

TIPA: a System for Processing Phonetic Symbols in \LaTeX

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1. Introduction

TIPA¹ is a system for processing IPA (International Phonetic Alphabet) symbols in \LaTeX . It is based on TSIPA² but both METAFONT source codes and \LaTeX macros have been thoroughly rewritten so that it can be considered as a new system.

Among many features of TIPA, the following are the new features as compared with TSIPA or any other existing systems for processing IPA symbols.

- A new 256 character encoding for phonetic symbols ('T3'), which includes all the symbols and diacritics found in the recent versions of IPA and some non-IPA symbols.
- Complete support of $\text{\LaTeX} 2_{\epsilon}$.
- Roman, slanted, bold, bold extended and sans serif font styles.
- Easy input method in the IPA environment.
- Extended macros for accents and diacritics.³

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¹TIPA stands for *TeX IPA* or *Tokyo IPA*. The primary ftp site in which the latest version of TIPA is placed is `ftp://tooyoo.l.u-tokyo.ac.jp/pub/TeX/tipa`, and also it is mirrored onto the directory `fonts/tipa` of the CTAN archives.

²TSIPA was made in 1992 by Kobayashi Hajime, Fukui Rei and Shirakawa Shun. It is available from a CTAN archive.

One problem with TSIPA was that symbols already included in OT1, T1 or Math fonts are excluded, because of the limitation of its 128 character encoding. As a result, a string of phonetic representation had to be often composed of symbols from different fonts, disabling the possibility of automatic inter-word kerning. And also too many symbols had to be realized as macros.

³These macros are now defined in a separate file called 'exaccent.sty' in order for the authors of other packages to be able to make use of them. The idea of separating these macros from other ones was suggested by Frank Mittelbach.

- A flexible system of macros for ‘tone letters’.
- An optional package (`vowel.sty`) for drawing vowel diagrams.⁴
- A slightly modified set of fonts that go well when used with Times Roman and Helvetica fonts.

2. TIPA Encoding

2.1. Selection of symbols

The selection of TIPA phonetic symbols⁵ was made based on the following works.

- *Phonetic Symbol Guide* [9] (henceforth abbreviated as *PSG*).
- The official IPA charts of ’49, ’79, ’89 and ’93 versions.
- Recent articles published in the *JIPA*⁶, such as “Report on the 1989 Kiel Convention” [6], “Further report on the 1989 Kiel Convention” [7], “Computer Codes for Phonetic Symbols” [3], “Council actions on revisions of the IPA” [8], etc.
- An unpublished paper by J. C. Wells: “Computer-coding the IPA: a proposed extension of SAMPA” [10].
- Popular textbooks on phonetics.

More specifically, TIPA contains all the symbols, including diacritics, defined in the ’79, ’89 and ’93 versions of IPA. And in the case of the ’49 version of IPA, which is described in the *Principles* [5], there are too many obsolete symbols and only those symbols that had had some popularity at least for some time or for some group of people are included.

Besides IPA symbols, TIPA also contains symbols that are useful for the following areas of phonetics and linguistics.

- Symbols used in the American phonetics (e.g. æ , ɛ , ɒ , λ , etc.).
- Symbols used in the historical study of Indo-European languages (e.g. ḫ , ṛ , ṣ , ṭ , and accents such as á , ě , etc.).
- Symbols used in the phonetic description of languages in East Asia (e.g. ɿ , ʅ , ɕ , ɲ , ʈ , etc.).
- Diacritics used in ‘extIPA Symbols for Disordered Speech’ [4] and ‘VoQS (Voice Quality Symbols)’ [1] (e.g. ṁ , ṡ , ṣ̌ , etc.).

It should be also noted that TIPA includes all the necessary elements of ‘tone letters’, enabling all the theoretically possible combinations of the tone letter system. In the recent publication of

⁴This package (`vowel.sty`) can be used independently from the TIPA package. Documentation is also made separately in ‘`vowel.tex`’ so that no further mention will be made here.

⁵In the case of TSIPA, the selection of symbols was based on “Computer coding of the IPA: Supplementary Report” [2].

⁶*Journal of the International Phonetic Association*.

the International Phonetic Association tone letters are admitted as an official way of representing tones but the treatment of tone letters is quite insufficient in that only a limited number of combination is allowed. This is apparently due to the fact that there has been no ‘portable’ way of combining symbols that can be used across various computer environments. Therefore \TeX ’s productive system of macro is an ideal tool for handling a system like tone letters.

In the process of writing METAFONT source codes for TIPA phonetic symbols there have been many problems besides the one with the selection of symbols. One of such problems was that sometimes the exact shape of a symbol was unclear. For example, the shapes of the symbols such as $\text{\textcircled{C}}$ (Stretched C), $\text{\textcircled{j}}$ (Curly-tail J) differ according to sources. This is partly due to the fact that the IPA has been continuously revised for the past few decades, and partly due to the fact that different ways of computerizing phonetic symbols on different systems have resulted in the diversity of the shapes of phonetic symbols.

Although there is no definite answer to such a problem yet, it seems to me that it is a privilege of those working with METAFONT to have a systematic way of controlling the shapes of phonetic symbols.

2.2. Encoding

The 256 character encoding of TIPA is now officially called the ‘T3’ encoding.⁷ In deciding this new encoding, care is taken to harmonize with existing other encodings, especially with the T1 encoding. Also the easiness of inputting phonetic symbols is taken into consideration in such a way that frequently used symbols can be input with small number of keystrokes.

Table 1 shows the layout of the T3 encoding.

The basic structure of the encoding found in the first half of the table (character codes ‘000–‘177) is based on normal text encodings (ASCII, OT1 and T1) in that sectioning of this area into several groups such as the section for accents and diacritics, the section for punctuation marks, the section for numerals, the sections for uppercase and lowercase letters is basically the same with these encodings.

Note also that the T3 encoding contains not only phonetic symbols but also usual punctuation marks that are used with phonetic symbols, and in such cases the same codes are assigned as the normal text encodings. However it is a matter of trade-off to decide which punctuation marks are to be included. For example ‘:’ and ‘;’ might have been preserved in T3 but in this case ‘:’ has been traditionally used as a substitute for the length mark ‘ˈ’ so that I decided to exclude ‘:’ in favor of the easiness of inputting the length mark by a single keystroke.

The encoding of the section for accents and diacritics is closely related to T1 in that the accents commonly included in T1 and T3 have the same encoding.

The sections for numerals and uppercase letters are filled with phonetic symbols that are used frequently in many languages, because numerals and uppercase letters are usually not used as phonetic symbols. And the assignments made here are used as the ‘shortcut characters’, which will be explained in the section entitled “Ordinary phonetic symbols” (page 8).

As for the section for uppercase letters in the usual text encoding, a series of discussion among the members of the `ling-tex` mailing list revealed that there seem to be a certain amount of

⁷In a discussion with the \LaTeX 2_ε team it was suggested that the 128 character encoding used in WSUIPA would be referred to as the OT3 encoding.

	'0	'1	'2	'3	'4	'5	'6	'7
'00x	Accents and diacritics							
'04x								
'05x	Punctuation marks							
'06x	Basic IPA symbols I (vowels)							
'07x								
'10x	Basic IPA symbols II							
'13x								
'14x	Punct.	Basic IPA symbols III (lowercase letters)						
'17x	Diacritics							
'20x	Tone letters and other suprasegmentals							
'23x								
'24x	Old IPA, non-IPA symbols							
'27x								
'30x	Extended IPA symbols							
'33x								
'34x	Basic IPA symbols IV							
'37x								

Table 1: Layout of the T3 encoding

consensus on what symbols are to be assigned to each code. For example they were almost unanimous for the assignments such as α for A, β for B, δ for D, \int for S, θ for T, etc. For more details, see table 2.

The encoding of the section for numerals was more difficult than the above case. One of the possibilities was to assign symbols based on the resemblance of shapes. One can easily think of assignments such as 3 for 3 6 for 6, etc. But the resemblance of shape alone does not serve as a criteria for all the assignments. So I decided to assign basic vowel symbols to this section.⁸ Fortunately the resemblance of shape is to some extent maintained as is shown in table 2.

The encoding of the section for lowercase letters poses no problem since they are all used as phonetic symbols. Only one symbol, namely 'g', needs some attention because its shape should

⁸This idea was influenced by the above mentioned article by J. C. Wells [10].

<i>ASCII</i>	:	:	:	:	:	:	:	:	:
<i>TIPA</i>	:	:	:	:	:	:	:	:	:
<i>ASCII</i>	0	1	2	3	4	5	6	7	8
<i>TIPA</i>	h	i	l	z	u	e	d	r	o
<i>ASCII</i>	@	A	B	C	D	E	F	G	H
<i>TIPA</i>	a	a	b	c	d	e	f	g	h
<i>ASCII</i>	J	K	L	M	N	O	P	Q	R
<i>TIPA</i>	j	k	l	m	n	o	p	q	r
<i>ASCII</i>	T	U	V	W	X	Y	Z		
<i>TIPA</i>	t	u	v	w	x	y	z		

Table 2: TIPA shortcut characters

be ‘g’, rather than ‘g’, as a phonetic symbol.⁹

The second half of the table (character codes ‘200–‘377) is divided into four sections. The first section is devoted to the elements of tone letters and other suprasegmental symbols.

Among the remaining three sections the last section ‘340–‘377 contains more basic symbols than the other two sections. This is a result of assigning the same character codes as latin-1 (ISO8859-1) and T1 encodings to the symbols that are commonly included in TIPA, latin-1 and T1 encoded fonts.¹⁰ These are the cases of æ, ø, œ, ç and þ. And within each section symbols are arranged largely in alphabetical order.

For a table of the T3 encoding, see Appendix C (page 43).

3. Installation

First, copy all the package and font description files (`tipa.sty`, `tone.sty`, `vowel.sty`, `*.fd`, `*.def`) to a directory which \TeX programs can find. In an ordinary Unix environment, it is recommended to create a directory such as `/usr/local/lib/texmf/tex/tipa` and copy all these files into this directory.

```
mkdir /usr/local/lib/texmf/tex/tipa
cp tipa.sty tone.sty vowel.sty /usr/local/lib/texmf/tex/tipa
cp *.fd *.def /usr/local/lib/texmf/tex/tipa
```

Next, copy all the TFM files to a directory which \TeX and device driver programs can find.

```
mkdir /usr/local/lib/texmf/fonts/public/tipa
mkdir /usr/local/lib/texmf/fonts/public/tipa/tfm
cp *.tfm /usr/local/lib/texmf/fonts/public/tipa/tfm
```

It is also recommended to copy all the METAFONT source files into an appropriate directory.

⁹But the alternative shape ‘g’ is preserved in other section and can be used as `\textg`.

¹⁰This is based on a suggestion by Jörg Knappen.

<i>Magnification</i>	<i>font name</i>
(mag=1)	tipa8, tipa9, tipa10, tipa12, tipasl8, tipasl9, tipasl10, tipasl12, tipabx8, tipabx9, tipabx10, tipabx12, tipass8, tipass9, tipass10, tipass12
mag=5/8	tipa8, tipasl8, tipabx8, tipass8
mag=6/8	tipa8, tipasl8, tipabx8, tipass8
mag=7/8	tipa8, tipasl8, tipabx8, tipass8
mag=magstep.5	tipa10, tipasl10, tipabx10, tipass10
mag=magstep1	tipa12, tipasl12, tipabx12, tipass12
mag=magstep2	tipa12, tipasl12, tipabx12, tipass12
mag=magstep3	tipa12, tipasl12, tipabx12, tipass12
mag=magstep4	tipa12, tipasl12, tipabx12, tipass12

Table 3: Full set of TIPA fonts

```
mkdir /usr/local/lib/texmf/fonts/public/tipa/src
cp *.mf /usr/local/lib/texmf/fonts/public/tipa/src
```

The final step of installation is that of PK font files. This procedure may differ according to the user's computer environment.

For users unfamiliar with running METAFONT programs, it is possible to get pre-compiled PK font files from ftp sites. In this case, just copy them to an appropriate directory.

```
mkdir /usr/local/lib/texmf/fonts/public/tipa/pk
mkdir /usr/local/lib/texmf/fonts/public/tipa/pk/your_mode_name
cp *pk /usr/local/lib/texmf/fonts/public/tipa/pk/your_mode_name
```

If you make PK fonts by yourself, generate fonts shown in table 3 by the METAFONT program.

The bold font `tipab10` and fonts of `xipa` family are not included in this table. Make PK files for these fonts by yourself if you need them.

In the Unix environment, all these fonts can be automatically generated by running the shell script `makepk1.sh`. And a set of `xipa` family fonts can be generated by running the shell script `makepk2.sh`.

Also, if you are using MakeTeXPK, it is not necessary to generate all these size variations at once.

4. TIPA fonts

This version of TIPA includes two families of IPA fonts, `tipa` and `xipa`. The former family of fonts is for normal use with \LaTeX , and the latter family is intended to be used with `'times.sty'`(PSNFSS). They all have the same T3 encoding as explained in the previous section.

- tipa

Roman: tipa8, tipa9, tipa10, tipa12, tipa17

Slanted: tipasl8, tipasl9, tipasl10, tipasl12

Bold extended: tipabx8, tipabx9, tipabx10, tipabx12

Sans serif: tipass8, tipass9, tipass10, tipass12, tipass17

Bold: tipab10

- xipa

Roman: xipa10

Slanted: xipas110

Bold: xipab10

Sans serif: xipass10

All these fonts are made by METAFONT, based on the Computer Modern font series. In the case of the xipa series, parameters are adjusted so as to look fine when used with Times Roman (in the cases of xipa10, xipas110, xipab10) and Helvetica (in the case of xipass10).

5. Usage

5.1. Declaration of TIPA package

In order to use TIPA, first declare TIPA package at the preamble of a document.

```
\documentclass{article}
\usepackage{tipa}
```

5.2. Encoding options

The above declaration uses OT1 as the default text encoding. If you want to use TIPA symbols with T1, specify the option ‘T1’.

```
\documentclass{article}
\usepackage[T1]{tipa}
```

If you want to use a more complex form of encoding, declare the use of fontenc package by yourself and specify the option ‘noenc’. In this case the option ‘T3’, which represents the TIPA encoding, must be included as an option to the fontenc package. For example, if you want to use TIPA and the University Washington Cyrillic (OT2) with the T1 text encoding, the following command will do this.

```
\documentclass{article}
\usepackage[T3,OT2,T1]{fontenc}
\usepackage[noenc]{tipa}
```

By default, TIPA includes the fontenc package internally but the option noenc suppresses this.

5.3. Using TIPA with PSNFSS

In order to use TIPA with `times.sty`, declare the use of `times.sty` before declaring `tipa` packages.

```
\documentclass{article}
\usepackage{times}
\usepackage{tipa}
```

Font description files `T3ptm.fd` and `T3phv.fd` are automatically loaded by the above declaration.

5.4. Other options

TIPA can be extended by the options `tone`, `extra`.

If you want to use the optional package for ‘tone letters’, add ‘`tone`’ option to the `\usepackage` command that declares `tipa` package.

```
\usepackage[tone]{tipa}
```

And if you want to use diacritics for extIPA and VoQS, specify ‘`extra`’ option.

```
\usepackage[extra]{tipa}
```

Finally there is one more option called ‘`safe`’, which is used to suppress definitions of some possibly ‘dangerous’ commands of TIPA.

```
\usepackage[safe]{tipa}
```

More specifically, the following commands are suppressed by declaring the `safe` option. Explanation on the function of each command will be given later.

- `\s` (equivalent to `\textsyllabic`)
- `*` (already defined in plain $\text{T}_{\text{E}}\text{X}$)
- `\|`, `\:`, `\;`, `\!` (already defined in $\text{L}^{\text{A}}\text{T}_{\text{E}}\text{X}$)

6. Input Commands for Phonetic Symbols

6.1. Ordinary phonetic symbols

TIPA phonetic symbols can be input by the following two ways.

- (1) Input macro names in the normal text environment.
- (2) Input macro names or *shortcut characters* within the following groups or environment.

- `\textipa{...}`¹¹
- `{\tipaencoding ...}`
- `\begin{IPA} ... \end{IPA}`

(These groups and environment will be henceforth referred to as the *IPA environment*.)

A shortcut character refers to a single character that is assigned to a specific phonetic symbol and that can be directly input by an ordinary keyboard. In TIPA fonts, the character codes for numerals and uppercase letters in the normal ASCII encoding are assigned to such shortcut characters, because numerals and uppercase letters are usually not used as phonetic symbols. And additional shortcut characters for symbols such as æ, œ, ø may also be used if you are using a T1 encoded font and an appropriate input system for it.

The following pair of examples show the same phonetic transcription of an English word that are input by the above mentioned two input methods.

Input 1: `[\textsecstress \textepsilon kspl \textschwa
\textprimstress ne \textsci \textesh \textschwa n]`

Output 1: `[,ɛksplə'neɪʃən]`

Input 2: `\textipa{ [" "EkspI@ "neIS@n] }`

Output 2: `[,ɛksplə'neɪʃən]`

It is apparent that inputting in the IPA environment is far easier than in the normal text environment. Moreover, although the outputs of the above examples look almost the same, they are *not* identical, exactly speaking. This is because in the IPA environment automatic kerning between symbols is enabled, as is illustrated by the following pair of examples.

Input 1: `v \textturnv v w \textscaw y \textturny y [\textesh]`

Output 1: `vAv wAw yAy [f]`

Input 2: `\textipa{ v2v w \textscaw yLy [S] }`

Output 2: `vAv wAw yAy [f]`

Table 2 shows most of the shortcut characters together with the corresponding characters in the ASCII encoding.

6.2. Naming of phonetic symbols

Every TIPA phonetic symbol has a unique symbol name, such as *Turned A*, *Hooktop B*, *Schwa*.¹² Also each symbol has a corresponding control sequence name, such as `\textturna`, `\texthtb`, `\textschwa`. The name used as a control sequence is usually an abbreviated form of the corresponding symbol name with a prefix `\text`. The conventions used in the abbreviation are as follows.

¹¹I personally prefer a slightly shorter name like `\ipa` rather than `\textipa` but this command was named after the general convention of L^AT_EX 2_ε. The same can be said to all the symbol names beginning with `\text`.

¹²The naming was made based on the literature listed in the section entitled “Selection of Symbols” (page 2). And users of TSIPA should be careful because TIPA’s naming is slightly modified from that of TSIPA.

<i>Symbol name</i>	<i>Macro name</i>	<i>Symbol</i>
Turned A	<code>\textturna</code>	ɐ
Glottal Stop	<code>\textglotstop</code>	ʔ
Right-tail D	<code>\texttrtaild</code>	ɖ
Small Capital G	<code>\textscg</code>	ɡ
Hooktop B	<code>\texthtb</code>	ɸ
Curly-tail C	<code>\textctc</code>	ç
Crossed H	<code>\textcrh</code>	ħ
Old L-Yogh Ligature	<code>\textOlyoghlig</code>	ȝ
Beta	<code>\textbeta</code>	β

Table 4: Naming of TIPA symbols

- Suffixes and endings such as ‘-ive’, ‘-al’, ‘-ed’ are omitted.
- ‘right’, ‘left’ are abbreviated to `r`, `l` respectively.
- For ‘small capital’ symbols, prefix `sc` is added.
- A symbol with a hooktop is abbreviated as `ht...`
- A symbol with a curly-tail is abbreviated as `ct...`
- A ‘crossed’ symbol is abbreviated as `cr...`
- A ligature is abbreviated as `...lig`.
- For an old version of a symbol, prefix `O` is added.

Note that the prefix `O` (old) should be given in uppercase letter.

Table 4 shows some examples of correspondence between symbol names and control sequence names.

6.3. Ligatures

Just like the symbols such as “, ”, –, —, fi, ff are realized as ligatures by inputting ``, ’, --, ---, fi, ff` in $\text{T}_{\text{E}}\text{X}$, two of the TIPA symbols, namely *Secondary Stress* and *Double Pipe*, and double quotation marks¹³ can be input as ligatures in the IPA environment.

Input: `\textipa{" " | | `` ''}`
Output: ‘ ’ || “ ”

6.4. Special macros `*`, `\;`, `\:` and `\!`

TIPA defines `*`, `\;`, `\:` and `\!` as special macros in order to easily input phonetic symbols that do not have a shortcut character explained above. Before explaining how to use these macros, it

¹³Although TIPA fonts do not include the symbols “ and ”, a negative value of kerning is automatically inserted between ‘ and ‘, ’ and ’, so that the same results can be obtained as in the case of the normal text font.

is necessary to note that these macros are primarily intended to be used by linguists who usually do not care about things in math mode. And they can be ‘dangerous’ in that they override existing L^AT_EX commands used in the math mode. So if you want to preserve the original meaning of these commands, declare the option ‘safe’ at the preamble.

The macro * is used in three different ways. First, when this macro is followed by one of the letters f, k, r, t or w, it results in a turned symbol.¹⁴

Input: \textipa{*f *k *r *t *w}

Output: ɸ ɣ ɹ ɹ̥ ɹ̥̥

Secondly, when this macro is followed by one of the letters j, n, h, l or z, it results in a frequently used symbol that has otherwise no easy way to input.

Input: \textipa{*j *n *h *l *z}

Output: ɟ ɲ ɦ ɭ ʒ

Thirdly, when this macro is followed by letters other than the above cases, they are turned into the symbols of the default text font. This is useful in the IPA environment to select symbols temporarily from the normal text font.

Input: \textipa{*A dOg, *B k\ae{}t, ma\super{*{214}}}

Output: A dɔg, B kæt, ma²¹⁴

The remaining macros \;, \: and \! are used to make small capital symbols, retroflex symbols, and implosives or clicks, respectively.

Input: \textipa{\;B \;E \;A \;H \;L \;R}

Output: B E A H L R

Input: \textipa{\:d \:l \:n \:r \:s \:z}

Output: ɖ ɭ ɳ ʂ ʐ

Input: \textipa{\!b \!d \!g \!j \!G \!o}

Output: ɓ ɗ ɡ ʄ ɠ ɔ

6.5. Punctuation marks

The following punctuation marks and text symbols that are normally included in the text encoding are also included in the T3 encoding so that they can be directly input in the IPA environment.

Input: \textipa{! ' () * + , - . \ / = ?
[] ` }

Output: ! ' () * + , - . / = ? [] `

¹⁴This idea was pointed out by Jörg Knappen.

<i>Input in the normal text environment</i>	<i>Input in the IPA environment</i>	<i>Output</i>
<code>\'a</code>	<code>\'a</code>	á
<code>\"a</code>	<code>\"a</code>	ä
<code>\ a</code>	<code>\~a</code>	ã
<code>\r{a}</code>	<code>\r{a}</code>	â
<code>\textsyllabic{m}</code>	<code>\s{m}</code>	ṁ
<code>\textsubumlaut{a}</code>	<code>\"*a</code>	Ḃ
<code>\textsubtilde{a}</code>	<code>\~*a</code>	Ḃ
<code>\textsubring{a}</code>	<code>\r*a</code>	Ḃ
<code>\textdotacute{e}</code>	<code>\.'e</code>	ě
<code>\textgravedot{e}</code>	<code>\'e</code>	ë
<code>\textacutemacron{a}</code>	<code>\'=a</code>	ǎ
<code>\textcircumdot{a}</code>	<code>\^a</code>	â
<code>\texttildedot{a}</code>	<code>\~a</code>	ã
<code>\textbrevevamacron{a}</code>	<code>\u=a</code>	ǣ

Table 5: Examples of inputting accents

All the other punctuation marks and text symbols that are not included in T3 need to be input with a prefix `*` explained in the last section when they appear in the IPA environment.

Input: `\textipa{*; *: \@ *\# *\$ *\& *\% *\{ *\}}`
Output: `;: @ # $ & % { }`

6.6. Accents and diacritics

Table 5 shows how to input accents and diacritics in TIPA with some examples. Here again, there are two kinds of input methods; one for the normal text environment, and the other for the IPA environment.

In the IPA environment, most of the accents and diacritics can be input more easily than in the normal text environment, especially in the cases of subscript symbols that are normally placed over a symbol and in the cases of combined accents, as shown in the table.

As can be seen by the above examples, most of the accents that are normally placed over a symbol can be placed under a symbol by adding an `*` to the corresponding accent command in the IPA environment.

The advantage of IPA environment is further exemplified by the all-purpose accent `\|`, which is used as a macro prefix to provide shortcut inputs for the diacritics that otherwise have to be input by lengthy macro names. Table 6 shows examples of such accents. Note that the macro `\|` is also ‘dangerous’ in that it has been already defined as a math symbol of \LaTeX . So if you want to preserve the original meaning of this macro, declare ‘safe’ option at the preamble.

Finally, examples of words with complex accents that are input in the IPA environment are shown below.

<i>Input in the normal text environment</i>	<i>Input in the IPA environment</i>	<i>Output</i>
<code>\textsubbridge{t}</code>	<code>\ [t</code>	t _ɪ
<code>\textinvsubbridge{t}\ t</code>		t _ʊ
<code>\textsublhalfiring{a}\ (a</code>		a _ɪ
<code>\textsubrhalfiring{a}\)a</code>		a _ʊ
<code>\textroundcap{k}</code>	<code>\ c{k}</code>	k ^ˆ
<code>\textsubplus{o}</code>	<code>\ +o</code>	o ₊
<code>\textraising{e}</code>	<code>\ 'e</code>	e _↑
<code>\textlowering{e}</code>	<code>\ 'e</code>	e _↓
<code>\textadvancing{o}</code>	<code>\ <o</code>	o _→
<code>\textretracting{a}</code>	<code>\ >a</code>	a _←
<code>\textovercross{e}</code>	<code>\ x{e}</code>	ē
<code>\textsubw{k}</code>	<code>\ w{k}</code>	k _w
<code>\textseagull{t}</code>	<code>\ m{t}</code>	t _ʃ

Table 6: Examples of the accent prefix `\|`

Input: `\textipa{*\\|c{k}\r*mt\'om *bhr\'=at\=er}`
Output: *k̂mtóm *bhrátēr

For a full list of accents and diacritics, see Appendix A

6.7. Superscript symbols

In the normal text environment, superscript symbols can be input by a macro called `\textsuperscript`, which has been newly introduced in the recent version of L^AT_EX 2_ε. This macro takes one argument which can be either a symbol or a string of symbols, and can be nested.

Since the name of this macro is too long, TIPA provides an abbreviated form of this macro called `\super`.

Input 1: `t\textsuperscript h k\textsuperscript w`
`abc`
`a\textsuperscript{bc}`
Output 1: t^h k^w a^{bc} a^{b^c}

Input 2: `\textipa{t\super{h} k\super{w}`
`a\super{bc} a\super{b\super{c}}}`
Output 2: t^h k^w a^{bc} a^{b^c}

These macros automatically select the correct size of superscript font no matter what size of the text font is used.

6.8. Tone letters

TIPA provides a flexible system of macros for ‘tone letters’. A tone letter is represented by a macro called ‘\tone’, which takes one argument consisting of a string of numbers ranging from 1 to 5. These numbers denote pitch levels, 1 being the lowest and 5 the highest. Within this range, any combination is allowed and there is no limit in the length of combination.

As an example of the usage of tone letter macro, the four tones of Chinese are show below.

Input: \tone{55}ma ``mother'', \tone{35}ma ``hemp'',
\tone{214}ma ``horse'', \tone{51}ma ``scold''

Output: ㄇma “mother”, ㄏma “hemp”, ㄐma “horse”, ㄌma “scold”

7. How easy to input phonetic symbols?

Let us briefly estimate here how much easy (or difficult) to input phonetic symbols with TIPA in terms of the number of keystrokes.

The following table shows statistics for all the phonetic symbols that appear in the '93 version of IPA chart (diacritics and symbols for suprasegmentals excluded). It is assumed here that each symbol is input within the IPA environment and the `safe` option is not specified.

<i>keystrokes</i>	<i>number</i>	<i>examples</i>
1	65	a, b, ə, ɑ, β, etc.
2	2	ø, ll
3	30	æ, t, B, ɓ, etc.
5	1	ç
more than 5	7	e, ʔ, ‡, ʉ, etc.

As is shown in the table, about 92% of the symbols can be input within three keystrokes.

8. Changing font styles

This version of TIPA includes five styles of fonts, i.e. roman, slanted, bold, bold extended and sans serif. These styles can be switched in much the same way as in the normal text fonts (see table 7).

The bold fonts are usually not used within the standard L^AT_EX class packages so that if you want to use them, it is necessary to use low-level font selection commands of L^AT_EX 2_ε.

Input: {\fontseries{b}\selectfont abcdefg \textipa{ABCDEFGG}}

Output: **abcdefg αβϵδϵϕγ**

Note also that slanting of TIPA symbols should correctly work even in the cases of combined accents and in the cases of symbols made up by macros.

Input: \textsl{\textipa{\' {\' {\' {\u*{e}}}}}}

<i>Roman</i>	<code>\textipa{f@"nEtIks}</code>	fə'netiks
<i>Slanted</i>	<code>\textipa{\slshape f@"nEtIks}</code>	fə'netiks
or	<code>\textipa{\textsl{f@"nEtIks}}</code>	fə'netiks
or	<code>\textsl{\textipa{f@"nEtIks}}</code>	fə'netiks
<i>Bold extended</i>	<code>\textipa{\bfseries f@"nEtIks}</code>	fə'netiks
or	<code>\textipa{\textbf{f@"nEtIks}}</code>	fə'netiks
or	<code>\textbf{\textipa{f@"nEtIks}}</code>	fə'netiks
<i>Sans serif</i>	<code>\textipa{\sffamily f@"nEtIks}</code>	fə'netiks
or	<code>\textipa{\textsf{f@"nEtIks}}</code>	fə'netiks
or	<code>\textsf{\textipa{f@"nEtIks}}</code>	fə'netiks

Table 7: Examples of font switching

Output: \tilde{e}
Input: `\textsl{\textdoublebaresh}`
Output: f (This symbol is composed by a macro.)

9. Internal commands

Some of the internal commands of TIPA are defined without the letter @ in order to allow a user to extend the capability of TIPA.

9.1. \ipabar

Some TIPA symbols such as `\textbarb b`, `\textcrtwo 2` are defined by using an internal macro command `\ipabar`. This command is useful when you want to make barred or crossed symbols not defined in TIPA.

This command requires the following five parameters to control the position of the bar.

- #1 the symbol to be barred
- #2 the height of the bar (in dimen)
- #3 bar width
- #4 left kern added to the bar
- #5 right kern added to the bar

Parameters #3, #4, #5 are to be given in a scaling factor to the width of the symbol, which is equal to 1 if the bar has the same width with the symbol in question. For example, the following command states a barred b (b) of which the bar position in the y-coordinate is `.5ex` and the width of the bar is slightly larger than that of the letter b.

```
% Barred B
\newcommand\textbarb{%
  \ipabar{\tIPAencoding b}{.5ex}{1.1}{}}{}}
```

Note that the parameters #4 and #5 can be left blank if the value is equal to 0.

And the next example declares a barred c (€) of which the bar width is a little more than half as large as the letter c and it has the same size of kerning at the right.

```
% Barred C
\newcommand\textbarc{%
  \ipabar{\tIPAencoding c}{.5ex}{.55}{}{.55}}
```

More complex examples with the `\ipabar` command are found in `T3enc.def`.

9.2. `\tipaloweraccent`, `\tipaupperaccent`

These two commands are used in the definitions of TIPA accents and diacritics. They are special forms of the commands `\loweraccent` and `\upperaccent` that are defined in `exaccent.sty`. The difference between the commands with the prefix `tipa` and the ones without it is that the former commands select accents from a T3 encoded font while the latter ones do so from the current text font.

These commands take two parameters, the code of the accent (in decimal, octal or hexadecimal number) and the symbol to be accented, as shown below.

Input: `\tipaupperaccent{0}{a}`
Output: à

Optionally, these commands can take a extra parameter to adjust the vertical position of the accent. Such an adjustment is sometimes necessary in the definition of a nested accent. The next example shows TIPA's definition of the 'Circumflex Dot Accent' (e.g. â).

```
% Circumflex Dot Accent
\newcommand\textcircumdot[1]{\tipaupperaccent[-.2ex]{2}%
  {\tipaupperaccent[-.1ex]{10}{#1}}}
```

This definition states that a dot accent is placed over a symbol thereby reducing the vertical distance between the symbol and the dot by `.1ex` and a circumflex accent is placed over the dot and the distance between the two accents is reduced by `.2ex`.

If you want to make a combined accent not included in TIPA, you can do so fairly easily by using these two commands together with the optional parameter. For more examples of these commands, see `tipa.sty` and `extraipa.sty`.

9.3. `\tipaLoweraccent`, `\tipaUpperaccent`

These two commands differ from the two commands explained above in that the first parameter should be a symbol (or any other things, typically an `\hbox`), rather than the code of the accent. They are special cases of the commands `\Loweraccent` and `\Upperaccent` and the difference between the two pairs of commands is the same as before.

The next example makes a schwa an accent.

Input: `\tipaUpperaccent[.2ex]%
{\lower.8ex\hbox{\textipa{\super@}}}{a}`
Output: $\overset{.}{a}$

10. Acknowledgments

First of all, many thanks are due to the co-authors of TSIPA, Kobayashi Hajime and Shirakawa Shun. Kobayashi Hajime was the main font designer of TSIPA. Shirakawa Shun worked very hard in deciding encoding, checking the shapes of symbols and writing the Japanese version of document. TIPA was impossible without TSIPA.

I would like to thank also Jörg Knappen whose insightful comments helped greatly in many ways the development of TIPA. I was also helped and encouraged by Christina Thiele, Martin Haase, Kirk Sullivan and many other members of the `ling-tex` mailing list.

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References

- [1] Martin J. Ball, John Esling, and Craig Dickson. VoQS: Voice Quality Symbols. 1994, 1994.
- [2] John Esling. Computer coding of the IPA: Supplementary report. *Journal of the International Phonetic Association*, 20(1):22–26, 1990.
- [3] John H. Esling and Harry Gaylord. Computer codes for phonetic symbols. *Journal of the International Phonetic Association*, 23(2):83–97, 1993.
- [4] ICPLA. extIPA Symbols for Disorderd Speech. 1994, 1994.
- [5] IPA. *The Principles of the International Phonetic Association*, 1949.
- [6] IPA. Report on the 1989 Kiel Convention. *Journal of the International Phonetic Association*, 19(2):67–80, 1989.
- [7] IPA. Further report on the 1989 Kiel Convention. *Journal of the International Phonetic Association*, 20(2):22–24, 1990.
- [8] IPA. Council actions on revisions of the IPA. *Journal of the International Phonetic Association*, 23(1):32–34, 1993.
- [9] Geoffrey K. Pullum and William A. Ladusaw. *Phonetic Symbol Guide*. The University of Chicago Press, 1986.
- [10] John C. Wells. Computer-coding the IPA: a proposed extension of SAMPA. Revised draft 1995 04 28, 1995.

Appendix

A. Annotated List of TIPA Symbols

For each symbol, a large scale image of the symbol is displayed with a frame. Within the frame, horizontal lines that indicate `asc_height`, `x_height`, `baseline`, and `desc_depth` are also shown. At the left of a frame, two numbers are given. The one at the top of the symbol indicates serial number, and the other at the bottom is the octal code of the symbol in TIPA fonts.

Next, the following informations are shown at the right of each symbol in this order: (1) the name of the symbol, (2) explanation on its usage with some examples, (3) input method in typewriter style, (4) the shapes of the symbol in four TIPA styles in normal size (i.e. roman, slanted, bold extended, sans serif), and finally (5) sources or references.

Sometimes the input method is displayed in the form of *Input1: xxx, Input2: yyy*. In such cases *Input1* indicates the one used in the normal text environment and *Input2* the one used in the IPA environment.

The following abbreviations are used in the examples of usage and explanations in the footnote.

extIPA = *extIPA Symbols for Disordered Speech*

VoQS = *Voice Quality Symbols*

PSG = *Phonetic Symbol Guide* [9]






JIPA = *Journal of the International Phonetic Association*

IE Indo-European

OHG Old High German

OCS Old Church Slavic

A.1. Vowels and Consonants

1		Lower-case A, <i>IPA usage</i> : open front unrounded vowel <i>Input</i> : a <i>Styles</i> : a a a a, <i>Sources</i> : <i>IPA</i> '49–'93
'141		
2		Turned A, <i>IPA usage</i> : open-mid–open central unrounded vowel <i>Input1</i> : \textturna, <i>Input2</i> : 5 <i>Styles</i> : e e e e, <i>Sources</i> : <i>IPA</i> '49–'93
'065		
3		Script A, <i>IPA usage</i> : open back unrounded vowel <i>Input1</i> : \textscripta, <i>Input2</i> : A <i>Styles</i> : a a a a, <i>Sources</i> : <i>IPA</i> '49–'93
'101		
4		Turned Script A, <i>IPA usage</i> : open back rounded vowel <i>Input1</i> : \textturnscripta, <i>Input2</i> : 6 <i>Styles</i> : ɒ ɒ ɒ ɒ, <i>Sources</i> : <i>IPA</i> '49–'93
'066		
5		Ash, <i>IPA usage</i> : open-mid–open front unrounded vowel <i>Input</i> : \ae <i>Styles</i> : æ æ æ æ, <i>Sources</i> : <i>IPA</i> '49–'93
'346		















6		Small Capital A ¹⁵ , Usage: open central unrounded vowel <i>Input1:</i> \text{sca, <i>Input2:</i> \ ; A <i>Styles:</i> A A A A, <i>Sources:</i>
'300		
7		Turned V ¹⁶ , <i>IPA usage:</i> open-mid back unrounded vowel <i>Input1:</i> \text{turnv, <i>Input2:</i> 2 <i>Styles:</i> A A A A, <i>Sources:</i> IPA '49–'93
'062		
8		Lower-case B, <i>IPA usage:</i> voiced bilabial plosive <i>Input:</i> b <i>Styles:</i> b b b b, <i>Sources:</i> IPA '49–'93
'142		
9		Soft Sign, Usage: as in <i>OCS</i> огнь 'fire'. <i>Input:</i> \text{softsign <i>Styles:</i> Ъ Ъ Ъ Ъ, <i>Sources:</i>
'272		
10		Hard Sign, Usage: as in <i>OCS</i> градъ 'town'. <i>Input:</i> \text{hardsign <i>Styles:</i> ъ ъ ъ ъ, <i>Sources:</i>
'273		
11		Hooktop B, <i>IPA usage:</i> voiced bilabial implosive <i>Input1:</i> \text{htb, <i>Input2:</i> \ ! b <i>Styles:</i> ɓ ɓ ɓ ɓ, <i>Sources:</i> IPA '49–'93
'341		
12		Small Capital B, <i>IPA usage:</i> voiced bilabial trill <i>Input1:</i> \text{scb, <i>Input2:</i> \ ; B <i>Styles:</i> B B B B, <i>Sources:</i> IPA '89, '93
'340		
13		Crossed B <i>Input:</i> \text{crb <i>Styles:</i> ʙ ʙ ʙ ʙ, <i>Sources:</i>
'240		
14		Barred B <i>Input:</i> \text{barb <i>Styles:</i> ɸ ɸ ɸ ɸ, <i>Sources:</i>
Macro		
15		Beta, <i>IPA usage:</i> voiced bilabial fricative <i>Input1:</i> \text{beta, <i>Input2:</i> B <i>Styles:</i> β β β β, <i>Sources:</i> IPA '49–'93
'102		
16		Lower-case C, <i>IPA usage:</i> voiceless palatal plosive <i>Input:</i> c <i>Styles:</i> c c c c, <i>Sources:</i> IPA '49–'93
'143		
17		Barred C <i>Input:</i> \text{barc <i>Styles:</i> ɕ ɕ ɕ ɕ, <i>Sources:</i>
Macro		
18		Hooktop C, <i>IPA usage:</i> voiceless palatal implosive <i>Input:</i> \text{htc <i>Styles:</i> ɗ ɗ ɗ ɗ, <i>Sources:</i> IPA '89
'301		















¹⁵This symbol is fairly common among Chinese phoneticians.

¹⁶In *PSG* this symbol is called 'Inverted V' but it is apparently a mistake.

19		C Wedge, Usage: equivalent to IPA ʧ <i>Input:</i> \v{c} <i>Styles:</i> ċ ċ ċ ċ, <i>Sources:</i>
Macro		
20		C Cedilla, <i>IPA usage:</i> voiceless palatal fricative <i>Input:</i> \c{c} <i>Styles:</i> ɕ ɕ ɕ ɕ, <i>Sources:</i> IPA '49–'93
'347		
21		Curly-tail C, <i>IPA usage:</i> voiceless alveolo-palatal fricative <i>Input1:</i> \textctc, <i>Input2:</i> C <i>Styles:</i> ɕ ɕ ɕ ɕ, <i>Sources:</i> IPA '49–'93
'103		
22		Stretched C ¹⁷ , <i>IPA usage:</i> postalveolar click <i>Input:</i> \textstretchc <i>Styles:</i> ɕ ɕ ɕ ɕ, <i>Sources:</i> IPA '49, '79
'302		
23		Lower-case D, <i>IPA usage:</i> voiced dental/alveolar plosive <i>Input:</i> d <i>Styles:</i> d d d d, <i>Sources:</i> IPA '49–'93
'144		
24		Crossed D <i>Input:</i> \textcrd <i>Styles:</i> đ đ đ đ, <i>Sources:</i>
'241		
25		Barred D <i>Input:</i> \textbard <i>Styles:</i> ɖ ɖ ɖ ɖ, <i>Sources:</i>
Macro		
26		Hooktop D, <i>IPA usage:</i> voiced dental/alveolar implosive <i>Input1:</i> \texthtd, <i>Input2:</i> \!d <i>Styles:</i> ɖ ɖ ɖ ɖ, <i>Sources:</i> IPA '49–'93
'342		
27		Right-tail D, <i>IPA usage:</i> voiced retroflex plosive <i>Input1:</i> \textrtaild, <i>Input2:</i> \:d <i>Styles:</i> ɖ ɖ ɖ ɖ, <i>Sources:</i> IPA '49–'93
'343		
28		Curly-tail D, Usage: voiced alveolo-palatal plosive <i>Input:</i> \textctd <i>Styles:</i> ɖ ɖ ɖ ɖ, <i>Sources:</i>
'242		
29		D-Z Ligature <i>Input:</i> \textdzlig <i>Styles:</i> ɖ ɖ ɖ ɖ, <i>Sources:</i>
Macro		
30		D-Curly-tail Z Ligature <i>Input:</i> \textdctzlig <i>Styles:</i> ɖ ɖ ɖ ɖ, <i>Sources:</i>
Macro		
31		D-Yogh Ligature, <i>IPA usage:</i> voiced alveolar lateral fricative <i>Input:</i> \textdyoghlig <i>Styles:</i> ɖ ɖ ɖ ɖ, <i>Sources:</i> IPA '49–'93
'303		

¹⁷The shape of this symbol differs according to the sources. In *PSG* and recent articles in *JIPA*, it is 'stretched' toward both the ascender and descender regions and the whole shape looks like a thick staple. In the old days, however, it was stretched only toward the ascender and the whole shape looked more like a stretched c.












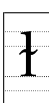

32		Curly-tail D-Curly-tail Z Ligature <i>Input:</i> \textctdctzlig <i>Styles:</i> d̥ d̥ d̥ d̥, <i>Sources:</i>
Macro		
33		Eth, <i>IPA usage:</i> voiced dental fricative <i>Input1:</i> \dh, <i>Input2:</i> D <i>Styles:</i> ð ð ð ð, <i>Sources:</i> IPA '49–'93
'104		
34		Lower-case E, <i>IPA usage:</i> colse-mid front unrounded vowel <i>Input:</i> e <i>Styles:</i> e e e e, <i>Sources:</i> IPA '49–'93
'145		
35		Schwa, <i>IPA usage:</i> mid central unrounded vowel <i>Input1:</i> \textschwa, <i>Input2:</i> @ <i>Styles:</i> ə ə ə ə, <i>Sources:</i> IPA '49–'93
'100		
36		Right-hook Schwa, <i>IPA usage:</i> r-colored ə <i>Input:</i> \textrhookswa <i>Styles:</i> ɶ ɶ ɶ ɶ, <i>Sources:</i> IPA '49, '79
'304		
37		Reversed E, <i>IPA usage:</i> close-mid central unrounded vowel <i>Input1:</i> \textreve, <i>Input2:</i> 9 <i>Styles:</i> ɘ ɘ ɘ ɘ, <i>Sources:</i> IPA '49–'93
'071		
38		Small Capital E <i>Input1:</i> \textsce, <i>Input2:</i> \; E <i>Styles:</i> E E E E, <i>Sources:</i>
'243		
39		Epsilon, <i>IPA usage:</i> open-mid front unrounded vowel <i>Input1:</i> \textepsilon, <i>Input2:</i> E <i>Styles:</i> ε ε ε ε, <i>Sources:</i> IPA '49–'93
'105		
40		Closed Epsilon, <i>IPA usage:</i> open-mid central rounded vowel <i>Input:</i> \textclosepsilon <i>Styles:</i> ɜ ɜ ɜ ɜ, <i>Sources:</i> IPA '93
'305		
41		Reversed Epsilon, <i>IPA usage:</i> open-mid central unrounded vowel <i>Input1:</i> \textrevepsilon, <i>Input2:</i> 3 <i>Styles:</i> ɜ ɜ ɜ ɜ, <i>Sources:</i> IPA '49–'93
'063		
42		Right-hook Reversed Epsilon, <i>IPA usage:</i> r colored ɜ <i>Input:</i> \textrhookrevepsilon <i>Styles:</i> ɶ ɶ ɶ ɶ, <i>Sources:</i>
'307		
43		Closed Reversed Epsilon <i>Input:</i> \textcloserevepsilon <i>Styles:</i> ɜ ɜ ɜ ɜ, <i>Sources:</i>
'306		
44		Lower-case F, <i>IPA usage:</i> voiceless labiodental fricative <i>Input:</i> f <i>Styles:</i> f f f f, <i>Sources:</i> IPA '49–'93
'146		
45		Lower-case G, <i>IPA usage:</i> voiced velar plosive <i>Input1:</i> \textg, <i>Input2:</i> g <i>Styles:</i> g g g g, <i>Sources:</i> IPA '49–'93
'147		

46		Barred G <i>Input:</i> \textbarg <i>Styles:</i> g g g g, <i>Sources:</i>
Macro		
47		Crossed G <i>Input:</i> \textcrg <i>Styles:</i> g g g g, <i>Sources:</i>
Macro		
48		Hooktop G, <i>IPA usage:</i> voiced velar implosive <i>Input1:</i> \texthtg, <i>Input2:</i> \!g <i>Styles:</i> g g g g, <i>Sources:</i> IPA '49–'93
'344		
49		Text G <i>Input1:</i> g, <i>Input2:</i> \textg <i>Styles:</i> g g g g, <i>Sources:</i>
'244		
50		Small Capital G, <i>IPA usage:</i> voiced uvular plosive <i>Input1:</i> \textscg, <i>Input2:</i> \!G <i>Styles:</i> G G G G, <i>Sources:</i> IPA '49–'93
'345		
51		Hooktop Small Capital G, <i>IPA usage:</i> voiced uvular implosive <i>Input1:</i> \texthtscg, <i>Input2:</i> \!G <i>Styles:</i> G G G G, <i>Sources:</i> IPA '89, '93
'311		
52		Gamma, <i>IPA usage:</i> voiced velar fricative <i>Input1:</i> \textgamma, <i>Input2:</i> G <i>Styles:</i> γ γ γ γ, <i>Sources:</i> IPA '49–'93
'107		
53		Baby Gamma, <i>IPA usage:</i> close-mid back unrounded vowel <i>Input:</i> \textbabygamma <i>Styles:</i> ɤ ɤ ɤ ɤ, <i>Sources:</i> IPA '49, '79
'310		
54		Ram's Horns, <i>IPA usage:</i> close-mid back unrounded vowel <i>Input1:</i> \extramshorns, <i>Input2:</i> 7 <i>Styles:</i> ɣ ɣ ɣ ɣ, <i>Sources:</i> IPA '89, '93
'067		
55		Lower-case H, <i>IPA usage:</i> voiceless glottal fricative <i>Input:</i> h <i>Styles:</i> h h h h, <i>Sources:</i> IPA '49–'93
'150		
56		H-V Ligature, Usage: as in <i>Gothic</i> hvas 'what'. <i>Input:</i> \texthvlig <i>Styles:</i> hv hv hv hv, <i>Sources:</i>
'377		
57		Crossed H, <i>IPA usage:</i> voiceless pharyngeal fricative <i>Input:</i> \textcrh <i>Styles:</i> h h h h, <i>Sources:</i> IPA '49–'93
'350		
58		Hooktop H, <i>IPA usage:</i> voiced glottal fricative <i>Input1:</i> \texthth, <i>Input2:</i> H <i>Styles:</i> fi fi fi fi, <i>Sources:</i> IPA '49–'93
'110		
59		Hooktop Heng, <i>IPA usage:</i> simultaneous f and x <i>Input:</i> \texththeng <i>Styles:</i> fj fj fj fj, <i>Sources:</i> IPA '49–'93
'312		

60		Turned H, <i>IPA usage</i> : voiced labial-palatal approximant <i>Input1</i> : \textturnh, <i>Input2</i> : 4 <i>Styles</i> : ꞥ ꞥ ꞥ ꞥ, <i>Sources</i> : IPA '49–'93
'064		
61		Small Capital H, <i>IPA usage</i> : voiceless epiglottal fricative <i>Input1</i> : \textsch, <i>Input2</i> : \;H <i>Styles</i> : Ꞣ Ꞣ Ꞣ Ꞣ, <i>Sources</i> : IPA '89, '93
'313		
62		Lower-case I, <i>IPA usage</i> : close front unrounded vowel <i>Input</i> : i <i>Styles</i> : i i i i, <i>Sources</i> : IPA '49–'93
'151		
63		Undotted I <i>Input</i> : \i <i>Styles</i> : ı ı ı ı, <i>Sources</i> :
'031		
64		Barred I, <i>IPA usage</i> : close central unrounded vowel <i>Input1</i> : \textbari, <i>Input2</i> : 1 <i>Styles</i> : ï ï ï ï, <i>Sources</i> : IPA '49–'93
'061		
65		Iota <i>Input</i> : \textiota <i>Styles</i> : ɪ ɪ ɪ ɪ, <i>Sources</i> : IPA '49, '79
'314		
66		Left-hooktop I ¹⁸ <i>Input</i> : \textlhti <i>Styles</i> : ɿ ɿ ɿ ɿ, <i>Sources</i> :
'245		
67		Left-hooktop Long I <i>Input</i> : \textlhtlongi <i>Styles</i> : ɿ ɿ ɿ ɿ, <i>Sources</i> :
'246		
68		Viby I ¹⁹ <i>Input</i> : \textviby <i>Styles</i> : ɿ ɿ ɿ ɿ, <i>Sources</i> :
'247		
69		Raised Viby I <i>Input</i> : \textraiseviby <i>Styles</i> : ɿ ɿ ɿ ɿ, <i>Sources</i> :
Macro		
70		Small Capital I, <i>IPA usage</i> : close–close-mid front unrounded vowel <i>Input1</i> : \textsci, <i>Input2</i> : I <i>Styles</i> : ɪ ɪ ɪ ɪ, <i>Sources</i> : IPA '89, '93
'111		
71		Lower-case J, <i>IPA usage</i> : voiced palatal approximant <i>Input</i> : j <i>Styles</i> : j j j j, <i>Sources</i> : IPA '49–'93
'152		















¹⁸The four symbols ɿ, ɿ, ɿ and ɿ are mainly used among Chinese linguists. These symbols are based on “det svenska landsmålsalfabetet” and introduced to China by Bernhard Karlgren. The original shapes of these symbols were in italic as was always the case with “det svenska landsmålsalfabetet”. It seems that the Chinese linguists who wanted to continue to use these symbols in IPA changed their shapes upright.

¹⁹I call this symbol ‘Viby I’, based on the following description by Bernhard Karlgren: “Une voyelle très analogue à ɿ se rencontre dans certains dial. suédois; on l’appelle ‘i de Viby’.” (*Études sur la phonologie chinoise*, 1915–26, p. 295)

72		Undotted J <i>Input:</i> \j <i>Styles:</i> j J J J, <i>Sources:</i>
'032		
73		Curly-tail J ²⁰ , <i>IPA usage:</i> voiced palatal fricative <i>Input1:</i> \textctj, <i>Input2:</i> J <i>Styles:</i> j j J j, <i>Sources:</i> IPA '89, '93
'112		
74		Small Capital J <i>Input1:</i> \textscj, <i>Input2:</i> \;J <i>Styles:</i> J J J J, <i>Sources:</i>
'250		
75		J Wedge, Usage: equivalent to IPA dʒ <i>Input:</i> \v{\j} <i>Styles:</i> J J J J, <i>Sources:</i>
Macro		
76		Barred Dotless J, <i>IPA usage:</i> voiced palatal plosive <i>Input:</i> \textbardotlessj <i>Styles:</i> j j J j, <i>Sources:</i> IPA '89, '93
'351		
77		Old Barred Dotless J, <i>IPA usage:</i> voiced palatal plosive <i>Input:</i> \textObardotlessj <i>Styles:</i> J J J J, <i>Sources:</i> IPA '49, '79
'315		
78		Hooktop Barred Dotless J ²¹ , <i>IPA usage:</i> voiced palatal implosive <i>Input1:</i> \texthtbardotlessj, <i>Input2:</i> \!j <i>Styles:</i> f f J f, <i>Sources:</i> IPA '89, '93
'352		
79		Lower-case K, <i>IPA usage:</i> voiceless velar plosive <i>Input:</i> k <i>Styles:</i> k k K k, <i>Sources:</i> IPA '49–'93
'153		
80		Hooktop K, <i>IPA usage:</i> voiceless velar implosive <i>Input:</i> \texthtk <i>Styles:</i> k k K k, <i>Sources:</i> IPA '89
'316		
81		Turned K <i>Input1:</i> \textturnk, <i>Input2:</i> *k <i>Styles:</i> x x X x, <i>Sources:</i>
'251		
82		Lower-case L, <i>IPA usage:</i> alveolar lateral approximant <i>Input:</i> l <i>Styles:</i> l l l l, <i>Sources:</i> IPA '49–'93
'154		
83		L with Tilde <i>Input1:</i> \textltilde, <i>Input2:</i> \ ~l <i>Styles:</i> l l l l, <i>Sources:</i> IPA '49–'93
'353		
84		Barred L <i>Input:</i> \textbarl <i>Styles:</i> l l l l, <i>Sources:</i>
'252		

²⁰In the official IPA charts of '89 and '93, this symbol has a dish serif on top of the stem, rather than the normal sloped serif found in the letter j. I found no reason why it should have a dish serif here, so I changed it to a normal sloped serif.


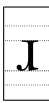
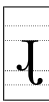







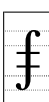

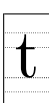
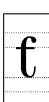
²¹In PSG the shape of this symbol slightly differs. Here I followed the shape found in IPA '89, '93.

85		Belted L, <i>IPA usage</i> : voiceless alveolar lateral fricative <i>Input</i> : <code>\textbeltl</code> <i>Styles</i> : <code>l l l l</code> , <i>Sources</i> : IPA '49–'93
'354		
86		Right-tail L, <i>IPA usage</i> : retroflex lateral approximant <i>Input1</i> : <code>\texttrtail</code> , <i>Input2</i> : <code>\:l</code> <i>Styles</i> : <code>l l l l</code> , <i>Sources</i> : IPA '49–'93
'355		
87		L-Yogh Ligature, <i>IPA usage</i> : voiced alveolar lateral fricative <i>Input</i> : <code>\textlyoghlig</code> <i>Styles</i> : <code>l l l l</code> , <i>Sources</i> : IPA '89, '93
'320		
88		Old L-Yogh Ligature, <i>IPA usage</i> : voiced alveolar lateral fricative <i>Input</i> : <code>\textOlyoghlig</code> <i>Styles</i> : <code>l l l l</code> , <i>Sources</i> : IPA '49, '79
'254		
89		Small Capital L, <i>IPA usage</i> : velar lateral approximant <i>Input1</i> : <code>\textscL</code> , <i>Input2</i> : <code>\;L</code> <i>Styles</i> : <code>L L L L</code> , <i>Sources</i> : IPA '89, '93
'317		
90		Lambda <i>Input</i> : <code>\textlambda</code> <i>Styles</i> : <code>λ λ λ λ</code> , <i>Sources</i> :
'253		
91		Crossed Lambda <i>Input</i> : <code>\textcrlambda</code> <i>Styles</i> : <code>λ λ λ λ</code> , <i>Sources</i> :
Macro		
92		Lower-case M, <i>IPA usage</i> : bilabial nasal <i>Input</i> : <code>m</code> <i>Styles</i> : <code>m m m m</code> , <i>Sources</i> : IPA '49–'93
'155		
93		Left-tail M (at right), <i>IPA usage</i> : labiodental nasal <i>Input1</i> : <code>\textlttailm</code> , <i>Input2</i> : <code>M</code> <i>Styles</i> : <code>m m m m</code> , <i>Sources</i> : IPA '49–'93
'115		
94		Turned M, <i>IPA usage</i> : close back unrounded vowel <i>Input1</i> : <code>\textturnm</code> , <i>Input2</i> : <code>W</code> <i>Styles</i> : <code>u u u u</code> , <i>Sources</i> : IPA '49–'93
'127		
95		Turned M, Right Leg, <i>IPA usage</i> : velar approximant <i>Input</i> : <code>\textturnmrleg</code> <i>Styles</i> : <code>u u u u</code> , <i>Sources</i> : IPA '79, '89, '93
'356		
96		Lower-case N, <i>IPA usage</i> : dental/alveolar nasal <i>Input</i> : <code>n</code> <i>Styles</i> : <code>n n n n</code> , <i>Sources</i> : IPA '49–'93
'156		
97		N, Right Leg <i>Input</i> : <code>\textnrleg</code> <i>Styles</i> : <code>n n n n</code> , <i>Sources</i> : IPA '49
'256		
98		N with Tilde <i>Input</i> : <code>\~n</code> <i>Styles</i> : <code>ñ ñ ñ ñ</code> , <i>Sources</i> :
Macro		















99		Left-tail N (at left), <i>IPA usage</i> : palatal nasal <i>Input</i> : <code>\textlttailn</code> <i>Styles</i> : Ꞓ Ꞓ ꞑ ꞑ, <i>Sources</i> : IPA '49–'93
100		Eng, <i>IPA usage</i> : velar nasal <i>Input1</i> : <code>\ng</code> , <i>Input2</i> : Ꞥ <i>Styles</i> : ŋ ŋ ꞑ ꞑ, <i>Sources</i> : IPA '49–'93
101		Right-tail N, <i>IPA usage</i> : retroflex nasal <i>Input1</i> : <code>\textrtailn</code> , <i>Input2</i> : ꞤꞤ <i>Styles</i> : ɳ ɳ ꞑ ꞑ, <i>Sources</i> : IPA '49–'93
102		Curly-tail N, <i>Usage</i> : alveolo-palatal nasal <i>Input</i> : <code>\textctn</code> <i>Styles</i> : ɲ ɲ ꞑ ꞑ, <i>Sources</i> :
103		Small Capital N, <i>IPA usage</i> : uvular nasal <i>Input1</i> : <code>\textscn</code> , <i>Input2</i> : ꞤꞤ <i>Styles</i> : Ꝣ Ꝣ Ꝣ Ꝣ, <i>Sources</i> : IPA '49–'93
104		Lower-case O, <i>IPA usage</i> : close-mid back rounded vowel <i>Input</i> : <code>o</code> <i>Styles</i> : o o ɔ ɔ, <i>Sources</i> : IPA '49–'93
105		Bull's Eye, <i>IPA usage</i> : bilabial click <i>Input1</i> : <code>\textbullseye</code> , <i>Input2</i> : ꞤꞤꞤꞤ <i>Styles</i> : Ꞥ Ꞥ Ꞥ Ꞥ, <i>Sources</i> : IPA '79, '89, '93
106		Barred O, <i>IPA usage</i> : close-mid central rounded vowel <i>Input1</i> : <code>\textbaro</code> , <i>Input2</i> : 8 <i>Styles</i> : ɵ ɵ ɵ ɵ, <i>Sources</i> : IPA '49–'93
107		Slashed O, <i>IPA usage</i> : close-mid front rounded vowel <i>Input</i> : <code>\o</code> <i>Styles</i> : ø ø ø ø, <i>Sources</i> : IPA '49–'93
108		O-E Ligature, <i>IPA usage</i> : open-mid front rounded vowel <i>Input</i> : <code>\oe</code> <i>Styles</i> : œ œ œ œ, <i>Sources</i> : IPA '49–'93
109		Small Capital O-E Ligature, <i>IPA usage</i> : open front rounded vowel <i>Input1</i> : <code>\textscoelig</code> , <i>Input2</i> : ꝢꝢ <i>Styles</i> : Œ Œ Œ Œ, <i>Sources</i> : IPA '79, '89, '93
110		Open O, <i>IPA usage</i> : open-mid back rounded vowel <i>Input1</i> : <code>\textopeno</code> , <i>Input2</i> : ɔ <i>Styles</i> : ɔ ɔ ɔ ɔ, <i>Sources</i> : IPA '49–'93
111		Turned C(Open O)-E Ligature <i>Input</i> : <code>\textturncelig</code> <i>Styles</i> : æ æ æ æ, <i>Sources</i> :
112		Omega <i>Input</i> : <code>\textomega</code> <i>Styles</i> : ω ω ʘ ʘ, <i>Sources</i> :

113		Small Capital Omega <i>Input:</i> \textscomega <i>Styles:</i> Ω Ω Ʊ Ω, <i>Sources:</i>
261		
114		Closed Omega <i>Input:</i> \textcloseomega <i>Styles:</i> ω ω Ɔ ω, <i>Sources:</i> IPA '49, '79
321		
115		Lower-case P, <i>IPA usage:</i> voiceless bilabial plosive <i>Input:</i> p <i>Styles:</i> p p Ɔ p, <i>Sources:</i> IPA '49–'93
160		
116		Wynn <i>Input:</i> \textwynn <i>Styles:</i> ƿ ƿ Ɔ ƿ, <i>Sources:</i>
337		
117		Thorn <i>Input1:</i> \textthorn, <i>Input2:</i> \th <i>Styles:</i> ƥ ƥ Ɔ ƥ, <i>Sources:</i>
376		
118		Hooktop P, <i>IPA usage:</i> voiceless bilabial implosive <i>Input:</i> \texthtp <i>Styles:</i> Ʒ Ʒ Ɔ Ʒ, <i>Sources:</i> IPA '89
322		
119		Phi, <i>IPA usage:</i> voiceless bilabial fricative <i>Input1:</i> \textphi, <i>Input2:</i> Ƒ <i>Styles:</i> Ƽ Ƽ Ɔ Ƽ, <i>Sources:</i> IPA '49–'93
106		
120		Lower-case Q, <i>IPA usage:</i> voiceless uvular plosive <i>Input:</i> ɢ <i>Styles:</i> q q Ɔ q, <i>Sources:</i> IPA '49–'93
161		
121		Hooktop Q, <i>IPA usage:</i> voiceless uvular implosive <i>Input:</i> \texthtq <i>Styles:</i> ɢ ɢ Ɔ ɢ, <i>Sources:</i> IPA '89
323		
122		Small Capital Q ²² , Usage: voiceless pharyngeal plosive <i>Input1:</i> \textscq, <i>Input2:</i> \;Q <i>Styles:</i> Q Q Ɔ Q, <i>Sources:</i>
262		
123		Lower-case R, <i>IPA usage:</i> alveolar trill <i>Input:</i> r <i>Styles:</i> r r Ɔ r, <i>Sources:</i> IPA '49–'93
162		
124		Fish-hook R, <i>IPA usage:</i> alveolar tap or flap <i>Input1:</i> \textfishhookr, <i>Input2:</i> R <i>Styles:</i> ɾ ɾ Ɔ ɾ, <i>Sources:</i> IPA '49–'93
122		
125		Long-leg R, <i>IPA usage:</i> alveolar fricative trill <i>Input:</i> \textlonglegr <i>Styles:</i> ɽ ɽ Ɔ ɽ, <i>Sources:</i> IPA '49, '79
324		









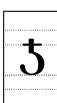


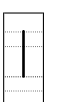
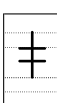
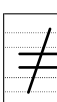
²²Suggested by Prof S. Tsuchida for Austronesian languages in Taiwan. In *PSG* 'Female Sign' and 'Uncrossed Female Sign'(pp. 110–111) are noted for pharyngeal stops, as proposed by Trager (1964). Also I'm not sure about the difference between an epiglottal plosive and a pharyngeal stop.



126		Right-tail R, <i>IPA usage</i> : retroflex tap or flap <i>Input1</i> : \texttrtailr, <i>Input2</i> : \:r <i>Styles</i> : Ꞥ Ꞥ Ꞥ Ꞥ, <i>Sources</i> : IPA '49–'93
'363		
127		Turned R, <i>IPA usage</i> : alveolar approximant <i>Input1</i> : \textturnr, <i>Input2</i> : *r <i>Styles</i> : Ꞥ Ꞥ Ꞥ Ꞥ, <i>Sources</i> : IPA '49–'93
'364		
128		Turned R, Right Tail, <i>IPA usage</i> : retroflex approximant <i>Input1</i> : \textturnrrtail, <i>Input2</i> : \:R <i>Styles</i> : Ꞥ Ꞥ Ꞥ Ꞥ, <i>Sources</i> : IPA '49–'93
'365		
129		Turned Long-leg R, <i>IPA usage</i> : alveolar lateral flap <i>Input</i> : \textturnlonglegr <i>Styles</i> : Ꞥ Ꞥ Ꞥ Ꞥ, <i>Sources</i> : IPA '49–'93
'325		
130		Small Capital R, <i>IPA usage</i> : uvular trill <i>Input1</i> : \textscr, <i>Input2</i> : \:R <i>Styles</i> : Ꞥ Ꞥ Ꞥ Ꞥ, <i>Sources</i> : IPA '49–'93
'366		
131		Inverted Small Capital R, <i>IPA usage</i> : voiced uvular fricative <i>Input1</i> : \textinvscr, <i>Input2</i> : Ꞥ <i>Styles</i> : Ꞥ Ꞥ Ꞥ Ꞥ, <i>Sources</i> : IPA '49–'93
'113		
132		Lower-case S, <i>IPA usage</i> : voiceless alveolar fricative <i>Input</i> : s <i>Styles</i> : s s s s, <i>Sources</i> : IPA '49–'93
'163		
133		S Wedge, Usage: equivalent to IPA ʃ <i>Input</i> : \v{s} <i>Styles</i> : š š š š, <i>Sources</i> :
Macro		
134		Right-tail S (at left), <i>IPA usage</i> : voiceless retroflex fricative <i>Input1</i> : \textrtails, <i>Input2</i> : \:s <i>Styles</i> : Ꞥ Ꞥ Ꞥ Ꞥ, <i>Sources</i> : IPA '49–'93
'371		
135		Esh, <i>IPA usage</i> : voiceless postalveolar fricative <i>Input1</i> : \textesh, <i>Input2</i> : Ꞥ <i>Styles</i> : Ꞥ Ꞥ Ꞥ Ꞥ, <i>Sources</i> : IPA '49–'93
'123		
136		Double-barred Esh <i>Input</i> : \textdoublebaresh <i>Styles</i> : Ꞥ Ꞥ Ꞥ Ꞥ, <i>Sources</i> :
Macro		
137		Curly-tail Esh, <i>IPA usage</i> : palatalized ʃ <i>Input</i> : \textctesh <i>Styles</i> : Ꞥ Ꞥ Ꞥ Ꞥ, <i>Sources</i> : IPA '49, '79
'263		
138		Lower-case T, <i>IPA usage</i> : voiceless dental/alveolar plosive <i>Input</i> : t <i>Styles</i> : Ꞥ Ꞥ Ꞥ Ꞥ, <i>Sources</i> : IPA '49–'93
'164		
139		Hooktop T, <i>IPA usage</i> : voiceless dental/alveolar implosive <i>Input</i> : \texthtt <i>Styles</i> : Ꞥ Ꞥ Ꞥ Ꞥ, <i>Sources</i> : IPA '89
'326		

140		Left-hook T, <i>IPA usage</i> : palatalized t <i>Input</i> : \textlhookt <i>Styles</i> : , <i>Sources</i> :
264		
141		Right-tail T, <i>IPA usage</i> : voiceless retroflex plosive <i>Input1</i> : \textrtailt, <i>Input2</i> : \:t <i>Styles</i> : , <i>Sources</i> : IPA '49–'93
372		
142		T-Curly-tail C Ligature <i>Input</i> : \texttctclig <i>Styles</i> : , <i>Sources</i> :
Macro		
143		T-S Ligature <i>Input</i> : \texttslig <i>Styles</i> : , <i>Sources</i> :
266		
144		T-Esh Ligature <i>Input</i> : \texttेशlig <i>Styles</i> : , <i>Sources</i> : IPA '49–'93
331		
145		Turned T, <i>IPA usage</i> : dental click <i>Input1</i> : \texttturnt, <i>Input2</i> : *t <i>Styles</i> : , <i>Sources</i> : IPA '49, '79
330		
146		Curly-tail T, <i>Usage</i> : voiceless alveolo-palatal plosive <i>Input</i> : \textctt <i>Styles</i> : , <i>Sources</i> :
265		
147		Curly-tail T-Curly-tail C Ligature <i>Input</i> : \textcttctclig <i>Styles</i> : , <i>Sources</i> :
Macro		
148		Theta, <i>IPA usage</i> : voiceless dental fricative <i>Input1</i> : \texttheta, <i>Input2</i> : T <i>Styles</i> : , <i>Sources</i> : IPA '49–'93
124		
149		Lower-case U, <i>IPA usage</i> : close back rounded vowel <i>Input</i> : u <i>Styles</i> : , <i>Sources</i> : IPA '49–'93
165		
150		Barred U, <i>IPA usage</i> : close central rounded vowel <i>Input1</i> : \textbaru, <i>Input2</i> : 0 <i>Styles</i> : , <i>Sources</i> : IPA '49–'93
060		
151		Upsilon, <i>IPA usage</i> : close–close-mid back rounded vowel <i>Input1</i> : \textupsilon, <i>Input2</i> : U <i>Styles</i> : , <i>Sources</i> : IPA '89, '93
125		
152		Small Capital U, <i>Usage</i> : equivalent to IPA u <i>Input1</i> : \textscu, <i>Input2</i> : \;U <i>Styles</i> : , <i>Sources</i> : IPA '49–'93
366		
153		Lower-case V, <i>IPA usage</i> : voiced labiodental fricative <i>Input</i> : v <i>Styles</i> : , <i>Sources</i> : IPA '49–'93
166		











154		Script V, <i>IPA usage</i> : labiodental approximant <i>Input1</i> : <code>\textscriptv</code> , <i>Input2</i> : V <i>Styles</i> : v v v v, <i>Sources</i> : IPA '49–'93
155		Lower-case W, <i>IPA usage</i> : voiced labio-velar approximant <i>Input</i> : w <i>Styles</i> : w w w w, <i>Sources</i> : IPA '49–'93
156		Turned W, <i>IPA usage</i> : voiceless labio-velar approximant <i>Input1</i> : <code>\textturnw</code> , <i>Input2</i> : <code>*w</code> <i>Styles</i> : W W W W , <i>Sources</i> : IPA '49–'93
157		Lower-case X, <i>IPA usage</i> : voiceless velar fricative <i>Input</i> : x <i>Styles</i> : x x x x, <i>Sources</i> : IPA '49–'93
158		Chi, <i>IPA usage</i> : voiceless uvular fricative <i>Input1</i> : <code>\textchi</code> , <i>Input2</i> : X <i>Styles</i> : χ χ χ χ, <i>Sources</i> : IPA '49–'93
159		Lower-case Y, <i>IPA usage</i> : close front rounded vowel <i>Input</i> : y <i>Styles</i> : y y y y, <i>Sources</i> : IPA '49–'93
160		Turned Y, <i>IPA usage</i> : palatal lateral approximant <i>Input1</i> : <code>\textturny</code> , <i>Input2</i> : L <i>Styles</i> : Y Y Y Y , <i>Sources</i> : IPA '49–'93
161		Small Capital Y, <i>IPA usage</i> : close–close-mid front rounded vowel <i>Input1</i> : <code>\textscy</code> , <i>Input2</i> : Y <i>Styles</i> : Y Y Y Y, <i>Sources</i> : IPA '49–'93
162		Viby Y ²³ <i>Input</i> : <code>\textvibyy</code> <i>Styles</i> : y y y y, <i>Sources</i> :
163		Lower-case Z, <i>IPA usage</i> : voiced alveolar fricative <i>Input</i> : z <i>Styles</i> : z z z z, <i>Sources</i> : IPA '49–'93
164		Comma-tail Z, Usage: as in <i>OHG</i> ēzzan ‘to eat’. <i>Input</i> : <code>\textcommatailz</code> <i>Styles</i> : z z z z, <i>Sources</i> :
165		Z Wedge, Usage: equivalent to IPA ɰ <i>Input</i> : <code>\v{z}</code> <i>Styles</i> : z z z z , <i>Sources</i> :
Macro		
166		Curly-tail Z, <i>IPA usage</i> : voiced alveolo-palatal fricative <i>Input</i> : <code>\textctz</code> <i>Styles</i> : z z z z, <i>Sources</i> : IPA '49–'93
167		Reversed Yogh <i>Input</i> : <code>\textrevyogh</code> <i>Styles</i> : z z z z , <i>Sources</i> :

²³See explanations in footnote 19.


168		Right-tail Z, <i>IPA usage</i> : voiced retroflex fricative <i>Input1</i> : \textrtailz, <i>Input2</i> : \:z <i>Styles</i> : z, z, z , z, <i>Sources</i> : IPA '49–'93
'374		
169		Yogh, <i>IPA usage</i> : voiced postalveolar fricative <i>Input1</i> : \texttyogh, <i>Input2</i> : z <i>Styles</i> : ʒ ʒ ʒ ʒ, <i>Sources</i> : IPA '49–'93
'132		
170		Curly-tail Yogh, <i>IPA usage</i> : palatalized ʒ <i>Input</i> : \textctyogh <i>Styles</i> : ʒ ʒ ʒ ʒ, <i>Sources</i> : IPA '49, '79
'270		
171		Crossed 2 <i>Input</i> : \textcrtwo <i>Styles</i> : 2 2 2 2, <i>Sources</i> : IPA '49
Macro		
172		Glottal Stop <i>Input1</i> : \textglotstop, <i>Input2</i> : p <i>Styles</i> : ʔ ʔ ʔ ʔ, <i>Sources</i> : IPA '49–'93
'120		
173		Superscript Glottal Stop <i>Input</i> : \textraiseglotstop <i>Styles</i> : ʔ ʔ ʔ ʔ, <i>Sources</i> :
'274		
174		Barred Glottal Stop, <i>IPA usage</i> : epiglottal plosive <i>Input</i> : \textbarglotstop <i>Styles</i> : ʔ ʔ ʔ ʔ, <i>Sources</i> : IPA '89, '93
'334		
175		Inverted Glottal Stop, <i>IPA usage</i> : alveolar lateral click <i>Input</i> : \textinvglotstop <i>Styles</i> : ɖ ɖ ɖ ɖ, <i>Sources</i> : IPA '49, '79
'333		
176		Crossed Inverted Glottal Stop <i>Input</i> : \textcrinvglotstop <i>Styles</i> : ɖ ɖ ɖ ɖ, <i>Sources</i> : IPA '49
Macro		
177		Reversed Glottal Stop, <i>IPA usage</i> : voiced pharyngeal fricative <i>Input1</i> : \textrevglotstop, <i>Input2</i> : q <i>Styles</i> : ʕ ʕ ʕ ʕ, <i>Sources</i> : IPA '49–'93
'121		
178		Barred Reversed Glottal Stop, <i>IPA usage</i> : voiced epiglottal fricative <i>Input</i> : \textbarrevglotstop <i>Styles</i> : ʕ ʕ ʕ ʕ, <i>Sources</i> : IPA '89, '93
'335		
179		Pipe, <i>IPA usage</i> : dental click <i>Input1</i> : \textpipe, <i>Input2</i> : <i>Styles</i> : , <i>Sources</i> : IPA '89, '93
'174		
180		Double-barred Pipe, <i>IPA usage</i> : palatoalveolar click <i>Input</i> : \textdoublebarpipe <i>Styles</i> : ɸ ɸ ɸ ɸ, <i>Sources</i> : IPA '89, '93
'175		
181		Double-barred Slash, Usage: a variant of ɸ <i>Input</i> : \textdoublebarslash <i>Styles</i> : ≠ ≠ ≠ ≠, <i>Sources</i> :
Macro		

182		Double Pipe, <i>IPA usage</i> : alveolar lateral click <i>Input1</i> : <code>\textdoublepipe</code> , <i>Input2</i> : <code> </code> <i>Styles</i> : <code> </code> , <i>Sources</i> : IPA '89, '93
183		Exclamation Point, <i>IPA usage</i> : (post)alveolar click <i>Input</i> : <code>!</code> <i>Styles</i> : <code>! ! ! !</code> , <i>Sources</i> : IPA '89, '93













A.2. Suprasegmentals

184		Vertical Stroke (Superior), <i>IPA usage</i> : primary stress <i>Input1</i> : <code>\textprimstress</code> , <i>Input2</i> : <code>"</code> <i>Styles</i> : <code>' ' ' '</code> , <i>Sources</i> : IPA '49–'93
185		Vertical Stroke (Inferior), <i>IPA usage</i> : secondary stress <i>Input1</i> : <code>\textsecstress</code> , <i>Input2</i> : <code>"</code> <i>Styles</i> : <code>, , , ,</code> , <i>Sources</i> : IPA '49–'93
186		Length Mark, <i>IPA usage</i> : long <i>Input1</i> : <code>\textlengthmark</code> , <i>Input2</i> : <code>:</code> <i>Styles</i> : <code>: : : :</code> , <i>Sources</i> : IPA '49–'93
187		Half-length Mark, <i>IPA usage</i> : half-long <i>Input1</i> : <code>\texthalflength</code> , <i>Input2</i> : <code>:</code> <i>Styles</i> : <code>ː ː ː ː</code> , <i>Sources</i> : IPA '49–'93
188		Vertical Line, <i>IPA usage</i> : minor (foot) group <i>Input</i> : <code>\textvertline</code> <i>Styles</i> : <code> </code> , <i>Sources</i> : IPA '89, '93
189		Double Vertical Line, <i>IPA usage</i> : major (intonation) group <i>Input</i> : <code>\textdoublevertline</code> <i>Styles</i> : <code> </code> , <i>Sources</i> : IPA '89, '93
190		Bottom Tie Bar, <i>IPA usage</i> : linking (absence of a break) <i>Input1</i> : <code>\textbottomtiebar</code> , <i>Input2</i> : <code>\t*{ }</code> <i>Styles</i> : <code>~~~~</code> , <i>Sources</i> : IPA '89, '93
191		Downward Diagonal Arrow, <i>IPA usage</i> : global fall <i>Input</i> : <code>\textglobfall</code> <i>Styles</i> : <code>↘ ↘ ↘ ↘</code> , <i>Sources</i> : IPA '89, '93
192		Upward Diagonal Arrow, <i>IPA usage</i> : global rise <i>Input</i> : <code>\textglobrise</code> <i>Styles</i> : <code>↗ ↗ ↗ ↗</code> , <i>Sources</i> : IPA '89, '93
193		Down Arrow ²⁴ , <i>IPA usage</i> : downstep <i>Input</i> : <code>\textdownstep</code> <i>Styles</i> : <code>↓ ↓ ↓ ↓</code> , <i>Sources</i> : IPA '89, '93

²⁴The shapes of `\textdownstep` and `\textupstep` differ according to sources. Here I followed the shapes found in the recent IPA charts.

194		Up Arrow, <i>IPA usage</i> : upstep
		<i>Input</i> : \textupstep
'227		<i>Styles</i> : ↑ ↑ ↑ ↑, <i>Sources</i> : IPA '89, '93

A.3. Accents and Diacritics

195		Grave Accent, <i>IPA usage</i> : low tone
		<i>Input</i> : \`e
'000		<i>Styles</i> : è è è è, <i>Sources</i> : IPA '49–'93
196		Acute Accent, <i>IPA usage</i> : high tone
		<i>Input</i> : \'e
'001		<i>Styles</i> : é é é é, <i>Sources</i> : IPA '49–'93
197		Circumflex Accent, <i>IPA usage</i> : falling tone
		<i>Input</i> : \^e
'002		<i>Styles</i> : ê ê ê ê, <i>Sources</i> : IPA '49–'93
198		Tilde, <i>IPA usage</i> : nasalized
		<i>Input</i> : \~e
'003		<i>Styles</i> : ã ã ã ã, <i>Sources</i> : IPA '49–'93
199		Umlaut, <i>IPA usage</i> : centralized
		<i>Input</i> : \"e
'004		<i>Styles</i> : ë ë ë ë, <i>Sources</i> : IPA '49–'93
200		Double Acute Accent, <i>IPA usage</i> : extra high tone
		<i>Input</i> : \H{e}
'005		<i>Styles</i> : ǚ ǚ ǚ ǚ, <i>Sources</i> : IPA '89, '93
201		Ring
		<i>Input</i> : \r{e}
'006		<i>Styles</i> : ê ê ê ê, <i>Sources</i> :
202		Wedge, <i>IPA usage</i> : rising tone
		<i>Input</i> : \v{e}
'007		<i>Styles</i> : ẽ ẽ ẽ ẽ, <i>Sources</i> : IPA '49–'93
203		Breve, <i>IPA usage</i> : extra short
		<i>Input</i> : \u{e}
'010		<i>Styles</i> : Ț Ț Ț Ț, <i>Sources</i> : IPA '49–'93
204		Macron
		<i>Input</i> : \=e
'011		<i>Styles</i> : ē ē ē ē, <i>Sources</i> :
205		Dot
		<i>Input</i> : \.e
'012		<i>Styles</i> : ȇ ȇ ȇ ȇ, <i>Sources</i> :
206		Cedille
		<i>Input</i> : \c{e}
'013		<i>Styles</i> : ɸ ɸ ɸ ɸ, <i>Sources</i> :

207		Polish Hook (Ogonek Accent) <i>Input1:</i> \textpolhook{e}, <i>Input2:</i> \k{e} <i>Styles:</i> ě ě ě ě, <i>Sources:</i>
'014		
208		Double Grave Accent, <i>IPA usage:</i> extra low tone <i>Input1:</i> \textdoublegrave{e}, <i>Input2:</i> \H*e <i>Styles:</i> ë ë ë ë, <i>Sources:</i> IPA '89, '93
'015		
209		Subscript Grave Accent, <i>IPA usage:</i> low falling tone <i>Input1:</i> \textsubgrave{e}, <i>Input2:</i> \`*e <i>Styles:</i> ẽ ẽ ẽ ẽ, <i>Sources:</i> IPA '49, '79
'016		
210		Subscript Acute Accent, <i>IPA usage:</i> low rising tone <i>Input1:</i> \textsubacute{e}, <i>Input2:</i> \'*e <i>Styles:</i> ẽ ẽ ẽ ẽ, <i>Sources:</i> IPA '49, '79
'017		
211		Subscript Circumflex Accent <i>Input1:</i> \textsubcircum{e}, <i>Input2:</i> \^*e <i>Styles:</i> ẽ ẽ ẽ ẽ, <i>Sources:</i>
Macro		
212		Round Cap <i>Input1:</i> \textroundcap{g}, <i>Input2:</i> \ c{g} <i>Styles:</i> ȧ ȧ ȧ ȧ, <i>Sources:</i>
'020		
213		Acute Accent with Macron <i>Input1:</i> \textacutemacron{a}, <i>Input2:</i> \'=a <i>Styles:</i> Ǻ Ǻ Ǻ Ǻ, <i>Sources:</i>
Macro		
214		Vertical Bar Accent <i>Input:</i> \textvbaraccent{a} <i>Styles:</i> ǻ ǻ ǻ ǻ, <i>Sources:</i>
'234		
215		Double Vertical Bar Accent <i>Input:</i> \textdoublevbaraccent{a} <i>Styles:</i> Ǽ Ǽ Ǽ Ǽ, <i>Sources:</i>
'235		
216		Grave Dot Accent <i>Input1:</i> \textgravedot{e}, <i>Input2:</i> \`.e <i>Styles:</i> Ț Ț Ț Ț, <i>Sources:</i>
'236		
217		Dot Acute Accent <i>Input1:</i> \textdotacute{e}, <i>Input2:</i> \'.e <i>Styles:</i> Ț Ț Ț Ț, <i>Sources:</i>
'237		
218		Circumflex Dot Accent <i>Input1:</i> \textcircumdot{a}, <i>Input2:</i> \^ .a <i>Styles:</i> Ȧ Ȧ Ȧ Ȧ, <i>Sources:</i>
Macro		
219		Tilde Dot Accent <i>Input1:</i> \texttildedot{a}, <i>Input2:</i> \~ .a <i>Styles:</i> Ȣ Ȣ Ȣ Ȣ, <i>Sources:</i>
Macro		
220		Breve Macron Accent <i>Input1:</i> \textbrevemacron{a}, <i>Input2:</i> \u=a <i>Styles:</i> Ȥ Ȥ Ȥ Ȥ, <i>Sources:</i>
Macro		

221		Ring Macron Accent <i>Input1:</i> <code>\textringmacron{a}</code> , <i>Input2:</i> <code>\r=a</code> <i>Styles:</i> $\grave{\text{a}}$ a° a° a° , <i>Sources:</i>
Macro		
222		Acute Wedge Accent <i>Input1:</i> <code>\textacutewedge{s}</code> , <i>Input2:</i> <code>\v's</code> <i>Styles:</i> $\acute{\text{s}}$ $\acute{\text{s}}$ $\acute{\text{s}}$ $\acute{\text{s}}$, <i>Sources:</i>
Macro		
223		Dot Breve Accent <i>Input:</i> <code>\textdotbreve{a}</code> <i>Styles:</i> a° a° a° a° , <i>Sources:</i>
Macro		
224		Subscript Bridge, <i>IPA usage:</i> dental <i>Input1:</i> <code>\textsubbridge{t}</code> , <i>Input2:</i> <code>\ [t</code> <i>Styles:</i> $\text{t}_\text{̣}$ $\text{t}_\text{̣}$ $\text{t}_\text{̣}$ $\text{t}_\text{̣}$, <i>Sources:</i> IPA '49–'93
'021		
225		Inverted Subscript Bridge, <i>IPA usage:</i> apical <i>Input1:</i> <code>\textinvsubbridge{d}</code> , <i>Input2:</i> <code>\]t</code> <i>Styles:</i> $\text{d}_\text{̣}$ $\text{d}_\text{̣}$ $\text{d}_\text{̣}$ $\text{d}_\text{̣}$, <i>Sources:</i> IPA '89, '93
'022		
226		Subscript Square, <i>IPA usage:</i> laminal <i>Input:</i> <code>\textsubsquare{n}</code> <i>Styles:</i> $\text{n}_\text{̣}$ $\text{n}_\text{̣}$ $\text{n}_\text{̣}$ $\text{n}_\text{̣}$, <i>Sources:</i> IPA '89, '93
'023		
227		Subscript Right Half-ring ²⁵ , <i>IPA usage:</i> more rounded <i>Input1:</i> <code>\textsubrhalfring{o}</code> , <i>Input2:</i> <code>\)o</code> <i>Styles:</i> $\text{o}_\text{̣}$ $\text{o}_\text{̣}$ $\text{o}_\text{̣}$ $\text{o}_\text{̣}$, <i>Sources:</i> IPA '49–'93
'024		
228		Subscript Left Half-ring, <i>IPA usage:</i> less rounded <i>Input1:</i> <code>\textsublhalfring{o}</code> , <i>Input2:</i> <code>\ (o</code> <i>Styles:</i> $\text{o}_\text{̣}$ $\text{o}_\text{̣}$ $\text{o}_\text{̣}$ $\text{o}_\text{̣}$, <i>Sources:</i> IPA '49–'93
'025		
229		Subscript W, <i>IPA usage:</i> labialized <i>Input1:</i> <code>\textsubw{k}</code> , <i>Input2:</i> <code>\ w{k}</code> <i>Styles:</i> $\text{k}_\text{̣}$ $\text{k}_\text{̣}$ $\text{k}_\text{̣}$ $\text{k}_\text{̣}$, <i>Sources:</i> IPA '79
'026		
230		Over W, Usage: labialized <i>Input:</i> <code>\textoverw{g}</code> <i>Styles:</i> g^w g^w g^w g^w , <i>Sources:</i>
'026		
231		Seagull, <i>IPA usage:</i> linguolabial <i>Input1:</i> <code>\textseagull{t}</code> , <i>Input2:</i> <code>\ m{t}</code> <i>Styles:</i> $\text{t}_\text{̣}$ $\text{t}_\text{̣}$ $\text{t}_\text{̣}$ $\text{t}_\text{̣}$, <i>Sources:</i> IPA '89, '93
'027		
232		Over-cross, <i>IPA usage:</i> mid-centralized <i>Input1:</i> <code>\textovercross{e}</code> , <i>Input2:</i> <code>\ x{e}</code> <i>Styles:</i> e^x e^x e^x e^x , <i>Sources:</i> IPA '49–'93
'030		
233		Subscript Plus ²⁶ , <i>IPA usage:</i> advanced <i>Input1:</i> <code>\textsubplus{\textopeno}</code> , <i>Input2:</i> <code>\ +o</code> <i>Styles:</i> $\text{o}_\text{̣}$ $\text{o}_\text{̣}$ $\text{o}_\text{̣}$ $\text{o}_\text{̣}$, <i>Sources:</i> IPA '49–'93
'033		








²⁵Diacritics `\textsubrhalfring` and `\textsublhalfring` can be placed after a symbol by inputting, for example, `[e\textsubrhalfring{ }]` `[e]`.

²⁶The diacritics such as `\textsubplus`, `\textraising`, `\textlowering` `\textadvancing` and `\textretracting` can be placed after a symbol by inputting `[e\textsubplus{ }]` `[e+]`, for example.

234		Raising Sign, <i>IPA usage</i> : raised <i>Input1</i> : <code>\textraising{\textepsilon}</code> , <i>Input2</i> : <code>\ 'E</code> <i>Styles</i> : ϵ ϵ ϵ ϵ , <i>Sources</i> : IPA '49–'93
'034		
235		Lowering Sign, <i>IPA usage</i> : lowered <i>Input1</i> : <code>\textlowering{e}</code> , <i>Input2</i> : <code>\ 'e</code> <i>Styles</i> : ϵ ϵ ϵ ϵ , <i>Sources</i> : IPA '49–'93
'035		
236		Advancing Sign, <i>IPA usage</i> : advanced tongue root <i>Input1</i> : <code>\textadvancing{u}</code> , <i>Input2</i> : <code>\ <u</code> <i>Styles</i> : u u u u , <i>Sources</i> : IPA '49–'93
'036		
237		Retracting Sign, <i>IPA usage</i> : retracted tongue root <i>Input1</i> : <code>\textretracting{\textschwa}</code> , <i>Input2</i> : <code>\ >@</code> <i>Styles</i> : ə ə ə ə , <i>Sources</i> : IPA '49–'93
'037		
238		Subscript Tilde, <i>IPA usage</i> : creaky voiced <i>Input1</i> : <code>\textsubtilde{e}</code> , <i>Input2</i> : <code>\~*e</code> <i>Styles</i> : e e e e , <i>Sources</i> : IPA '89, '93
'003		
239		Subscript Umlaut, <i>IPA usage</i> : breathy voiced <i>Input1</i> : <code>\textsubumlaut{e}</code> , <i>Input2</i> : <code>\ " *e</code> <i>Styles</i> : e e e e , <i>Sources</i> : IPA '79, '89, '93
'004		
240		Subscript Ring, <i>IPA usage</i> : voiceless <i>Input1</i> : <code>\textsubring{u}</code> , <i>Input2</i> : <code>\r *u</code> <i>Styles</i> : u u u u , <i>Sources</i> : IPA '49–'93
'006		
241		Subscript Wedge, <i>IPA usage</i> : voiced <i>Input1</i> : <code>\textsubwedge{e}</code> , <i>Input2</i> : <code>\v *e</code> <i>Styles</i> : e e e e , <i>Sources</i> : IPA '49–'93
'007		
242		Subscript Bar, <i>IPA usage</i> : retracted <i>Input1</i> : <code>\textsubbar{e}</code> , <i>Input2</i> : <code>\ = *e</code> <i>Styles</i> : e e e e , <i>Sources</i> : IPA '49–'93
'011		
243		Subscript Dot, <i>Usage</i> : retroflex <i>Input1</i> : <code>\textsubdot{e}</code> , <i>Input2</i> : <code>\ . *e</code> <i>Styles</i> : e e e e , <i>Sources</i> :
'012		
244		Subscript Arch, <i>IPA usage</i> : non-syllabic <i>Input</i> : <code>\textsubarch{e}</code> <i>Styles</i> : e e e e , <i>Sources</i> :
'020		
245		Syllability Mark, <i>IPA usage</i> : syllabic <i>Input1</i> : <code>\textsyllabic{m}</code> , <i>Input2</i> : <code>\s {m}</code> <i>Styles</i> : m m m m , <i>Sources</i> : IPA '49–'93
'042		
246		Superimposed Tilde, <i>IPA usage</i> : velarized or pharyngealized <i>Input1</i> : <code>\textsuperimposetilde{t}</code> , <i>Input2</i> : <code>\ ~{t}</code> <i>Styles</i> : t t t t , <i>Sources</i> : IPA '49–'93
'046		
247		Corner, <i>IPA usage</i> : no audible release <i>Input</i> : <code>t\textcorner</code> <i>Styles</i> : t t t t , <i>Sources</i> : IPA '89, '93
'136		

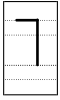
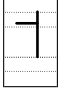


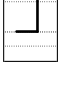
248		Open Corner, Usage: release/burst <i>Input:</i> t\textopencorner <i>Styles:</i> t̟ t̠ t̡ t̢, <i>Sources:</i>
249		Rhoticity, <i>IPA usage:</i> rhoticity <i>Input:</i> \textschwa\rhoticity <i>Styles:</i> ə̤ ə̥ ə̦ ə̧, <i>Sources:</i> IPA '89, '93
250		Celtic Palatalization Mark, Usage: as in <i>Irish</i> bʰan ‘woman’. <i>Input:</i> b\textceltpal <i>Styles:</i> bʰ bʱ bʲ bʳ, <i>Sources:</i>
251		Left Pointer <i>Input:</i> k\textlptr <i>Styles:</i> k̟ k̠ k̡ k̢, <i>Sources:</i>
252		Right Pointer <i>Input:</i> k\textrptr <i>Styles:</i> k̟̠ k̡̠ k̡̢ ḳ̢, <i>Sources:</i>
253		Rectangle ²⁷ , Usage: equivalent to IPA ͡ (Corner) <i>Input:</i> p\textrectangle <i>Styles:</i> p̟ p̠ p̡ p̢, <i>Sources:</i>
254		Top Tie Bar, <i>IPA usage:</i> affricates and double articulations <i>Input1:</i> \texttoptiebar{gb}, <i>Input2:</i> \t{gb} <i>Styles:</i> gb̟ gb̠ gb̡ gb̢, <i>Sources:</i>
255		Apostrophe, <i>IPA usage:</i> ejective <i>Input:</i> ʼ <i>Styles:</i> ʼ ʽ ʾ ʿ, <i>Sources:</i> IPA '49–'93
256		Reversed Apostrophe, <i>IPA usage:</i> aspirated <i>Input:</i> \textrevapostrophe <i>Styles:</i> ʽ ʾ ʿ, <i>Sources:</i> IPA '49, '79
257		Period, <i>IPA usage:</i> syllable break as in [ɹi.ækt] <i>Input:</i> . <i>Styles:</i>, <i>Sources:</i> IPA '89, '93
258		Hooktop <i>Input:</i> \texthooktop <i>Styles:</i> ʱ ʽ ʾ ʿ, <i>Sources:</i>
259		Right Hook <i>Input:</i> \textrthook <i>Styles:</i> ʝ ʞ ʟ ʠ, <i>Sources:</i>
260		Palatalization Hook <i>Input:</i> \textpalhook <i>Styles:</i> ɟ ɠ ɢ ɣ, <i>Sources:</i>

²⁷This symbol is used among Japanese linguists as a diacritical symbol indicating no audible release (IPA ͡), because the symbol ͡ is used to indicate pitch accent in Japanese.

261		Superscript H, <i>IPA usage</i> : aspirated <i>Input1</i> : <code>ph</code> , <i>Input2</i> : <code>p\super h</code> <i>Styles</i> : p^h p^h p^h p^h , <i>Sources</i> : IPA '49–'93
262		Superscript W, <i>IPA usage</i> : labialized <i>Input1</i> : <code>kw</code> , <i>Input2</i> : <code>k\super w</code> <i>Styles</i> : k^w k^w k^w k^w , <i>Sources</i> : IPA '49–'93
263		Superscript J, <i>IPA usage</i> : palatalized <i>Input1</i> : <code>tj</code> , <i>Input2</i> : <code>t\super j</code> <i>Styles</i> : t^j t^j t^j t^j , <i>Sources</i> : IPA '49–'93
264		Superscript Gamma, <i>IPA usage</i> : velarized <i>Input1</i> : <code>t\textgamma</code> , <i>Input2</i> : <code>t\super G</code> <i>Styles</i> : t^γ t^γ t^γ t^γ , <i>Sources</i> : IPA '89, '93
265		Superscript Reversed Glottal Stop, <i>IPA usage</i> : pharyngealized <i>Input1</i> : <code>d\textrevglotstop</code> , <i>Input2</i> : <code>d\super Q</code> <i>Styles</i> : d^{f} d^{f} d^f d^{f} , <i>Sources</i> : IPA '89, '93
266		Superscript N, <i>IPA usage</i> : nasal release <i>Input1</i> : <code>dn</code> , <i>Input2</i> : <code>d\super n</code> <i>Styles</i> : d^n d^n dⁿ d^n , <i>Sources</i> : IPA '89, '93
267		Superscript L, <i>IPA usage</i> : lateral release <i>Input1</i> : <code>dl</code> , <i>Input2</i> : <code>d\super l</code> <i>Styles</i> : d^l d^l d^l d^l , <i>Sources</i> : IPA '89, '93

A.4. Tone letters

The tones illustrated here are only a representative sample of what is possible. For more details see the section entitled “Tone Letters” (page 14).

268		Extra High Tone <i>Input</i> : <code>\tone{55}</code> <i>Styles</i> : ᵿ ᵿ ᵿ ᵿ, <i>Sources</i> : IPA '89, '93
269		High Tone <i>Input</i> : <code>\tone{44}</code> <i>Styles</i> : ᵹ ᵹ ᵹ ᵹ, <i>Sources</i> : IPA '89, '93
270		Mid Tone <i>Input</i> : <code>\tone{33}</code> <i>Styles</i> : ᵺ ᵺ ᵺ ᵺ, <i>Sources</i> : IPA '89, '93
271		Low Tone <i>Input</i> : <code>\tone{22}</code> <i>Styles</i> : ᵻ ᵻ ᵻ ᵻ, <i>Sources</i> : IPA '89, '93
272		Extra Low Tone <i>Input</i> : <code>\tone{11}</code> <i>Styles</i> : ᵼ ᵼ ᵼ ᵼ, <i>Sources</i> : IPA '89, '93

273		Falling Tone <i>Input:</i> <code>\tone{51}</code> <i>Styles:</i> <code>\ V \ V \</code> , <i>Sources:</i> IPA '89, '93
274		Rising Tone <i>Input:</i> <code>\tone{15}</code> <i>Styles:</i> <code>\ / / / /</code> , <i>Sources:</i> IPA '89, '93
275		High Rising Tone <i>Input:</i> <code>\tone{45}</code> <i>Styles:</i> <code>\ 1 1 1 1</code> , <i>Sources:</i> IPA '89, '93
276		Low Rising Tone <i>Input:</i> <code>\tone{12}</code> <i>Styles:</i> <code>\ 1 1 1 1</code> , <i>Sources:</i> IPA '89, '93
277		High Rising Falling Tone <i>Input:</i> <code>\tone{454}</code> <i>Styles:</i> <code>\ 1 1 1 1</code> , <i>Sources:</i> IPA '89, '93

A.5. Diacritics for extIPA, VoQS

In order to use diacritics listed in this section, it is necessary to specify the option ‘extra’ at the preamble (See the section entitled “Other options” on page 8). Note also that some of the diacritics are defined by using symbols from fonts other than TIPA so that they may not look quite satisfactory and/or may not be slanted (e.g. `\whistle{s}`).

278		Left Right Arrow, Usage: labial spreading <i>Input:</i> <code>\spreadlips{s}</code> <i>Styles:</i> <code>\ s s s s</code> , <i>Sources:</i> extIPA '94
279		Overbridge, Usage: dentolabial <i>Input:</i> <code>\overbridge{v}</code> <i>Styles:</i> <code>\ v v v v</code> , <i>Sources:</i> extIPA '94
280		Bibridge, Usage: interdental/bidental <i>Input:</i> <code>\bibbridge{n}</code> <i>Styles:</i> <code>\ n n n n</code> , <i>Sources:</i> extIPA '94
281		Subscript Double Bar, Usage: alveolar <i>Input:</i> <code>\subdoublebar{t}</code> <i>Styles:</i> <code>\ t t t t</code> , <i>Sources:</i> extIPA '94
282		Subscript Double Vertical Line, Usage: strong articulation <i>Input:</i> <code>\subdoublevert{f}</code> <i>Styles:</i> <code>\ f f f f</code> , <i>Sources:</i> extIPA '94
283		Subscript Corner, Usage: weak articulation <i>Input:</i> <code>\subcorner{v}</code> <i>Styles:</i> <code>\ v v v v</code> , <i>Sources:</i> extIPA '94

284		Up Arrow, Usage: whistled Articulation <i>Input:</i> \whistle{s} <i>Styles:</i> s s s s, <i>Sources:</i> extIPA '94
285		Right Arrow, Usage: sliding articulation <i>Input:</i> \sliding{\ipa{Ts}} <i>Styles:</i> ʈs ʈs ʈs ʈs, <i>Sources:</i> extIPA '94
286		Crossed tilde, Usage: denasal <i>Input:</i> \crtilde{m} <i>Styles:</i> m m m m, <i>Sources:</i> extIPA '94
287		Dotted Tilde, Usage: nasal escape <i>Input:</i> \dottedtilde{a} <i>Styles:</i> a a a a, <i>Sources:</i> extIPA '94
288		Double Tilde, Usage: velopharyngeal friction <i>Input:</i> \doubletilde{s} <i>Styles:</i> s s s s, <i>Sources:</i> extIPA '94
289		Parenthesis + Ring, Usage: partial voiceless <i>Input:</i> \partvoiceless{n} <i>Styles:</i> n n n n, <i>Sources:</i> extIPA '94
290		Parenthesis + Ring, Usage: initial partial voiceless <i>Input:</i> \inipartvoiceless{n} <i>Styles:</i> n n n n, <i>Sources:</i> extIPA '94
291		Parenthesis + Ring, Usage: final partial voiceless <i>Input:</i> \finpartvoiceless{n} <i>Styles:</i> n n n n, <i>Sources:</i> extIPA '94
292		Parenthesis + Subwedge, Usage: partial voicing <i>Input:</i> \partvoice{s} <i>Styles:</i> s s s s, <i>Sources:</i> extIPA '94
293		Parenthesis + Subwedge, Usage: initial partial voicing <i>Input:</i> \inipartvoice{s} <i>Styles:</i> s s s s, <i>Sources:</i> extIPA '94
294		Parenthesis + Subwedge, Usage: final partial voicing <i>Input:</i> \finpartvoice{s} <i>Styles:</i> s s s s, <i>Sources:</i> extIPA '94
295		Subscript Left Pointer, Usage: right offset jaw voice <i>Input:</i> \sublptr{J} <i>Styles:</i> J J J J, <i>Sources:</i> VoQS '94
296		Subscript Right Pointer, Usage: left offset jaw voice <i>Input:</i> \subrptr{J} <i>Styles:</i> J J J J, <i>Sources:</i> VoQS '94

B. Symbols not included in TIPA

There are about 40 symbols that appear in *PSG* but are not included or defined in TIPA (ordinary capital letters, Greek letters and punctuation marks excluded). Most of such symbols are the ones that have been proposed by someone but never or rarely been followed by other people.

Some of such symbols can be realized by writing appropriate macros, while some others cannot be realized without resorting to the Metafont.

This section discusses these problems by classifying such symbols into three categories, as shown below.

- (1) Symbols that can be realized by \TeX 's macro level and/or by using symbols from other fonts.
- (2) Symbols that can be imitated by \TeX 's macro level and/or by using symbols from other fonts (but may not look quite satisfactory).
- (3) Symbols that cannot be realized at all, without creating a new font.

The following table shows symbols that belong to the first category. For each symbol, an example of input method and its output is also given. Note that barred or crossed symbols can be easily made by TIPA's `\ipabar` macro.

Script Lowe-case F	<code>{\itshape f}</code>	f
Barred Small Capital I	<code>\ipabar{\textsci}{.5ex}{1.1}{}{}</code>	\textsci I
Barred J	<code>\ipabar{j}{.5ex}{1.1}{}{}</code>	\textsci j
Crossed K	<code>\ipabar{k}{1.2ex}{.6}{}{.4}</code>	\textsci k
Barred Open O	<code>\ipabar{\textopeno}{.5ex}{.6}{.4}{}{}</code>	\textsci o
Barred Small Capital Omega	<code>\ipabar{\textscomega}{.5ex}{1.1}{}{}</code>	\textsci \Omega
Barred P	<code>\ipabar{p}{.5ex}{1.1}{}{}</code>	\textsci p
Half-barred U	<code>\ipabar{u}{.5ex}{.5}{}{.5}</code>	\textsci u
Barred Small Capital U	<code>\ipabar{\textscu}{.5ex}{1.1}{}{}</code>	\textsci U
Null Sign	<code>\emptyset</code>	\emptyset
Double Slash	<code>/\kern-.25em/</code>	$//$
Triple Slash	<code>/\kern-.25em/\kern-.25em/</code>	$///$
Pointer (Upward)	<code>k\super{\tiny\$\wedge\$}</code>	k^{\wedge}
Pointer (Downward)	<code>k\super{\tiny\$\vee\$}</code>	k^{\vee}
Superscript Arrow	<code>k\super{\super{\leftarrow}}</code>	k^{\leftarrow}

Symbols that belong to the second category are shown below. Note that slashed symbols can be in fact easily made by a macro. For example, a slashd b i.e. \textsci b can be made by `\ipaclap{b}{/}`. The reason why slashed symbols are not included in TIPA is as follows: first, a simple overlapping of a symbol and a slash does not always result in a good shape, and secondly, it doesn't seem significant to devise fine-tuned macros for symbols which were created essentially for typewriters.

Right-hook A	Ȧ
Slashed B	Ḃ
Slashed C	Ĉ
Slashed D	Ḍ
Small Capital Delta	Δ
Right-hook E	Ȧ
Right-hook Epsilon	Ḝ
Small Capital F	F
Female Sign	
Uncrossed Female Sign	
Right-hook Open O	
Slashed U	Ũ
Slashed W	Ẃ

And finally, symbols that cannot be realized at all are as follows.

- Reversed Turned Script A
- A-O Ligature
- Inverted Small Capital A
- Small Capital A-O Ligature
- D with Upper-left Hook
- Hooktop H with Rightward Tail
- Heng
- Hooktop J
- Front-bar N
- Inverted Lower-case Omega
- Reversed Esh with Top Loop
- T with Upper Left Hook
- Turned Small Capital U
- Bent-tail Yogh
- Turned 2
- Turned 3

C. Layout of TIPA fonts

xipa10

	0	1	2	3	4	5	6	7	
00x	`	´	^	˘	¨	”	°	˙	~0x
01x	˘	–	˙	˚	˛	”	˘	˙	
02x	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	~1x
03x	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	
04x	ˆ	!	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	~2x
05x	()	*	+	,	-	.	/	
06x	u	i	Λ	3	u	e	D	ʁ	~3x
07x	ø	ə	ː	˙	˘	=	˘	?	
10x	ə	ɑ	β	ϵ	ð	ε	φ	Υ	~4x
11x	fi	ı	j	ʁ	Λ	ny	ŋ	ɔ	
12x	ʔ	ʎ	r	f	θ	υ	υ	uu	~5x
13x	χ	ʏ	ʒ	[˘]	˘	˘	
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	–	˘	˘	˘	˘	˘	˘	˘	~8x
21x	/	–	˘	˘	˘	˘	˘	˘	
22x	/	/			↓	↑	↗	↘	~9x
23x	˘	˘	˘	˘	˘	˘	˘	˘	
24x	đ	đ	đ	E	g	ı	ı	ı	~Ax
25x	J	ʎ	ı	λ	ı	ı	ı	æ	
26x	ω	Ω	Q	∫	ı	ı	ts	ı	~Bx
27x	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	
30x	A	C	Ç	ç	ø	ø	ø	ø	~Cx
31x	ʁ	G	ŋ	H	ı	J	k	L	
32x	ı	ω	ı	ı	ı	ı	ı	æ	~Dx
33x	ı	ı	ı	ı	ı	ı	ı	ı	
34x	B	ı	ı	ı	ı	G	æ	ç	~Ex
35x	h	J	f	ı	ı	ı	ı	ı	
36x	N	ı	⊙	ı	ı	ı	R	œ	~Fx
37x	ø	ş	t	M	ı	ı	ı	ı	
	~8	~9	~A	~B	~C	~D	~E	~F	