|	}	~	¨	
´20x	Ł	'	,	*f*	„	…	†	‡	″8x
´21x	ˆ	‰	Š	‹	Œ	Ž	^	–	
´22x	ł	‘	’	“	”	•	–	—	″9x
´23x	~	™	š	›	œ	ž	~	Ÿ	
´24x		¡	¢	£	¤	¥	¦	§	″Ax
´25x	¨	©	ª	«	¬		®	¯	
´26x	°	±	²	³	´	µ	¶	·	″Bx
´27x	¸	¹	º	»	¼	½	¾	¿	
´30x	À	Á	Â	Ã	Ä	Å	Æ	Ç	″Cx
´31x	È	É	Ê	Ë	Ì	Í	Î	Ï	
´32x	Ð	Ñ	Ò	Ó	Ô	Õ	Ö	×	″Dx
´33x	Ø	Ù	Ú	Û	Ü	Ý	Þ	ß	
´34x	à	á	â	ã	ä	å	æ	ç	″Ex
´35x	è	é	ê	ë	ì	í	î	ï	
´36x	ð	ñ	ò	ó	ô	õ	ö	÷	″Fx
´37x	ø	ù	ú	û	ü	ý	þ	ÿ	
	″8	″9	″A	″B	″C	″D	″E	″F	

grmn1000, LGR

	´0	´1	´2	´3	´4	´5	´6	´7	
´00x	–	◌͡◌	𝔸	𝔹	𝕏	𝕄	ҭ	ҷ	″0x
´01x	ᵢ	A_I	H_I	Ω_I	A	Ÿ	α	ü	
´02x	◌́	◌̀	ɬ	ʕ	◌̆	ʕ	Ꞇ	ʞ	″1x
´03x	€	‰	ə	ɔ	ʻ	’	◌̑	–	
´04x	◌̋	!	¨	◌̒	◌̓	%	·	ʼ	″2x
´05x	(	)	*	+	,	-	.	/	
´06x	0	1	2	3	4	5	6	7	″3x
´07x	8	9	:	·	ʾ	=	ʾ	;	
´10x	◌̏	A	B	◌̔	Δ	E	Φ	Γ	″4x
´11x	H	I	Θ	K	Λ	M	N	O	
´12x	Π	X	P	Σ	T	Υ	◌̕	Ω	″5x
´13x	Ξ	Ψ	Z	[	◌̗	]	◌̙	◌̚	
´14x	◌̀	α	β	ς	δ	ε	φ	γ	″6x
´15x	η	ι	ϑ	κ	λ	μ	ν	ο	
´16x	π	χ	ρ	σ	τ	υ		ω	″7x
´17x	ξ	ψ	ζ	«	◌̛	»	~	—	
´20x	◌̀	◌́	◌̂	◌̃	◌̄	◌̆	◌̇	◌̈	″8x
´21x	◌́	◌̆	◌̆	◌̃	◌́	◌̆	◌̆	◌̈	
´22x	◌̃	◌̆	◌̆	◌̈	◌̃	◌̆	◌̆	◌̑	″9x
´23x	◌̀	◌́	◌̂		◌̀	◌́	◌̂		
´24x	◌́	◌̆	◌̆	◌̃	◌́	◌̆	◌̆	◌̈	″Ax
´25x	◌̃	◌̆	◌̆	◌̃	◌̃	◌̆	◌̆	◌̈	
´26x	◌̀	◌́	◌̂	◌̃	◌̄	◌̆	◌̇	◌̈	″Bx
´27x	◌́	◌̆	◌̆	◌̃	◌́	◌̆	◌̆	◌̈	
´30x	◌̃	◌̆	◌̆	F	◌̃	◌̆	◌̆		″Cx
´31x	◌̀	◌́	◌̂	◌̃	◌̀	◌́	◌̂	◌̃	
´32x	◌́	◌̆	◌̆	◌̃	◌́	◌̆	◌̆	◌̃	″Dx
´33x	◌̃	◌̆	◌̆	Ï	◌̃	◌̆	◌̆	Ÿ	
´34x	◌̀	◌́	◌̂	◌̃	◌̀	◌́	◌̂	◌̃	″Ex
´35x	◌́	◌̆	◌̆	◌̃	◌́	◌̆	◌̆	◌̃	
´36x	◌̈	◌̆	◌̆	◌̆	◌̈	◌̆	◌̆	◌̆	″Fx
´37x	◌̣	◌̇	◌̇	◌̣	◌̣		◌̆	◌́	
	″8	″9	″A	″B	″C	″D	″E	″F	

wasy10, U	´0	´1	´2	´3	´4	´5	´6	´7	
´00x	△	◁	◁	▷	▷	∴	∽	☎	″0x
´01x	✓	✩	♠	♪	♩	𝅗𝅥	𝅝	♫	
´02x	◀	▶	ϟ	♌	♑	⊗	⊛	♈	″1x
´03x	⌐	♀	♂	¤	⏲	∝	⊰	⌀	
´04x	●	⟳	⟲	○	☾	☽	♁	☿	″2x
´05x	‹	›	ˆ	ˇ	☺	☻	☼	☹	
´06x	℧	⋈	□	◇	⊠	¤	✣	⎔	″3x
´07x	◯	⬡	∼	⇝	⊏	⊐	≲	≳	
´10x	≋	⚹	✳	✡	⬠	⋆	▽	◖	″4x
´11x	◗	◖	◗	▲	▼	§	€	ȝ	
´12x	ɣ	ˎ	ˋ	⌘	ſ	ə	♂	♂	″5x
´13x	ϟ	♄	♆	♅	♇	♉	♊	♋	
´14x	♍	♎	♏	♐	♑	≈	♓	¢	″6x
´15x	‰	þ	Þ	ð	ɔ	◈	⇑	⇓	
´16x	⊟	⊟	∫	∬	∭	∮	∯	∫	″7x
´17x	∬	∭	∮	∯	¦	⊓	□	ɐ	
	″8	″9	″A	″B	″C	″D	″E	″F	

logo10, U	´0	´1	´2	´3	´4	´5	´6	´7	
´00x									″0x
´01x									
´02x									″1x
´03x									
´04x									″2x
´05x									
´06x									″3x
´07x									
´10x		A				E	F		″4x
´11x						M	N	O	
´12x	P			S	T				″5x
´13x									
´14x									″6x
´15x									
´16x									″7x
´17x									
	″8	″9	″A	″B	″C	″D	″E	″F	

B Uppercase and lowercase tables

The following two sets of tables list the `\uppercase` and `\lowercase` values for each position in the LaTeX standard 256-character tables.

Each row of each table lists:

pos	The position in the table (0-255)
lc	The value in the `\lowercase` table at the position (note that value 0 here means that `\lowercase` is ineffective for this character, and hyphenation does not apply to it)
uc	The value in the `\uppercase` table at the position (note that value 0 here means that `\uppercase` is ineffective for this character)
glyphs	The glyphs specified for the T1 encoding for this position, laid out as ⟨*glyph*⟩(⟨*lowercase glyph*⟩/⟨*uppercase glyph*⟩)

pos	lc	uc	glyphs	pos	lc	uc	glyphs	pos	lc	uc	glyphs	pos	lc	uc	glyphs
0	0	0	`(–/–)	32	0	0	␣(–/–)	64	0	0	@(–/–)	96	0	0	‘(–/–)
1	0	0	´(–/–)	33	0	0	!(–/–)	65	97	65	A(a/A)	97	97	65	a(a/A)
2	0	0	ˆ(–/–)	34	0	0	"(–/–)	66	98	66	B(b/B)	98	98	66	b(b/B)
3	0	0	˜(–/–)	35	0	0	#(–/–)	67	99	67	C(c/C)	99	99	67	c(c/C)
4	0	0	¨(–/–)	36	0	0	$(–/–)	68	100	68	D(d/D)	100	100	68	d(d/D)
5	0	0	˝(–/–)	37	0	0	%(–/–)	69	101	69	E(e/E)	101	101	69	e(e/E)
6	0	0	˚(–/–)	38	0	0	&(–/–)	70	102	70	F(f/F)	102	102	70	f(f/F)
7	0	0	ˇ(–/–)	39	0	0	’(–/–)	71	103	71	G(g/G)	103	103	71	g(g/G)
8	0	0	˘(–/–)	40	0	0	((–/–)	72	104	72	H(h/H)	104	104	72	h(h/H)
9	0	0	¯(–/–)	41	0	0	)(–/–)	73	105	73	I(i/I)	105	105	73	i(i/I)
10	0	0	˙(–/–)	42	0	0	*(–/–)	74	106	74	J(j/J)	106	106	74	j(j/J)
11	0	0	¸(–/–)	43	0	0	+(–/–)	75	107	75	K(k/K)	107	107	75	k(k/K)
12	0	0	˛(–/–)	44	0	0	,(–/–)	76	108	76	L(l/L)	108	108	76	l(l/L)
13	0	0	,(–/–)	45	45	0	-(-/–)	77	109	77	M(m/M)	109	109	77	m(m/M)
14	0	0	‹(–/–)	46	0	0	.(–/–)	78	110	78	N(n/N)	110	110	78	n(n/N)
15	0	0	›(–/–)	47	0	0	/(–/–)	79	111	79	O(o/O)	111	111	79	o(o/O)
16	0	0	“(–/–)	48	0	0	0(–/–)	80	112	80	P(p/P)	112	112	80	p(p/P)
17	0	0	”(–/–)	49	0	0	1(–/–)	81	113	81	Q(q/Q)	113	113	81	q(q/Q)
18	0	0	„(–/–)	50	0	0	2(–/–)	82	114	82	R(r/R)	114	114	82	r(r/R)
19	0	0	«(–/–)	51	0	0	3(–/–)	83	115	83	S(s/S)	115	115	83	s(s/S)
20	0	0	»(–/–)	52	0	0	4(–/–)	84	116	84	T(t/T)	116	116	84	t(t/T)
21	0	0	–(–/–)	53	0	0	5(–/–)	85	117	85	U(u/U)	117	117	85	u(u/U)
22	0	0	—(–/–)	54	0	0	6(–/–)	86	118	86	V(v/V)	118	118	86	v(v/V)
23	23	0	(/–)	55	0	0	7(–/–)	87	119	87	W(w/W)	119	119	87	w(w/W)
24	0	0	˛(–/–)	56	0	0	8(–/–)	88	120	88	X(x/X)	120	120	88	x(x/X)
25	25	73	ı(ı/I)	57	0	0	9(–/–)	89	121	89	Y(y/Y)	121	121	89	y(y/Y)
26	26	74	ȷ(ȷ/J)	58	0	0	:(–/–)	90	122	90	Z(z/Z)	122	122	90	z(z/Z)
27	27	0	ff(ff/–)	59	0	0	;(–/–)	91	0	0	[(–/–)	123	0	0	{(–/–)
28	0	0	fi(–/–)	60	0	0	<(–/–)	92	0	0	\(–/–)	124	0	0	|(–/–)
29	0	0	fl(–/–)	61	0	0	=(–/–)	93	0	0	](–/–)	125	0	0	}(–/–)
30	0	0	ffi(–/–)	62	0	0	>(–/–)	94	0	0	ˆ(–/–)	126	0	0	~(–/–)
31	0	0	ffl(–/–)	63	0	0	?(–/–)	95	0	0	_(–/–)	127	127	0	-(-/–)

pos	lc	uc	glyphs
128	160	128	Ă(ă/Ă)
129	161	129	Ą(ą/Ą)
130	162	130	Ć(ć/Ć)
131	163	131	Č(č/Č)
132	164	132	Ď(ď/Ď)
133	165	133	Ě(ě/Ě)
134	166	134	Ę(ę/Ę)
135	167	135	Ğ(ğ/Ğ)
136	168	136	Ĺ(ĺ/Ĺ)
137	169	137	Ľ(ľ/Ľ)
138	170	138	Ł(ł/Ł)
139	171	139	Ń(ń/Ń)
140	172	140	Ň(ň/Ň)
141	173	141	Ŋ(ŋ/Ŋ)
142	174	142	Ő(ő/Ő)
143	175	143	Ŕ(ŕ/Ŕ)
144	176	144	Ř(ř/Ř)
145	177	145	Ś(ś/Ś)
146	178	146	Š(š/Š)
147	179	147	Ş(ş/Ş)
148	180	148	Ť(ť/Ť)
149	181	149	Ţ(ţ/Ţ)
150	182	150	Ű(ű/Ű)
151	183	151	Ů(ů/Ů)
152	184	152	Ÿ(ÿ/Ÿ)
153	185	153	Ź(ź/Ź)
154	186	154	Ž(ž/Ž)
155	187	155	Ż(ż/Ż)
156	188	156	IJ(ij/IJ)
157	105	157	İ(i/İ)
158	158	208	đ(đ/Đ)
159	0	0	§(–/–)
160	160	128	ă(ă/Ă)
161	161	129	ą(ą/Ą)
162	162	130	ć(ć/Ć)
163	163	131	č(č/Č)
164	164	132	ď(ď/Ď)
165	165	133	ě(ě/Ě)
166	166	134	ę(ę/Ę)
167	167	135	ğ(ğ/Ğ)
168	168	136	ĺ(ĺ/Ĺ)
169	169	137	ľ(ľ/Ľ)
170	170	138	ł(ł/Ł)
171	171	139	ń(ń/Ń)
172	172	140	ň(ň/Ň)
173	173	141	ŋ(ŋ/Ŋ)
174	174	142	ő(ő/Ő)
175	175	143	ŕ(ŕ/Ŕ)
176	176	144	ř(ř/Ř)
177	177	145	ś(ś/Ś)
178	178	146	š(š/Š)
179	179	147	ş(ş/Ş)
180	180	148	ť(ť/Ť)
181	181	149	ţ(ţ/Ţ)
182	182	150	ű(ű/Ű)
183	183	151	ů(ů/Ů)
184	184	152	ÿ(ÿ/Ÿ)
185	185	153	ź(ź/Ź)
186	186	154	ž(ž/Ž)
187	187	155	ż(ż/Ż)
188	188	156	ij(ij/IJ)
189	0	0	¡(–/–)
190	0	0	¿(–/–)
191	0	0	£(–/–)
192	224	192	À(à/À)
193	225	193	Á(á/Á)
194	226	194	Â(â/Â)
195	227	195	Ã(ã/Ã)
196	228	196	Ä(ä/Ä)
197	229	197	Å(å/Å)
198	230	198	Æ(æ/Æ)
199	231	199	Ç(ç/Ç)
200	232	200	È(è/È)
201	233	201	É(é/É)
202	234	202	Ê(ê/Ê)
203	235	203	Ë(ë/Ë)
204	236	204	Ì(ì/Ì)
205	237	205	Í(í/Í)
206	238	206	Î(î/Î)
207	239	207	Ï(ï/Ï)
208	240	208	Ð(ð/Ð)
209	241	209	Ñ(ñ/Ñ)
210	242	210	Ò(ò/Ò)
211	243	211	Ó(ó/Ó)
212	244	212	Ô(ô/Ô)
213	245	213	Õ(õ/Õ)
214	246	214	Ö(ö/Ö)
215	247	215	Œ(œ/Œ)
216	248	216	Ø(ø/Ø)
217	249	217	Ù(ù/Ù)
218	250	218	Ú(ú/Ú)
219	251	219	Û(û/Û)
220	252	220	Ü(ü/Ü)
221	253	221	Ý(ý/Ý)
222	254	222	Þ(þ/Þ)
223	255	223	SS(ß/SS)
224	224	192	à(à/À)
225	225	193	á(á/Á)
226	226	194	â(â/Â)
227	227	195	ã(ã/Ã)
228	228	196	ä(ä/Ä)
229	229	197	å(å/Å)
230	230	198	æ(æ/Æ)
231	231	199	ç(ç/Ç)
232	232	200	è(è/È)
233	233	201	é(é/É)
234	234	202	ê(ê/Ê)
235	235	203	ë(ë/Ë)
236	236	204	ì(ì/Ì)
237	237	205	í(í/Í)
238	238	206	î(î/Î)
239	239	207	ï(ï/Ï)
240	240	208	ð(ð/Ð)
241	241	209	ñ(ñ/Ñ)
242	242	210	ò(ò/Ò)
243	243	211	ó(ó/Ó)
244	244	212	ô(ô/Ô)
245	245	213	õ(õ/Õ)
246	246	214	ö(ö/Ö)
247	247	215	œ(œ/Œ)
248	248	216	ø(ø/Ø)
249	249	217	ù(ù/Ù)
250	250	218	ú(ú/Ú)
251	251	219	û(û/Û)
252	252	220	ü(ü/Ü)
253	253	221	ý(ý/Ý)
254	254	222	þ(þ/Þ)
255	255	223	ß(ß/SS)