

TIPA Manual

Version 1.3

Rei Fukui

**Graduate School of Humanities and
Sociology**

The University of Tokyo

fkr@l.u-tokyo.ac.jp

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PHONETICS is the **science** of speech-sounds.

From a practical point of view it is the **art** of producing speech-sounds and recognizing them by ear.

(Henry Sweet, *A Primer of Phonetics*, 1906; Boldface by Sweet)

The non-roman letters of the International Phonetic Alphabet have been designed as far as possible to harmonise well with the roman letters. The Association does not recognise makeshift letters; It recognises only letters which have been carefully cut so as to be in harmony with the other letters.

(*The Principles of the International Phonetic Association*, 1949)

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Chapter 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 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 $\text{\LaTeX} 2_{\epsilon}$.
- A variety of font styles including roman, slanted, bold, bold extended, sans serif and typewriter.
- Easy input method in the IPA environment.
- Extended macros for accents and diacritics.³
- A flexible system of macros for 'tone letters'.
- An optional package (`vowel.sty`) for drawing vowel diagrams. This package can be used independently from the TIPA package.⁴
- A slightly modified set of fonts that go well when used with Times Roman and Helvetica fonts.

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.

⁴Documentation is also made separately in '`vowel.tex`' so that no further mention will be made here.

1.1 Installation

1.1.1 Basics

In a CTAN site or any other sites that have a copy of the TIPA package, the directory structure of TIPA looks as follows.

```
sty — containing *.sty, *.fd, *.def files.
mf  — containing METAFONT source files.
tfm — containing font metric files.
doc — containing document files.
dvips — containing tipa.map file.
type1 — containing PostScript type1 fonts.
```

If you are using a recent set of L^AT_EX2e distribution, all you need to do is basically only two things.

- Copy all the files in the `sty` directory into an appropriate place.
- Copy all the files in the `mf` directory into an appropriate place.

In the case of a popular Unix-like OS, the actual installation procedure will look like the following.

(`$texmf` stands for your T_EX system directory; `/usr/local/share/texmf`, for example).

```
mkdir $texmf/tex/latex/tipa — create a directory for style files.
cp sty/* $texmf/tex/latex/tipa — copy all the files in sty.
mkdir $texmf/fonts/source/fkr — create a directory for
mkdir $texmf/fonts/source/fkr/tipa mf files.
cp mf/* $texmf/fonts/source/fkr/tipa — copy all the mf files.
mktexlsr — update the kpathsea database.
```

If you are using Windows or Mac, follow the equivalent steps: i.e., create a directory/folder for style files and copy the contents of the TIPA `sty` directory/folder; then, create a directory/folder for METAFONT source files and copy the contents of the TIPA `mf` directory/folder.

If you are going to run TIPA on the basis of `pk` files, all other things such as `tfm` files and `pk` files will be generated automatically. That's all for the installation.

You may optionally copy all the `tfm` files into an appropriate directory which T_EX and device driver programs can find. This will save time for the automatic font generation.

```
mkdir $texmf/fonts/tfm/fkr
mkdir $texmf/fonts/tfm/fkr/tipa
cp tfm/* $texmf/fonts/tfm/fkr/tipa
```

If your T_EX system is not equipped with the automatic font generation mechanism, you may have to create and install `pk` files by yourself. For example:

```
(generate pk font files; please ask someone how to do this.)
mkdir $texmf/fonts/pk/ljfour/fkr
mkdir $texmf/fonts/pk/ljfour/fkr/tipa
cp *pk $texmf/fonts/pk/ljfour/fkr/tipa
```


1.2. TIPA font families

1.1.2 Installing Type1 fonts

If you want to create a PDF document, you need to install Type1 fonts. First, copy the contents of the directories `dvips` and `type1` onto appropriate directories. For example:

```
cp dvips/tipa.map $texmf/dvips/config
mkdir $texmf/fonts/type1/fkr
mkdir $texmf/fonts/type1/fkr/tipa
cp type1/* $texmf/fonts/type1/fkr/tipa
mktexlsr — update the kpathsea database.
```

Then, edit config files for your device driver. In the case of `dvips`, edit `config.ps` and/or `config.pdf`, for example, and insert a line containing:

```
p +tipa.map
```

There are several ways to make PDF documents. The author of this document usually uses `dvips`. For example:

```
dvips -Ppdf tipaman
```

will produce `tipaman.ps`. In this case, `config.pdf` has to be modified as explained above. Then, by using Acrobat Distiller (this is not free software), you can convert it to a PDF file. Alternatively, you can use free software such as `dvipdfm`, `dvipdf`, `pdflatex`, and so on.

In the case of `pdflatex`, for example, you have to copy the file `tipa.map` onto the following directory.

```
$texmf/pdftex/config
```

Then, edit `pdftex.cfg` and insert a line containing:

```
map +tipa.map
```

1.2 TIPA font families

This version of TIPA includes two families of IPA fonts, `tipa` and `xipa`. The former family of fonts is for normal use with L^AT_EX, 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: `tipas18`, `tipas19`, `tipas110`, `tipas112`

Bold extended: `tipabx8`, `tipabx9`, `tipabx10`, `tipabx12`

Bold extended Slanted: `tipabs10`

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

Sans serif Bold extended: `tipasb10`

Sans serif Slanted: tipasi10

Bold: tipab10

Typewriter Text: tipatt8, tipatt9, tipatt10, tipatt12

Typewriter Text Slanted: tipats10

- xipa

Roman: xipa10

Slanted: xipas110

Bold: xipab10

Bold Slanted: xipabs10

Sans serif Bold: xipasb10

Sans serif Slanted: xipasi10

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).

Chapter 2

TIPA Encoding

2.1 Selection of symbols

2.1.1 IPA symbols

When the first version of TIPA (version 1.0) was released, the selection of IPA phonetic symbols was made based on the following works.

- *Phonetic Symbol Guide* (Pullum and Ladusaw, 1986).
- The official IPA charts of '49, '79, '89 and '93 versions.
- Articles published in the *JIPA*¹, such as IPA (1989), IPA (1990), Esling and Gaylord (1993), IPA (1993), and so on.
- An unpublished paper by J. C. Wells: “Computer-coding the IPA: a proposed extension of SAMPA” (Wells, 1995).
- Popular textbooks on phonetics.

More specifically, this first version tried to incorporate all the symbols and diacritics defined in the '79, '89 and '93 versions of IPA and some non-IPA symbols. And in the case of the '49 version of IPA, as was described in the *Principles* (IPA, 1949), there were too many obsolete symbols and only those symbols that had had some popularity at least for some time or for some group of people were included.

Then, soon after the first release, several important works were published.

- The second edition of *Phonetic Symbol Guide* (Pullum and Ladusaw, 1996). (henceforth abbreviated as *PSG*.)
- The official IPA chart of '96 version.
- “Preview of the IPA Handbook” (IPA, 1995).
- *Handbook of the International Phonetic Association* (IPA, 1999). (henceforth abbreviated as *Handbook*.)

¹ *Journal of the International Phonetic Association*.

The differences between '93 and '96 versions of IPA are very few. However, the second edition of *PSG* contains much more symbols than before.

The current version of tipa (version 1.1) is a result of an effort to increase the number of symbols as much as possible and to cover almost all the symbols included in *PSG*. However, the 256 character encoding (see next section for detail) used in TIPA has been already filled with symbols assigned in the first release. Therefore, it was necessary to create a set of new auxiliary fonts to include new symbols, and the new set of fonts is now called TIPX.

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. This system was devised by Yuen-Ren Chao (Chao, 1933) and it is now admitted as an official way of representing tones in the recent publication of the International Phonetic Association.

But the treatment of tone letters is quite insufficient in that only a limited number of combinations 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 such problem was that sometimes the exact shape of a symbol was unclear. For example, the shapes of the symbols such as ʃ (Stretched C), and ʝ (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 a 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.

2.1.2 Non-IPA symbols

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., ʰ, ʳ, ʷ, ʸ, ʹ, ʺ, and accents such as ˆ, ˜, etc.)
- Symbols used in the phonetic description of languages in East Asia. (e.g., ɿ, ʅ, ɕ, ɹ, ʈ, etc.)
- Diacritics used in 'ExtIPA Symbols for Disordered Speech' (ICPLA, 1994) and 'VoQS (Voice Quality Symbols)' (Ball et al., 1994). (e.g., ̩, ̥, ̦, etc.)

2.2. 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 2.1: Layout of the T3 encoding

2.2 Encoding

The 256 character encoding of TIPA is now officially called the ‘T3’ encoding.² In deciding this new encoding, care is taken to harmonize with other existing 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 inputted with small number of keystrokes.

Table 2.1 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, and 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

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

<i>ASCII</i>	:	:	:	:	:	:	:	:	:	:
<i>TIPA</i>	:	˙	˘	˙	˘	˙	˘	˙	˘	˙
<i>ASCII</i>	0	1	2	3	4	5	6	7	8	9
<i>TIPA</i>	ʊ	ɪ	ʌ	ɜ	ɥ	ɐ	ɒ	ɹ	ɵ	ə
<i>ASCII</i>	@	A	B	C	D	E	F	G	H	I
<i>TIPA</i>	ə	ɑ	β	ɕ	ð	ɛ	φ	ɣ	ɦ	ɪ
<i>ASCII</i>	J	K	L	M	N	O	P	Q	R	S
<i>TIPA</i>	j	ɸ	ʌ	ɱ	ɲ	ɔ	ʔ	ʕ	ɾ	ʃ
<i>ASCII</i>	T	U	V	W	X	Y	Z			
<i>TIPA</i>	θ	ʊ	ʊ	ʍ	χ	ɻ	ʒ			

Table 2.2: TIPA shortcut characters

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 ‘˙’ 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. Also, the assignments made here are used as the ‘shortcut characters’, which will be explained in section 3.2.1.

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 consensus on what symbols are to be assigned to each code. For example, they were almost unanimous for the assignments such as ɑ for A, β for B, ð for D, ʃ for S, θ for T, etc. For more details, see table 2.2.

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 ɜ 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.³ Fortunately the resemblance of shape is to some extent maintained as is shown in table 2.2.

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 be ‘g’, rather than ‘g’, as a phonetic symbol.⁴

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

³This idea was influenced by the above mentioned article by J. C. Wells (Wells, 1995).

⁴However, it was declared that these two symbols are equivalent in the most recent version of the IPA. Anyway, alternative shape ‘g’ is preserved in another section and can be used as `\textg`.

2.2. *Encoding*

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.⁵ 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 F.

⁵This is based on a suggestion by Jörg Knappen.

Chapter 3

Usage

3.1 Declaration of TIPA package

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

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

If you want to use an additional set of phonetic symbols, declare `tipx.sty` after the declaration of `tipa.sty`.

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

3.1.1 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.

3.1.2 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.

This manual can be typeset with Times Roman and XIPA fonts by uncommenting a few lines that appear near the top of the file `tipaman.tex`.

3.1.3 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`; maybe harmless but too short for a control sequence name.
- `*` Already defined in plain T_EX; however, many consider its redefinition harmless.
- `\|`, `\:`, `\;`, `\!` Already defined in L^AT_EX; these redefinitions are obviously the most dangerous ones. However, remedies are prepared even in ‘unsafe’ mode. There is a command called `\Vert` which has the same meaning as `\|` and can be used in ‘unsafe’ mode. For the remaining three commands, TIPA provides commands called `\tipamedspace`, `\tipathickspace` and `\tipanegthinspace` which retain the meanings of `\:`, `\;` and `\!`, respectively, even in the ‘unsafe mode’.

Despite the above ‘remedies’, you may sometimes want to use the above commands with their original names in the ‘unsafe’ mode. In such cases, a command called `\tipasafemode` can be used. For example:

3.2. Input commands for phonetic symbols

Input: `\textipa{[\!b] [\!r] [\!B]}\quad\{tipasafemode
$ a\!:\!a\quad b\!;\!b\quad c\!\!c\quad\!|\! |\! $}\quad
\textipa{[\!b] [\!r] [\!B] (back again!)}`

Output: [b] [r] [B] a a b b æ || [b] [r] [B] (back again!)

As is shown in this example, `\tipasafemode` must be used within a group. Otherwise, the meanings of TIPA's special macros are lost.

Finally, more than one options can be specified at the same time, by separating a comma. For example:

```
\usepackage[tone,extra,safe]{tipa}
```

3.2 Input commands for phonetic symbols

3.2.1 Ordinary phonetic symbols

TIPA phonetic symbols can be inputted 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{...}`¹
- `{\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 inputted 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. 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 inputted 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{["Ekspl@"neɪʃən]}`

Output 2: [ɛksplə'neɪʃən]

¹I personally prefer a slightly shorter name like `\ipa` rather than `\textipa` so that I usually put a command `\let\ipa\textipa` somewhere in my style file. However, this command was named after the general convention of L^AT_EX 2_ε. The same can be said for all the symbol names beginning with `\text`.

<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>\textrtaild</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>	ḥ
Beta	<code>\textbeta</code>	β

Table 3.1: Naming of TIPA symbols

It is apparent that inputting shortcut characters in the IPA environment is far easier than inputting lengthy symbol names 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 neighboring symbols is enabled, as is illustrated by the following pair of examples.

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

Output 1: vɐv wɐw yɐy [ʃ]

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

Output 2: vɐv wɐw yɐy [ʃ]

In the next example, *Input 2* is far better than *Input 1*, for the same reason.

Input 1: `[\textipa{S}]`

Output 1: [ʃ]

Input 2: `\textipa{[S]}`

Output 2: [ʃ]

Therefore, it is recommended to use `\textipa` or other IPA environments as much as possible.

Table 2.2 shows most of the shortcut characters that can be used in the IPA environment, together with the corresponding characters in the ASCII encoding.

3.2.2 Naming of phonetic symbols

Every TIPA phonetic symbol has a unique symbol name, such as *Turned A*, *Hooktop B*, *Schwa*. Also each symbol has a corresponding macro name, such as `\textturna`, `\texthtb`, `\textschwa`. The naming was made based on the literature listed in section 2.1. Among them, *PSG* is particularly important because it gives several explicit principles on naming. As an example, the three terms ‘turned’, ‘inverted’ and ‘reversed’ are distinguished in the following way (p. xxvii):

Turned rotated by 180 degrees (e.g., t vs. ɹ)

3.2. Input commands for phonetic symbols

Inverted vertical mirror image (e.g., \mathfrak{R} vs. \mathfrak{R})

Reversed horizontal mirror image (e.g., $\mathfrak{?}$ vs. $\mathfrak{?}$)

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 can be summarized as follows.

- 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 `0` is added.

Note that the prefix `0` (old) should be given in uppercase letter.

Table 3.1 shows some examples of correspondence between symbol names and control sequence names.

3.2.3 Ligatures

Just like the symbols such as “, ”, −, —, fi, ff are realized as ligatures by inputting ‘, ’, --, ---, fi, ff in \TeX , two of the TIPA symbols, namely *Secondary Stress* and *Double Pipe*, and double quotation marks² can be inputted as ligatures in the IPA environment.

Input: `\textipa{" " | | ‘ ’}`

Output: ‘, | || “ ”

3.2.4 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 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 \LaTeX 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. (However, TIPA provides commands called `\tipamedspace`, `\tipathickspace` and `\tipanegthinspace`, having the same meanings as `\:`, `\;` and `\!`, respectively. These can be used even in ‘unsafe’ mode.)

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.³

²Although 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.

³This idea was pointed out by Jörg Knappen.

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

Output: ɸ ɰ ɹ ɹ ɯ

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 otherwise has no easy way to input.

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

Output: ɟ ɲ ɥ ɫ 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 d0g, *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: d̥ l̥ n̥ r̥ s̥ z̥

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

Output: b̥ d̥ g̥ f̥ ɡ̥ ɔ̥

3.2.5 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 inputted in the IPA environment.

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

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

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

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

Output: ; : @ # \$ & % { }

3.2. Input commands for phonetic symbols

<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>	Ḅ
<code>\textsubring{a}</code>	<code>\r*a</code>	Ḥ
<code>\textdotacute{e}</code>	<code>\.'e</code>	é
<code>\textgravedot{e}</code>	<code>\'e</code>	è
<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>\textbreve{a}</code>	<code>\u=a</code>	ă

Table 3.2: Examples of inputting accents and diacritics

3.2.6 Accents and diacritics

Table 3.2 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 inputted 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 inputted by lengthy macro names. Table 3.3 shows examples of such accents. Note that the macro `\|` is also ‘dangerous’ in that it has been already defined as a math symbol of L^AT_EX. So if you want to preserve the original meaning of this macro, declare ‘`safe`’ option at the preamble. (However, there is an alternative command called `\Vert` (originally defined in plain T_EX) which has the same meaning as `\|` and can be used even if the `safe` option is not specified.)

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

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

Output: *k̂mtóm *bhrátēr

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

<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 _u
<code>\textinvsubbridge{t}</code>	<code>\ t</code>	t _u
<code>\textsublhalfring{a}</code>	<code>\ (a</code>	a _c
<code>\textsubrhalfring{a}</code>	<code>\)a</code>	a _c
<code>\textroundcap{k}</code>	<code>\ c{k}</code>	k _u
<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

Table 3.3: Examples of the accent prefix \l

3.2.7 Superscript symbols

In the normal text environment, superscript symbols can be inputted by a L^AT_EX macro called `\textsuperscript`. 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: $t^h k^w$
 a^{bc}
 a^{b^c}

Output 1: $t^h k^w a^{bc} a^{b^c}$

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

Output 2: $t^h k^w a^{bc} a^{b^c}$

(A quiz question: A careful reader may have noticed that the above *Output1* and *Output2* slightly differ. Explain the reason.)

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

3.2.8 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 the tone letter macro, the four tones of Chinese are shown below.

3.3. How easy is it to input phonetic symbols?

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

Output: ma⁷ “mother”, ma¹ “hemp”, ma³ “horse”, ma⁵ “scold”

The next example looks ridiculous but shows capabilities of the tone letter macro.

Input: \tone{15253545}

Output:

\stone

In some languages, length distinctions accompany the tone letter description. In such cases a command called `\stone` can be used to represent a tone letter that is shorter than a usual one. The next example from Cantonese illustrates this (look at the examples for *entering tones*).

<i>Tone name</i>	<i>Input</i>	<i>Output</i>
high level	\tone{53} or \tone{55}	˥ or ˥˥
low level	\tone{21} or \tone{22}	˩ or ˩˩
high rising	\tone{35}	˥˩
low rising	\tone{24}	˩˥
high departing	\tone{44}	˥˨
low departing	\tone{33}	˩˨
high entering	\stone{55}	˥
mid entering	\stone{44}	˥˩
low entering	\stone{33}	˩

\rtone

In some languages, the level/contour bars are placed at the right hand side of the vertical bar. In such cases a command called `\rtone` is used instead of `\tone`. The next example is from the Kyoto Japanese.

Input: `\textipa{[\rtone{11}a\rtone{53}me]}` ‘rain’

Output: [La \neg me] ‘rain’

3.3 How easy is it to input phonetic symbols?

Let us briefly estimate here how easy (or difficult) it is 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 inputted 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, α, β, etc.
2	2	∅,
3	30	æ, t, v, f, etc.
5	1	ç
more than 5	7	ø, ʔ, ±, w, etc.

<i>Font style</i>	<i>Input in the IPA environment</i>	<i>Output</i>
<i>Roman</i>	<code>\textipa{f@"nEtIks}</code>	fə'netɪks
<i>Slanted</i>	<code>\textipa{\slshape f@"nEtIks}</code>	fə'netɪks
or	<code>\textipa{\textsl{f@"nEtIks}}</code>	fə'netɪks
or	<code>\textsl{\textipa{f@"nEtIks}}</code>	fə'netɪks
<i>Bold extended</i>	<code>\textipa{\bfseries f@"nEtIks}</code>	fə'netɪks
or	<code>\textipa{\textbf{f@"nEtIks}}</code>	fə'netɪks
or	<code>\textbf{\textipa{f@"nEtIks}}</code>	fə'netɪks
<i>Sans serif</i>	<code>\textipa{\sffamily f@"nEtIks}</code>	fə'netɪks
or	<code>\textipa{\textsf{f@"nEtIks}}</code>	fə'netɪks
or	<code>\textsf{\textipa{f@"nEtIks}}</code>	fə'netɪks
<i>Typewriter Text</i>	<code>\textipa{\ttfamily f@"nEtIks}</code>	fə'netɪks
or	<code>\textipa{\texttt{f@"nEtIks}}</code>	fə'netɪks
or	<code>\texttt{\textipa{f@"nEtIks}}</code>	fə'netɪks

Table 3.4: Examples of font switching

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

3.4 Changing font styles

This version of TIPA includes five styles of fonts, i.e., roman, slanted, bold, bold extended, sans serif and typewriter. These styles can be switched in much the same way as in the normal text fonts (see table 3.4).

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{ABCDEFG}}`

Output: **abcdefg aɸɕðɛɸɣ**

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

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

Output: é

Input: `\textsl{\textdoublebaresh}`

Output: ₣ (This symbol is composed by a macro.)

Chapter 4

Customizing TIPA

4.1 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.

4.1.1 `\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 and length 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 as the symbol in question. For example, the following command states a barred `b` (`\textbarb 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` (`\textbarc c`) of which the bar width is a little more than half as large as the letter `c` and it has the same amount of kerning at the right.

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

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

4.1.2 `\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 an 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`.

4.1.3 `\tipaLoweraccent`, `\tipaUpperaccent`

These two commands differ from the two commands explained above in that the first parameter should be a symbol (or any other thing, 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{\texttip{\super@}}}{a}`
Output: ă

The next example is an interesting application of this command for the Middle High German (This macro and the example below are provided by Christian Folini and now included in `tipa.sty`).

```
\newcommand{\sup}[2]{\texttip{\tipaUpperaccent[.2ex]{%
  \lower.8ex\hbox{\super{#2}}}{#1}}}
```

4.2. Manual Kerning

Und swer dc mit flis t^ot, so stat das gelt und v^och d^u g^uter in destē
bessere behabnüsse und beh^ugde. (1330 AD. Translation: And if
this is done with diligence, the money and the affairs will be in
better shape.)

In this example, t^ot is inputted as `t\sups{u}{o}t` and so on.

4.1.4 \ipaclap

This command is useful if you need to compose a new symbol by overlapping two symbols. This command is different from T_EX's commands `\llap` and `\rlap` in that the alignment is made at the center of each symbol.

The next example shows how to make a Slashed B.

Input: `\ipaclap{\textipa{b}}{\textipa{/}}`

Output: ɸ

4.2 Manual Kerning

The shapes of phonetic symbols are sometimes *nasty* in the sense that they can have a leftward or rightward protrusion that cannot be found in the case of normal text fonts. In such cases it is sometimes necessary to input kerning commands manually.

One way to do this is to prepare a set of kerning commands like the following:

```
\newcommand\K{\kern.05em} % small amount of kerning
\newcommand\KK{\kern.1em} % middle amount of kerning
\newcommand\KKK{\kern.2em} % big amount of kerning
```

And then to put these commands whenever necessary. For example:

Input: `\textipa{[\texttrhooke r]}`

Output: $[\text{e}_r]$ — This is OK but

Input: `\textipa{[\texttrhooke]}`

Output: $[\text{e}]$ — this doesn't look good so that

Input: `\textipa{[\texttrhooke\KK]}`

Output: $[\text{e}_]$ — manually fixed like this.

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Bibliography

- Martin J. Ball, John Esling, and Craig Dickson. VoQS: Voice Quality Symbols. Revised to 1994, 1994.
- D. M. Beach. *The Phonetics of the Hottentot Language*. Cambridge: Heffner, 1938.
- Yuen-Ren Chao. A system of tone letters. *Le Maître Phonétique*, (30):24–27, 1933.
- John H. Esling and Harry Gaylord. Computer codes for phonetic symbols. *Journal of the International Phonetic Association*, 23(2):83–97, 1993.
- ICPLA. extIPA Symbols for Disordered Speech. Revised to 1994, 1994.
- IPA. *The Principles of the International Phonetic Association*. University College: London, 1949.
- IPA. Report on the 1989 Kiel Convention. *Journal of the International Phonetic Association*, 19(2):67–80, 1989.
- IPA. Further report on the 1989 Kiel Convention. *Journal of the International Phonetic Association*, 20(2):22–24, 1990.
- IPA. Council actions on revisions of the IPA. *Journal of the International Phonetic Association*, 23(1):32–34, 1993.
- IPA. Preview of the IPA Handbook. *Journal of the International Phonetic Association*, 25(1):1–48, 1995.
- IPA. *Handbook of the International Phonetic Association*. Cambridge University Press, 1999.
- Daniel Jones. The term ‘phoneme’. In W. E. Jones and J. Laver, editors, *Phonetics in Linguistics: A Book of Reading*, pages 187–204. London: Longman, 1973.
- Bernhard Karlgren. *Étude sur la phonologie chinoise*. Leyde, Stockholm, and Gotembourg, 1915–1926.
- Geoffrey K. Pullum and William A. Ladusaw. *Phonetic Symbol Guide*. The University of Chicago Press, 1986. First Edition.
- Geoffrey K. Pullum and William A. Ladusaw. *Phonetic Symbol Guide*. The University of Chicago Press, 1996. Second Edition.
- George L. Trager. *Phonetics: Glossary and Tables*. Studies in Linguistics: Occasional Papers 6. Buffalo, N.Y., 1964.
- 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 `x_height` and baseline are also shown. At the top left corner of a frame, a number indicating the octal code of the symbol is shown. In the case of a symbol from `tipx` fonts, the code number is underlined.

Next, the following information is shown at the right of each symbol in this order: (1) the name of the symbol, (2) explanation on its usage with some examples (for non-IPA usages, an asterisk is put at the beginning), (3) input method in typewriter style, and finally (4) 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* (Pullum and Ladusaw, 1996)

Handbook = *Handbook of the International Phonetic Association* (IPA, 1999)

Principles = *Principles of the International Phonetic Association* (IPA, 1949)














JIPA = *Journal of the International Phonetic Association*

IE Indo-European

OHG Old High German

OCS Old Church Slavic
















A.1 Vowels and Consonants














'141		Lower-case A <i>Usage:</i> open front unrounded vowel <i>Input:</i> <code>a</code> <i>Sources:</i> IPA '49–'96
'040		Right-hook A <i>Input:</i> <code>\textrhooka</code> <i>Sources:</i> PSG
'065		Turned A <i>Usage:</i> near-open central vowel <i>Input1:</i> <code>\textturna</code> <i>Input2:</i> 5 <i>Sources:</i> IPA '49–'96
'101		Script A <i>Usage:</i> open back unrounded vowel <i>Input1:</i> <code>\textscripta</code> <i>Input2:</i> A <i>Sources:</i> IPA '49–'96
'066		Turned script A <i>Usage:</i> open back rounded vowel <i>Input1:</i> <code>\textturnscripta</code> <i>Input2:</i> 6 <i>Sources:</i> IPA '49–'96
'041		Inverted script A <i>Input:</i> <code>\textinvscripta</code> <i>Sources:</i> PSG
'346		Ash <i>Usage:</i> near-open front unrounded vowel <i>Input:</i> <code>\ae</code> <i>Sources:</i> IPA '49–'96
'042		A-O ligature <i>Input:</i> <code>\textaoilig</code> <i>Sources:</i> PSG
'300		Small capital A ¹ <i>Usage:</i> *open central unrounded vowel <i>Input1:</i> <code>\textsca</code> <i>Input2:</i> <code>\;A</code> <i>Sources:</i> PSG
'043		Left-hook four <i>Input:</i> <code>\textlhookfour</code> <i>Sources:</i> PSG
'160		Inverted small capital A <i>Input:</i> <code>\textinvsca</code> <i>Sources:</i> PSG
'161		Small capital A-O ligature <i>Input:</i> <code>\textscaolig</code> <i>Sources:</i> PSG
'062		Turned V ² <i>Usage:</i> open-mid back unrounded vowel <i>Input1:</i> <code>\textturnv</code> <i>Input2:</i> 2 <i>Sources:</i> IPA '49–'96

¹This symbol is fairly common among Chinese phoneticians.

²In a previous version of PSG this symbol was called 'Inverted V' but it was apparently a mistake.

A.1. Vowels and Consonants
















'162		Small capital delta <i>Input:</i> <code>\textscdelta</code> <i>Sources:</i> PSG
'142		Lower-case B <i>Usage:</i> voiced bilabial plosive <i>Input:</i> <code>b</code> <i>Sources:</i> IPA '49–'96
'240		Crossed B <i>Input:</i> <code>\textcrb</code> <i>Sources:</i> PSG
Macro		Barred B <i>Input:</i> <code>\textbarb</code> <i>Sources:</i> PSG
'272		Soft sign <i>Usage:</i> *as in OCS ognь 'fire'. <i>Input:</i> <code>\textsoftsign</code> <i>Sources:</i> PSG
'273		Hard sign <i>Usage:</i> *as in OCS gradъ 'town'. <i>Input:</i> <code>\texthardsign</code> <i>Sources:</i> PSG
'341		Hooktop B <i>Usage:</i> voiced bilabial implosive <i>Input1:</i> <code>\texthtb</code> <i>Input2:</i> <code>!b</code> <i>Sources:</i> IPA '49–'96
'340		Small capital B <i>Usage:</i> voiced bilabial trill <i>Input1:</i> <code>\textscb</code> <i>Input2:</i> <code>;\B</code> <i>Sources:</i> IPA '89–'96
'102		Beta <i>Usage:</i> voiced bilabial fricative <i>Input1:</i> <code>\textbeta</code> <i>Input2:</i> <code>B</code> <i>Sources:</i> IPA '49–'96
'143		Lower-case C <i>Usage:</i> voiceless palatal plosive <i>Input:</i> <code>c</code> <i>Sources:</i> IPA '49–'96
Macro		Barred C <i>Input:</i> <code>\textbarc</code> <i>Sources:</i> PSG
Macro		Wedge C <i>Usage:</i> *equivalent to IPA tʃ <i>Input:</i> <code>\v{c}</code> <i>Sources:</i> PSG
'347		C Cedilla <i>Usage:</i> voiceless palatal fricative <i>Input:</i> <code>\c{c}</code> <i>Sources:</i> IPA '49–'96
'301		Hooktop C <i>Usage:</i> voiceless palatal implosive <i>Input:</i> <code>\texthtc</code> <i>Sources:</i> IPA '89
'103		Curly-tail C <i>Usage:</i> voiceless alveolo-palatal fricative <i>Input1:</i> <code>\textctc</code> <i>Input2:</i> <code>C</code> <i>Sources:</i> IPA '49–'96

'302		Stretched C ³ <i>Usage:</i> postalveolar click <i>Input:</i> <code>\textstretchc</code> <i>Sources:</i> IPA '49, '79
'044		Stretched C (original form) <i>Input:</i> <code>\textstretchcvar</code> <i>Sources:</i> Beach (1938)
'045		Curly-tail stretched C <i>Input:</i> <code>\textctstretchc</code> <i>Sources:</i> PSG
'046		Curly-tail stretched C (original form) <i>Input:</i> <code>\textctstretchcvar</code> <i>Sources:</i> Beach (1938)
'144		Lower-case D <i>Usage:</i> voiced dental or alveolar plosive <i>Input:</i> <code>d</code> <i>Sources:</i> IPA '49–'96
'241		Crossed D <i>Input:</i> <code>\textcrd</code> <i>Sources:</i> PSG
Macro		Barred D <i>Input:</i> <code>\textbard</code> <i>Sources:</i> PSG
'047		Front-hook D <i>Input:</i> <code>\textfrhookd</code> <i>Sources:</i> PSG
'050		Front-hook D (Original) ⁴ <i>Input:</i> <code>\textfrhookdvar</code> <i>Sources:</i>
'342		Hooktop D <i>Usage:</i> voiced dental or alveolar implosive <i>Input1:</i> <code>\texthtd</code> <i>Input2:</i> <code>\!d</code> <i>Sources:</i> IPA '49–'96
'343		Right-tail D <i>Usage:</i> voiced retroflex plosive <i>Input1:</i> <code>\textrtaild</code> <i>Input2:</i> <code>\:d</code> <i>Sources:</i> IPA '49–'96
'243		Hooktop right-tail D <i>Usage:</i> voiced retroflex implosive <i>Input:</i> <code>\texthtrtaild</code> <i>Sources:</i> PSG, Handbook
'242		Curly-tail D <i>Usage:</i> *voiced alveolo-palatal plosive <i>Input:</i> <code>\textctd</code> <i>Sources:</i>















³The 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 descender and the whole shape looked more like a stretched c, as is shown in the next item (original form).

⁴This shape is used by Jones (1973).

A.1. Vowels and Consonants

'051		D-B ligature <i>Input:</i> <code>\textdblig</code> <i>Sources:</i> PSG
Macro		D-Z ligature <i>Input:</i> <code>\textdzlig</code> <i>Sources:</i> PSG
Macro		D-Curly-tail Z ligature <i>Input:</i> <code>\textdctzlig</code> <i>Sources:</i>
'303		D-Yogh ligature <i>Usage:</i> voiced postalveolar affricate <i>Input:</i> <code>\textdyoghlig</code> <i>Sources:</i> IPA '49–'96
Macro		Curly-tail D-Curly-tail Z ligature <i>Input:</i> <code>\textctdctzlig</code> <i>Sources:</i>
'104		Eth <i>Usage:</i> voiced dental fricative <i>Input1:</i> <code>\dh</code> <i>Input2:</i> D <i>Sources:</i> IPA '49–'96
'145		Lower-case E <i>Usage:</i> close-mid front unrounded vowel <i>Input:</i> e <i>Sources:</i> IPA '49–'96
'052		Right-hook E <i>Input:</i> <code>\textrhooke</code> <i>Sources:</i> PSG
'100		Schwa <i>Usage:</i> mid central vowel <i>Input1:</i> <code>\textschwa</code> <i>Input2:</i> @ <i>Sources:</i> IPA '49–'96
'304		Right-hook schwa <i>Usage:</i> r-colored ə <i>Input:</i> <code>\textrhookschwa</code> <i>Sources:</i> IPA '49, '79
'071		Reversed E <i>Usage:</i> close-mid central unrounded vowel <i>Input1:</i> <code>\textreve</code> <i>Input2:</i> 9 <i>Sources:</i> IPA '49–'96
'244		Small capital E <i>Input1:</i> <code>\textsce</code> <i>Input2:</i> \;E <i>Sources:</i> PSG
'105		Epsilon <i>Usage:</i> open-mid front unrounded vowel <i>Input1:</i> <code>\textepsilon</code> <i>Input2:</i> E <i>Sources:</i> IPA '49–'96
'053		Right-hook epsilon <i>Input:</i> <code>\textrhookepsilon</code> <i>Sources:</i> PSG
'305		Closed epsilon ⁵ <i>Usage:</i> (obsolete) open-mid central rounded vowel <i>Input:</i> <code>\textcloseepsilon</code> <i>Sources:</i> IPA '93















Appendix A. Annotated List of TIPA Symbols

'063		Reversed epsilon <i>Usage:</i> open-mid central unrounded vowel <i>Input1:</i> <code>\textreversedepsilon</code> <i>Input2:</i> 3 <i>Sources:</i> IPA '49–'96
'307		Right-hook reversed epsilon <i>Usage:</i> r colored ɜ <i>Input:</i> <code>\textrhookreversedepsilon</code> <i>Sources:</i> PSG
'306		Closed reversed epsilon ⁶ <i>Usage:</i> open-mid central rounded vowel <i>Input:</i> <code>\textclosereversedepsilon</code> <i>Sources:</i> Handbook
'146		Lower-case F <i>Usage:</i> voiceless labiodental fricative <i>Input:</i> f <i>Sources:</i> IPA '49–'96
'163		Small capital F <i>Input:</i> <code>\textscf</code> <i>Sources:</i> PSG
'147		Lower-case G <i>Usage:</i> voiced velar plosive <i>Input1:</i> <code>\textscriptg</code> <i>Input2:</i> g <i>Sources:</i> IPA '49–'96
Macro		Barred G <i>Input:</i> <code>\textbarg</code> <i>Sources:</i> PSG
Macro		Crossed G <i>Input:</i> <code>\textcrg</code> <i>Sources:</i> PSG
'344		Hooktop G <i>Usage:</i> voiced velar implosive <i>Input1:</i> <code>\texthtg</code> <i>Input2:</i> \!g <i>Sources:</i> IPA '49–'96
'245		Looptail G <i>Usage:</i> equivalent to g <i>Input1:</i> g <i>Input2:</i> <code>\textg</code> <i>Sources:</i>
'345		Small capital G <i>Usage:</i> voiced uvular plosive <i>Input1:</i> <code>\textscg</code> <i>Input2:</i> \;G <i>Sources:</i> IPA '49–'96
'311		Hooktop small capital G <i>Usage:</i> voiced uvular implosive <i>Input1:</i> <code>\texthtscg</code> <i>Input2:</i> \!G <i>Sources:</i> IPA '89–'96
'107		Gamma <i>Usage:</i> voiced velar fricative <i>Input1:</i> <code>\textgamma</code> <i>Input2:</i> G <i>Sources:</i> IPA '49–'96
'054		Greek gamma ⁷ <i>Input:</i> <code>\textgrgamma</code> <i>Sources:</i> PSG

⁵In the 1993 version of IPA, this symbol was used as the symbol for the open-mid central rounded vowel. However, in the 1996 version, this symbol was replaced by Closed reversed epsilon, i.e., ɜ. In fact, it was a typographical error, as was announced in IPA (1995, p. 48).

⁶See the footnote above.












A.1. Vowels and Consonants

'055		Front-tail gamma <i>Input:</i> <code>\textfrtailgamma</code> <i>Sources:</i> PSG
'056		Back-tail gamma <i>Input:</i> <code>\textbktailgamma</code> <i>Sources:</i> PSG
'310		Baby gamma <i>Usage:</i> (obsolete) close-mid back unrounded vowel <i>Input:</i> <code>\textbabygamma</code> <i>Sources:</i> IPA '49, '79
'067		Ram's horns <i>Usage:</i> close-mid back unrounded vowel <i>Input1:</i> <code>\textramshorns</code> <i>Input2:</i> 7 <i>Sources:</i> IPA '89–'96
'150		Lower-case H <i>Usage:</i> voiceless glottal fricative <i>Input:</i> h <i>Sources:</i> IPA '49–'96
'377		H-V ligature <i>Usage:</i> *as in <i>Gothic</i> has 'what'. <i>Input:</i> <code>\texthvlig</code> <i>Sources:</i> PSG
'350		Crossed H ⁸ <i>Usage:</i> voiceless pharyngeal fricative <i>Input:</i> <code>\textcrh</code> <i>Sources:</i> IPA '49–'96
'110		Hooktop H <i>Usage:</i> voiced glottal fricative <i>Input1:</i> <code>\texthth</code> <i>Input2:</i> H <i>Sources:</i> IPA '49–'96
'057		Right-tail hooktop H <i>Input:</i> <code>\textrtailhth</code> <i>Sources:</i> PSG
'060		Heng <i>Input:</i> <code>\textheng</code> <i>Sources:</i> PSG
'312		Hooktop heng <i>Usage:</i> simultaneous f and x <i>Input:</i> <code>\textthheng</code> <i>Sources:</i> IPA '49–'96
'064		Turned H <i>Usage:</i> voiced labial-palatal approximant <i>Input1:</i> <code>\textturnh</code> <i>Input2:</i> 4 <i>Sources:</i> IPA '49–'96
'313		Small capital H <i>Usage:</i> voiceless epiglottal fricative <i>Input1:</i> <code>\textsch</code> <i>Input2:</i> <code>\;H</code> <i>Sources:</i> IPA '89–'96
'151		Lower-case I <i>Usage:</i> close front unrounded vowel <i>Input:</i> i <i>Sources:</i> IPA '49–'96

⁷It is not my intention to include all the Greek letters appearing in PSG. The reason for including this symbol is to assure typographical consistency with the next two symbols derived from Greek gamma.

⁸In *Handbook*, this symbol is called 'Barred H'.

Appendix A. Annotated List of TIPA Symbols

'031		Undotted I <i>Usage:</i> *used in Turkish orthography <i>Input:</i> \i <i>Sources:</i> PSG
'061		Barred I <i>Usage:</i> close central unrounded vowel <i>Input1:</i> \textbari <i>Input2:</i> 1 <i>Sources:</i> IPA '49–'96
'111		Small capital I <i>Usage:</i> near-close near-front unrounded vowel <i>Input1:</i> \textsci <i>Input2:</i> I <i>Sources:</i> IPA '89–'96
'314		Iota <i>Usage:</i> (obsolete) near-close near-front unrounded vowel <i>Input:</i> \textiota <i>Sources:</i> IPA '49, '79
'061		Left-hooktop I ⁹ <i>Input:</i> \textlhti <i>Sources:</i>
'246		Left-hooktop Long I ¹⁰ <i>Input:</i> \textlhtlongi <i>Sources:</i> PSG
'247		Viby I ¹¹ <i>Input:</i> \textviby <i>Sources:</i> PSG
Macro		Raised Viby I <i>Input:</i> \textraiseviby <i>Sources:</i>
'152		Lower-case J <i>Usage:</i> voiced palatal approximant <i>Input:</i> j <i>Sources:</i> IPA '49–'96
'032		Undotted J <i>Input:</i> \j <i>Sources:</i>
'112		Curly-tail J ¹² <i>Usage:</i> voiced palatal fricative <i>Input1:</i> \textctj <i>Input2:</i> J <i>Sources:</i> IPA '89–'96















⁹This symbol is sometimes found instead of ɿ (next item) in textbooks of Chinese in Japan.

¹⁰The two symbols ɿ and ʝ 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. PSG’s descriptions to the origin of these symbols are inaccurate.

¹¹I 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’.” (Karlgren, 1915–1926, p. 295)















¹²In the official IPA charts of '89 through '96, 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. The official (?) IPA shape can be used by the \textctjvar command. (j)

A.1. Vowels and Consonants

'062		Curly-tail J (a variety found in 1996 IPA) <i>Usage:</i> same as the above <i>Input:</i> <code>\textctjvar</code> <i>Sources:</i> IPA '89–'96
Macro		Wedge J <i>Usage:</i> *equivalent to IPA dʒ <i>Input:</i> <code>\v{\j}</code> <i>Sources:</i> PSG
'351		Barred dotless J <i>Usage:</i> voiced palatal plosive <i>Input:</i> <code>\textbardotlessj</code> <i>Sources:</i> IPA '89–'96
'315		Old barred dotless J <i>Usage:</i> voiced palatal plosive <i>Input:</i> <code>\text0bardotlessj</code> <i>Sources:</i> IPA '49, '79
'352		Hooktop barred dotless J ¹³ <i>Usage:</i> voiced palatal implosive <i>Input1:</i> <code>\texthtbardotlessj</code> <i>Input2:</i> <code>\!j</code> <i>Sources:</i> Handbook
'063		Hooktop barred dotless J (a variety) <i>Usage:</i> same as the above <i>Input:</i> <code>\texthtbardotlessjvar</code> <i>Sources:</i> IPA '89–'93, PSG
'250		Small capital J <i>Input1:</i> <code>\textscj</code> <i>Input2:</i> <code>\;J</code> <i>Sources:</i> PSG
'153		Lower-case K <i>Usage:</i> voiceless velar plosive <i>Input:</i> <code>k</code> <i>Sources:</i> IPA '49–'96
'316		Hooktop K <i>Usage:</i> voiceless velar implosive <i>Input:</i> <code>\texthtk</code> <i>Sources:</i> IPA '89
'251		Turned K <i>Input1:</i> <code>\textturnk</code> <i>Input2:</i> <code>*k</code> <i>Sources:</i> PSG
'164		Small capital K <i>Input:</i> <code>\textscK</code> <i>Sources:</i> PSG
'165		Turned small capital K <i>Input:</i> <code>\textturnscK</code> <i>Sources:</i> PSG
'154		Lower-case L <i>Usage:</i> alveolar lateral approximant <i>Input:</i> <code>l</code> <i>Sources:</i> IPA '49–'96
'353		L with tilde <i>Input1:</i> <code>\textltilde</code> <i>Input2:</i> <code>\ ~l</code> <i>Sources:</i> IPA '49–'96















¹³In PSG the shape of this symbol slightly differs. Here I followed the shape found in IPA '89–'96.

Appendix A. Annotated List of TIPA Symbols

'252		Barred L <i>Input:</i> <code>\textbarl</code> <i>Sources:</i> PSG
'354		Belted L <i>Usage:</i> voiceless dental or alveolar lateral fricative <i>Input:</i> <code>\textbeltl</code> <i>Sources:</i> IPA '49–'96
'355		Right-tail L <i>Usage:</i> retroflex lateral approximant <i>Input1:</i> <code>\texttrtail</code> <i>Input2:</i> <code>\:1</code> <i>Sources:</i> IPA '49–'96
'320		L-Yogh ligature <i>Usage:</i> voiced alveolar lateral fricative <i>Input:</i> <code>\textlyoghlig</code> <i>Sources:</i> IPA '89–'96
'255		Old L-Yogh ligature <i>Usage:</i> voiced alveolar lateral fricative <i>Input:</i> <code>\text0lyoghlig</code> <i>Sources:</i> IPA '49, '79
'111		L-Fish-hook R ligature <i>Usage:</i> alveolar lateral flap <i>Input:</i> <code>\textlfishhookrlig</code> <i>Sources:</i>
'317		Small capital L <i>Usage:</i> velar lateral approximant <i>Input1:</i> <code>\textscL</code> <i>Input2:</i> <code>\;L</code> <i>Sources:</i> IPA '89–'96
'166		Reversed small capital L <i>Input:</i> <code>\textrevscL</code> <i>Sources:</i> PSG
'253		Lambda <i>Input:</i> <code>\textlambda</code> <i>Sources:</i> PSG
'254		Crossed lambda <i>Input:</i> <code>\textcrlambda</code> <i>Sources:</i> PSG
'155		Lower-case M <i>Usage:</i> bilabial nasal <i>Input:</i> <code>m</code> <i>Sources:</i> IPA '49–'96
'115		Left-tail M (at right) ¹⁴ <i>Usage:</i> labiodental nasal <i>Input1:</i> <code>\textltailm</code> <i>Input2:</i> <code>M</code> <i>Sources:</i> IPA '49–'96
'064		H-M ligature <i>Input:</i> <code>\texthmlig</code> <i>Sources:</i> PSG
'127		Turned M <i>Usage:</i> close back unrounded vowel <i>Input1:</i> <code>\textturnm</code> <i>Input2:</i> <code>W</code> <i>Sources:</i> IPA '49–'96

¹⁴PSG calls this symbol 'Meng'.















A.1. Vowels and Consonants

'356		Turned M, right leg <i>Usage:</i> voiced velar approximant <i>Input:</i> <code>\textturnmrleg</code> <i>Sources:</i> IPA '79–'93
'167		Small capital M <i>Input:</i> <code>\textscm</code> <i>Sources:</i> PSG
'156		Lower-case N <i>Usage:</i> dental or alveolar nasal <i>Input:</i> <code>n</code> <i>Sources:</i> IPA '49–'96
'065		Front-bar N ¹⁵ <i>Input:</i> <code>\textfrbarn</code> <i>Sources:</i> PSG
'066		N, right leg ¹⁶ <i>Input:</i> <code>\textnrleg</code> <i>Sources:</i> IPA '49
Macro		N with tilde <i>Input:</i> <code>\~n</code> <i>Sources:</i> PSG
'361		Left-tail N (at left) <i>Usage:</i> palatal nasal <i>Input:</i> <code>\textltailn</code> <i>Sources:</i> IPA '49–'96
'116		Eng <i>Usage:</i> velar nasal <i>Input1:</i> <code>\ng</code> <i>Input2:</i> <code>N</code> <i>Sources:</i> IPA '49–'96
'357		Right-tail N <i>Usage:</i> retroflex nasal <i>Input1:</i> <code>\textrtailn</code> <i>Input2:</i> <code>\:n</code> <i>Sources:</i> IPA '49–'96
'256		Curly-tail N <i>Usage:</i> *alveolo-palatal nasal <i>Input:</i> <code>\textctn</code> <i>Sources:</i>
'360		Small capital N <i>Usage:</i> uvular nasal <i>Input1:</i> <code>\textscn</code> <i>Input2:</i> <code>\;N</code> <i>Sources:</i> IPA '49–'96
'157		Lower-case O <i>Usage:</i> close-mid back rounded vowel <i>Input:</i> <code>o</code> <i>Sources:</i> IPA '49–'96
'067		Female sign <i>Input:</i> <code>\textfemale</code> <i>Sources:</i> PSG
'070		Uncrossed female sign <i>Input:</i> <code>\textuncrfemale</code> <i>Sources:</i> PSG

¹⁵This shape is based on *PSG* (p. 119). However, its original shape looks a little different. Here I simply followed the shape found in *PSG* because in its source (Trager, 1964) the shape of this symbol is unclear (typewritten, modified by handwriting).















¹⁶In *PSG*, this symbol is called 'Long-Leg N'.

Appendix A. Annotated List of TIPA Symbols

'362		Bull's eye ¹⁷ <i>Usage:</i> bilabial click <i>Input1:</i> <code>\textbullseye</code> <i>Input2:</i> <code>\!o</code> <i>Sources:</i> IPA '93, '96
'071		Bull's eye (an old version) <i>Usage:</i> bilabial click <i>Input:</i> <code>\text0bullseye</code> <i>Sources:</i> IPA '79, '89
'070		Barred O <i>Usage:</i> close-mid central rounded vowel <i>Input1:</i> <code>\textbaro</code> <i>Input2:</i> 8 <i>Sources:</i> IPA '49–'96
'370		Slashed O <i>Usage:</i> close-mid front rounded vowel <i>Input:</i> <code>\o</code> <i>Sources:</i> IPA '49–'96
'367		O-E ligature <i>Usage:</i> open-mid front rounded vowel <i>Input:</i> <code>\oe</code> <i>Sources:</i> IPA '49–'96
'327		Small capital O-E ligature <i>Usage:</i> open front rounded vowel <i>Input1:</i> <code>\textSCOelig</code> <i>Input2:</i> <code>\OE</code> <i>Sources:</i> IPA '79–'96
'117		Open O <i>Usage:</i> open-mid back rounded vowel <i>Input1:</i> <code>\textopeno</code> <i>Input2:</i> 0 <i>Sources:</i> IPA '49–'96
'072		Right-hook open O <i>Input:</i> <code>\textrhookopeno</code> <i>Sources:</i> PSG
'257		Turned C (Open O)-E ligature <i>Input:</i> <code>\textturncelig</code> <i>Sources:</i> PSG
'260		Omega <i>Input:</i> <code>\textomega</code> <i>Sources:</i> PSG
'073		Inverted omega <i>Input:</i> <code>\textinvomega</code> <i>Sources:</i> PSG
'321		Closed omega <i>Usage:</i> (obsolete) near-close near-back rounded vowel <i>Input:</i> <code>\textcloseomega</code> <i>Sources:</i> IPA '49, '79
'261		Small capital omega <i>Input:</i> <code>\textScomega</code> <i>Sources:</i> PSG
'160		Lower-case P <i>Usage:</i> voiceless bilabial plosive <i>Input:</i> <code>p</code> <i>Sources:</i> IPA '49–'96
















¹⁷In PSG this name is spelled 'Bullseye'.

A.1. Vowels and Consonants
















'322		Hooktop P <i>Usage:</i> voiceless bilabial implosive <i>Input:</i> <code>\texthtp</code> <i>Sources:</i> IPA '89
'074		Left-hook P <i>Input:</i> <code>\textlhookp</code> <i>Sources:</i> PSG
'170		Small capital P <i>Input:</i> <code>\textscp</code> <i>Sources:</i> PSG
'337		Wynn <i>Usage:</i> *labiovelar approximant <i>Input:</i> <code>\textwynn</code> <i>Sources:</i> Old English
'376		Thorn <i>Usage:</i> *interdental fricative <i>Input1:</i> <code>\textthorn</code> <i>Input2:</i> <code>\th</code> <i>Sources:</i> Old English
'120		A variety of thorn (1) <i>Input:</i> <code>\textthornvari</code> <i>Sources:</i> PSG
'121		A variety of thorn (2) <i>Input:</i> <code>\textthornvarii</code> <i>Sources:</i> PSG
'122		A variety of thorn (3) <i>Input:</i> <code>\textthornvariii</code> <i>Sources:</i> PSG
'123		A variety of thorn (4) <i>Input:</i> <code>\textthornvariv</code> <i>Sources:</i> PSG
'106		Phi <i>Usage:</i> voiceless bilabial fricative <i>Input1:</i> <code>\textphi</code> <i>Input2:</i> F <i>Sources:</i> IPA '49–'96
'161		Lower-case Q <i>Usage:</i> voiceless uvular plosive <i>Input:</i> q <i>Sources:</i> IPA '49–'96
'323		Hooktop Q <i>Usage:</i> voiceless uvular implosive <i>Input:</i> <code>\texthtq</code> <i>Sources:</i> IPA '89
'075		Q-P ligature <i>Input:</i> <code>\textqplig</code> <i>Sources:</i> PSG
'171		Small capital Q ¹⁸ <i>Usage:</i> *voiceless pharyngeal plosive <i>Input1:</i> <code>\textscq</code> <i>Input2:</i> <code>\;Q</code> <i>Sources:</i>

¹⁸Suggested 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.















Appendix A. Annotated List of TIPA Symbols

'162		Lower-case R <i>Usage:</i> alveolar trill <i>Input:</i> <code>r</code> <i>Sources:</i> IPA '49–'96
'122		Fish-hook R <i>Usage:</i> alveolar tap or flap <i>Input1:</i> <code>\textfishhookr</code> <i>Input2:</i> <code>R</code> <i>Sources:</i> IPA '49–'96
'324		Long-leg R <i>Usage:</i> alveolar fricative trill <i>Input:</i> <code>\textlonglegr</code> <i>Sources:</i> IPA '49, '79
'363		Right-tail R <i>Usage:</i> retroflex tap or flap <i>Input1:</i> <code>\textrtailr</code> <i>Input2:</i> <code>\:r</code> <i>Sources:</i> IPA '49–'96
'364		Turned R <i>Usage:</i> alveolar approximant <i>Input1:</i> <code>\textturnr</code> <i>Input2:</i> <code>*r</code> <i>Sources:</i> IPA '49–'96
'365		Turned R, right tail <i>Usage:</i> retroflex approximant <i>Input1:</i> <code>\textturnrrtail</code> <i>Input2:</i> <code>\:R</code> <i>Sources:</i> IPA '49–'96
'325		Turned long-leg R <i>Usage:</i> alveolar lateral flap <i>Input:</i> <code>\textturnlonglegr</code> <i>Sources:</i> IPA '49–'96
'366		Small capital R <i>Usage:</i> uvular trill <i>Input1:</i> <code>\textscr</code> <i>Input2:</i> <code>\;R</code> <i>Sources:</i> IPA '49–'96
'172		Reversed small capital R <i>Input:</i> <code>\textrevscr</code> <i>Sources:</i> PSG
'113		Inverted small capital R <i>Usage:</i> voiced uvular fricative <i>Input1:</i> <code>\textinvscr</code> <i>Input2:</i> <code>K</code> <i>Sources:</i> IPA '49–'96
'163		Lower-case S <i>Usage:</i> voiceless alveolar fricative <i>Input:</i> <code>s</code> <i>Sources:</i> IPA '49–'96
Macro		Wedge S <i>Usage:</i> *equivalent to IPA <code>j</code> <i>Input:</i> <code>\v{s}</code> <i>Sources:</i> PSG
'371		Right-tail S (at left) <i>Usage:</i> voiceless retroflex fricative <i>Input1:</i> <code>\textrtails</code> <i>Input2:</i> <code>\:s</code> <i>Sources:</i> IPA '49–'96
'123		Esh <i>Usage:</i> voiceless postalveolar fricative <i>Input1:</i> <code>\textesh</code> <i>Input2:</i> <code>S</code> <i>Sources:</i> IPA '49–'96
Macro		Double-barred esh <i>Input:</i> <code>\textdoublebaresh</code> <i>Sources:</i> Beach (1938), PSG

A.1. Vowels and Consonants















'076		Reversed esh with top loop <i>Input:</i> <code>\textlooptoprevesh</code> <i>Sources:</i> IPA '49
'262		Curly-tail esh <i>Usage:</i> palatalized j <i>Input:</i> <code>\textctesh</code> <i>Sources:</i> IPA '49, '79
'164		Lower-case T <i>Usage:</i> voiceless dental or alveolar plosive <i>Input:</i> <code>t</code> <i>Sources:</i> IPA '49–'96
'077		Front-hook T <i>Input:</i> <code>\textfrhookt</code> <i>Sources:</i> PSG
'263		Left-hook T <i>Usage:</i> palatalized t <i>Input:</i> <code>\textlhookt</code> <i>Sources:</i> PSG
'372		Right-tail T <i>Usage:</i> voiceless retroflex plosive <i>Input1:</i> <code>\texttrtailt</code> <i>Input2:</i> <code>\:t</code> <i>Sources:</i> IPA '49–'96
'326		Hooktop T <i>Usage:</i> voiceless dental or alveolar implosive <i>Input:</i> <code>\texthtt</code> <i>Sources:</i> IPA '89
'330		Turned T <i>Usage:</i> dental click <i>Input1:</i> <code>\textturnt</code> <i>Input2:</i> <code>*t</code> <i>Sources:</i> IPA '49, '79
'100		Curly-tail turned T <i>Input:</i> <code>\textctturnt</code> <i>Sources:</i> Beach (1938), PSG
'264		Curly-tail T <i>Usage:</i> *voiceless alveolo-palatal plosive <i>Input:</i> <code>\textctt</code> <i>Sources:</i>
Macro		T-Curly-tail C ligature <i>Input:</i> <code>\texttctclig</code> <i>Sources:</i>
Macro		Curly-tail T-Curly-tail C ligature <i>Input:</i> <code>\textcttctclig</code> <i>Sources:</i>
'265		T-S ligature <i>Input:</i> <code>\texttslig</code> <i>Sources:</i> IPA '49, '79
'331		T-Esh ligature <i>Usage:</i> voiceless postalveolar affricate <i>Input:</i> <code>\texttेशlig</code> <i>Sources:</i> IPA '49–'96
'124		Theta <i>Usage:</i> voiceless dental fricative <i>Input1:</i> <code>\texttheta</code> <i>Input2:</i> <code>T</code> <i>Sources:</i> IPA '49–'96

Appendix A. Annotated List of TIPA Symbols

'165		Lower-case U <i>Usage:</i> close back rounded vowel <i>Input:</i> u <i>Sources:</i> IPA '49–'96
'060		Barred U <i>Usage:</i> close central rounded vowel <i>Input1:</i> \textbaru <i>Input2:</i> 0 <i>Sources:</i> IPA '49–'96
'125		Upsilon <i>Usage:</i> near-close near-back rounded vowel <i>Input1:</i> \textupsilon <i>Input2:</i> U <i>Sources:</i> IPA '89–'96
'366		Small capital U <i>Usage:</i> *equivalent to IPA ʊ <i>Input1:</i> \textscu <i>Input2:</i> \;U <i>Sources:</i> IPA '49–'96
'173		Turned small capital U <i>Input:</i> \textturnscu <i>Sources:</i> PSG
'166		Lower-case V <i>Usage:</i> voiced labiodental fricative <i>Input:</i> v <i>Sources:</i> IPA '49–'96
'126		Script V ¹⁹ <i>Usage:</i> voiced labiodental approximant <i>Input1:</i> \textscriptv <i>Input2:</i> V <i>Sources:</i> IPA '49–'96
'167		Lower-case W <i>Usage:</i> voiced labio-velar approximant <i>Input:</i> w <i>Sources:</i> IPA '49–'96
'373		Turned W <i>Usage:</i> voiceless labio-velar fricative <i>Input1:</i> \textturnw <i>Input2:</i> *w <i>Sources:</i> IPA '49–'96
'170		Lower-case X <i>Usage:</i> voiceless velar fricative <i>Input:</i> x <i>Sources:</i> IPA '49–'96
'130		Chi <i>Usage:</i> voiceless uvular fricative <i>Input1:</i> \textchi <i>Input2:</i> x <i>Sources:</i> IPA '49–'96
'171		Lower-case Y <i>Usage:</i> close front rounded vowel <i>Input:</i> y <i>Sources:</i> IPA '49–'96
'114		Turned Y <i>Usage:</i> palatal lateral approximant <i>Input1:</i> \textturny <i>Input2:</i> L <i>Sources:</i> IPA '49–'96
'131		Small capital Y <i>Usage:</i> near-close near-front rounded vowel <i>Input1:</i> \textscy <i>Input2:</i> Y <i>Sources:</i> IPA '49–'96

¹⁹In *Handbook*, this symbols is called ‘Cursive V’.

A.1. Vowels and Consonants

'266		Left-hooktop long Y ²⁰ <i>Input:</i> <code>\textlhtlongy</code> <i>Sources:</i> PSG
'267		Viby Y ²¹ <i>Input:</i> <code>\textvibyy</code> <i>Sources:</i> PSG
'172		Lower-case Z <i>Usage:</i> voiced alveolar fricative <i>Input:</i> <code>z</code> <i>Sources:</i> IPA '49–'96
'336		Comma-tail Z <i>Usage:</i> *as in <i>OHG</i> <i>ëzzan</i> 'to eat'. <i>Input:</i> <code>\textcommatailz</code> <i>Sources:</i> OHG, PSG
Macro		Wedge Z <i>Usage:</i> *equivalent to IPA ʒ <i>Input:</i> <code>\v{z}</code> <i>Sources:</i> PSG
'375		Curly-tail Z <i>Usage:</i> voiced alveolo-palatal fricative <i>Input:</i> <code>\textctz</code> <i>Sources:</i> IPA '49–'96
'374		Right-tail Z <i>Usage:</i> voiced retroflex fricative <i>Input1:</i> <code>\textrtailz</code> <i>Input2:</i> <code>\:z</code> <i>Sources:</i> IPA '49–'96
Macro		Crossed two <i>Input:</i> <code>\textcrtwo</code> <i>Sources:</i> IPA '49
'101		Turned two <i>Input:</i> <code>\textturntwo</code> <i>Sources:</i> IPA '49
'132		Yogh ²² <i>Usage:</i> voiced postalveolar fricative <i>Input1:</i> <code>\textyogh</code> <i>Input2:</i> <code>z</code> <i>Sources:</i> IPA '49–'96
'102		Bent-tail yogh <i>Input:</i> <code>\textbenttailyogh</code> <i>Sources:</i> IPA '49
'270		Curly-tail yogh <i>Usage:</i> palatalized ʒ <i>Input:</i> <code>\textctyogh</code> <i>Sources:</i> IPA '49, '79
'271		Reversed yogh <i>Input:</i> <code>\textrevyogh</code> <i>Sources:</i> PSG
'103		Turned three <i>Input:</i> <code>\textturnthree</code> <i>Sources:</i> IPA '49

²⁰See explanations in footnote 11.






²¹See explanations in footnote 11.

²²In *Handbook*, this symbols is called 'Ezh'.









Appendix A. Annotated List of TIPA Symbols

'120		Glottal stop <i>Usage:</i> glottal plosive <i>Input1:</i> \textglotstop <i>Input2:</i> P <i>Sources:</i> IPA '49–'96
'124		A variety of glottal stop (1) <i>Input:</i> \textglotstopvari <i>Sources:</i> PSG
'125		A variety of glottal stop (2) <i>Input:</i> \textglotstopvarii <i>Sources:</i> PSG
'126		A variety of glottal stop (3) <i>Input:</i> \textglotstopvariii <i>Sources:</i> PSG
'274		Superscript glottal stop <i>Input:</i> \textraiseglotstop <i>Sources:</i>
'334		Barred glottal stop <i>Usage:</i> epiglottal plosive <i>Input:</i> \textbarglotstop <i>Sources:</i> IPA '89–'96
'333		Inverted glottal stop <i>Usage:</i> alveolar lateral click <i>Input:</i> \textinvglotstop <i>Sources:</i> IPA '49, '79
Macro		Crossed inverted glottal stop <i>Input:</i> \textcrinvglotstop <i>Sources:</i> IPA '49
'104		Curly-tail inverted glottal stop <i>Input:</i> \textctinvglotstop <i>Sources:</i> Beach (1938), PSG
'105		Turned glottal stop (PSG 1996:211) <i>Input:</i> \textturnglotstop <i>Sources:</i> PSG
'121		Reversed glottal stop <i>Usage:</i> voiced pharyngeal fricative <i>Input1:</i> \textrevglotstop <i>Input2:</i> Q <i>Sources:</i> IPA '49–'96
'335		Barred reversed glottal stop <i>Usage:</i> voiced epiglottal fricative <i>Input:</i> \textbarrevglotstop <i>Sources:</i> IPA '89–'96
'174		Pipe <i>Usage:</i> dental click <i>Input1:</i> \textpipe <i>Input2:</i> <i>Sources:</i> IPA '89–'96
'106		Pipe (a variety with no descender) <i>Usage:</i> dental click <i>Input:</i> \textpipevar <i>Sources:</i> PSG
'175		Double-barred pipe <i>Usage:</i> palatoalveolar click <i>Input:</i> \textdoublebarpipe <i>Sources:</i> IPA '89–'96









A.2. Suprasegmentals

'110		Double-barred pipe (a variety with no descender) <i>Usage:</i> same as the above <i>Input:</i> <code>\textdoublebarpipevar</code> <i>Sources:</i> PSG
Macro		Double-barred slash <i>Usage:</i> *a variant of \neq <i>Input:</i> <code>\textdoublebarslash</code> <i>Sources:</i> PSG
'177		Double pipe <i>Usage:</i> alveolar lateral click <i>Input1:</i> <code>\textdoublepipe</code> <i>Input2:</i> <code> </code> <i>Sources:</i> IPA '89–'96
'107		Double pipe (a variety with no descender) <i>Usage:</i> same as the above <i>Input:</i> <code>\textdoublepipevar</code> <i>Sources:</i> PSG
'041		Exclamation point <i>Usage:</i> (post)alveolar click <i>Input:</i> <code>!</code> <i>Sources:</i> IPA '89–'96

A.2 Suprasegmentals





'042		Vertical stroke (Superior) <i>Usage:</i> primary stress <i>Input1:</i> <code>\textprimstress</code> <i>Input2:</i> <code>"</code> <i>Sources:</i> IPA '49–'96
'177		Vertical stroke (Inferior) <i>Usage:</i> secondary stress <i>Input1:</i> <code>\textsecstress</code> <i>Input2:</i> <code>""</code> <i>Sources:</i> IPA '49–'96
'072		Length mark <i>Usage:</i> long <i>Input1:</i> <code>\textlengthmark</code> <i>Input2:</i> <code>:</code> <i>Sources:</i> IPA '49–'96
'073		Half-length mark <i>Usage:</i> half-long <i>Input1:</i> <code>\texthalflength</code> <i>Input2:</i> <code>;</code> <i>Sources:</i> IPA '49–'96
'222		Vertical line <i>Usage:</i> minor (foot) group <i>Input:</i> <code>\textvertline</code> <i>Sources:</i> IPA '89–'96
'223		Double vertical line <i>Usage:</i> major (intonation) group <i>Input:</i> <code>\textdoublevertline</code> <i>Sources:</i> IPA '89–'96
'074		Bottom tie bar <i>Usage:</i> linking (absence of a break) <i>Input1:</i> <code>\textbottomtiebar</code> <i>Input2:</i> <code>\t*{}</code> <i>Sources:</i> IPA '89–'96
'224		Down arrow ²³ <i>Usage:</i> downstep <i>Input:</i> <code>\textdownstep</code> <i>Sources:</i> IPA '89–'96

Appendix A. Annotated List of TIPA Symbols

'225		Up arrow <i>Usage:</i> upstep <i>Input:</i> <code>\textupstep</code> <i>Sources:</i> IPA '89–'96
'226		Downward diagonal arrow <i>Usage:</i> global fall <i>Input:</i> <code>\textglobfall</code> <i>Sources:</i> IPA '89–'96
'227		Upward diagonal arrow <i>Usage:</i> global rise <i>Input:</i> <code>\textglobrise</code> <i>Sources:</i> IPA '89–'96
'005		Superscript left arrow <i>Input:</i> <code>\textspleftarrow</code> <i>Sources:</i> PSG, p. 243
'007		Down full arrow <i>Usage:</i> ingressive airflow <i>Input:</i> <code>\textdownfullarrow</code> <i>Sources:</i> ExtIPA, <i>Handbook</i>
'010		Up full arrow <i>Usage:</i> egressive airflow <i>Input:</i> <code>\textupfullarrow</code> <i>Sources:</i> ExtIPA, <i>Handbook</i>
'011		Subscript right arrow <i>Usage:</i> sliding articulation <i>Input:</i> <code>\textsubbrightarrow</code> <i>Sources:</i> ExtIPA
'012		Subscript double arrow <i>Usage:</i> labial spreading <i>Input:</i> <code>\textsubdoublearrow</code> <i>Sources:</i> ExtIPA







A.2.1 Tone letters

The tones illustrated here are only a representative sample of what is possible. For more details see section 3.2.8.

Macro		Extra high tone <i>Input:</i> <code>\tone{55}</code> <i>Sources:</i> IPA '89–'96
Macro		High tone <i>Input:</i> <code>\tone{44}</code> <i>Sources:</i> IPA '89–'96
Macro		Mid tone <i>Input:</i> <code>\tone{33}</code> <i>Sources:</i> IPA '89–'96
Macro		Low tone <i>Input:</i> <code>\tone{22}</code> <i>Sources:</i> IPA '89–'96





²³The shapes of `\textdownstep` and `\textupstep` differ according to sources. Here I followed the shapes found in the recent IPA charts.

A.3. Accents and Diacritics



Macro		Extra low tone <i>Input:</i> <code>\tone{11}</code> <i>Sources:</i> IPA '89–'96
Macro		Falling tone <i>Input:</i> <code>\tone{51}</code> <i>Sources:</i> IPA '89–'96
Macro		Rising tone <i>Input:</i> <code>\tone{15}</code> <i>Sources:</i> IPA '89–'96
Macro		High rising tone <i>Input:</i> <code>\tone{45}</code> <i>Sources:</i> IPA '89–'96
Macro		Low rising tone <i>Input:</i> <code>\tone{12}</code> <i>Sources:</i> IPA '89–'96
Macro		High rising falling tone <i>Input:</i> <code>\tone{454}</code> <i>Sources:</i> IPA '89–'96

A.2.2 Diacritical Tone Marks
















Some symbols included in the next section are also used as diacritical tone marks.

'230		Macron plus acute accent <i>Usage:</i> high rising tone <i>Input:</i> <code>\texthighrise{a}</code> <i>Sources:</i> IPA '89–'96
'231		Grave accent plus macron <i>Usage:</i> low rising tone <i>Input:</i> <code>\textlowrise{a}</code> <i>Sources:</i> IPA '89–'96
'232		Grave plus acute plus grave accent <i>Usage:</i> rising-falling tone <i>Input:</i> <code>\textrisefall{a}</code> <i>Sources:</i> IPA '89–'96
'233		Acute plus grave plus acute accent <i>Usage:</i> falling-rising tone <i>Input:</i> <code>\textfallrise{a}</code> <i>Sources:</i>
















A.3 Accents and Diacritics

'000		Grave accent <i>Usage:</i> low tone <i>Input:</i> <code>\'e</code> <i>Sources:</i> IPA '49–'96
'001		Acute accent <i>Usage:</i> high tone <i>Input:</i> <code>\'e</code> <i>Sources:</i> IPA '49–'96














Appendix A. Annotated List of TIPA Symbols

'002		Circumflex accent <i>Usage:</i> falling tone <i>Input:</i> <code>\^e</code> <i>Sources:</i> IPA '49–'96
'003		Tilde <i>Usage:</i> nasalized <i>Input:</i> <code>\~e</code> <i>Sources:</i> IPA '49–'96
'004		Umlaut <i>Usage:</i> centralized <i>Input:</i> <code>\"e</code> <i>Sources:</i> IPA '49–'96
'005		Double acute accent <i>Usage:</i> extra high tone <i>Input:</i> <code>\H{e}</code> <i>Sources:</i> IPA '89–'96
'006		Ring <i>Input:</i> <code>\r{e}</code> <i>Sources:</i>
'007		Wedge <i>Usage:</i> rising tone <i>Input:</i> <code>\v{e}</code> <i>Sources:</i> IPA '49–'96
'010		Breve <i>Usage:</i> extra short <i>Input:</i> <code>\u{e}</code> <i>Sources:</i> IPA '49–'96
'011		Macron <i>Usage:</i> mid tone <i>Input:</i> <code>\=e</code> <i>Sources:</i>
'012		Dot <i>Input:</i> <code>\.e</code> <i>Sources:</i>
'013		Cedilla <i>Input:</i> <code>\c{e}</code> <i>Sources:</i>
'014		Polish hook (Ogonek accent) <i>Input1:</i> <code>\textpolhook{e}</code> <i>Input2:</i> <code>\k{e}</code> <i>Sources:</i>
'000		Reversed Polish hook <i>Input:</i> <code>\textrevpolhook{o}</code> <i>Sources:</i> PSG, p. 129
'015		Double grave accent <i>Usage:</i> extra low tone <i>Input1:</i> <code>\textdoublegrave{e}</code> <i>Input2:</i> <code>\H*e</code> <i>Sources:</i> IPA '89–'96
'016		Subscript grave accent <i>Usage:</i> low falling tone <i>Input1:</i> <code>\textsubgrave{e}</code> <i>Input2:</i> <code>\'*e</code> <i>Sources:</i> IPA '49, '79
'017		Subscript acute accent <i>Usage:</i> low rising tone <i>Input1:</i> <code>\textsubacute{e}</code> <i>Input2:</i> <code>\'*e</code> <i>Sources:</i> IPA '49, '79

A.3. Accents and Diacritics

Macro		Subscript circumflex accent <i>Input1:</i> <code>\textsubcircum{e}</code> <i>Input2:</i> <code>\^*e</code> <i>Sources:</i>
'020		Round cap <i>Input1:</i> <code>\textroundcap{g}</code> <i>Input2:</i> <code>\ c{g}</code> <i>Sources:</i>
Macro		Acute accent with macron <i>Input1:</i> <code>\textacutemacron{a}</code> <i>Input2:</i> <code>\'=a</code> <i>Sources:</i>
Macro		Grave accent with macron <i>Input:</i> <code>\textgravemacron{a}</code> <i>Sources:</i>
'234		Vertical bar accent <i>Input:</i> <code>\textvbaraccent{a}</code> <i>Sources:</i>
'235		Double vertical bar accent <i>Input:</i> <code>\textdoublevbaraccent{a}</code> <i>Sources:</i>
'236		Grave dot accent <i>Input1:</i> <code>\textgravedot{e}</code> <i>Input2:</i> <code>\'.e</code> <i>Sources:</i>
'237		Dot acute accent <i>Input1:</i> <code>\textdotacute{e}</code> <i>Input2:</i> <code>\'.e</code> <i>Sources:</i>
Macro		Circumflex dot accent <i>Input1:</i> <code>\textcircumdot{a}</code> <i>Input2:</i> <code>\^ .a</code> <i>Sources:</i>
Macro		Tilde dot accent <i>Input1:</i> <code>\texttildedot{a}</code> <i>Input2:</i> <code>\~.a</code> <i>Sources:</i>
Macro		Breve macron accent <i>Input1:</i> <code>\textbrevemacron{a}</code> <i>Input2:</i> <code>\u=a</code> <i>Sources:</i>
Macro		Ring macron accent <i>Input1:</i> <code>\textringmacron{a}</code> <i>Input2:</i> <code>\r=a</code> <i>Sources:</i>
Macro		Acute wedge accent <i>Input1:</i> <code>\textacutewedge{s}</code> <i>Input2:</i> <code>\v's</code> <i>Sources:</i>
Macro		Dot breve accent <i>Input:</i> <code>\textdotbreve{a}</code> <i>Sources:</i>
'021		Subscript bridge <i>Usage:</i> dental <i>Input1:</i> <code>\textsubbridge{t}</code> <i>Input2:</i> <code>\ [t</code> <i>Sources:</i> IPA '49–'96
















Appendix A. Annotated List of TIPA Symbols

'022		Inverted subscript bridge <i>Usage:</i> apical <i>Input1:</i> <code>\textinvsubbridge{d}</code> <i>Input2:</i> <code>\ t</code> <i>Sources:</i> IPA '89–'96
'023		Subscript square <i>Usage:</i> laminal <i>Input:</i> <code>\textsubsquare{n}</code> <i>Sources:</i> IPA '89–'96
'024		Subscript right half-ring ²⁴ <i>Usage:</i> more rounded <i>Input1:</i> <code>\textsubrhalfring{o}</code> <i>Input2:</i> <code>\ o</code> <i>Sources:</i> IPA '49–'96
'025		Subscript left half-ring <i>Usage:</i> less rounded <i>Input1:</i> <code>\textsublhalfring{o}</code> <i>Input2:</i> <code>\ o</code> <i>Sources:</i> IPA '49–'96
'026		Subscript W <i>Usage:</i> labialized <i>Input1:</i> <code>\textsubw{k}</code> <i>Input2:</i> <code>\ w{k}</code> <i>Sources:</i> IPA '79
'026		Over W <i>Usage:</i> *labialized <i>Input:</i> <code>\textoverw{g}</code> <i>Sources:</i>
'027		Subscript seagull <i>Usage:</i> linguolabial <i>Input1:</i> <code>\textseagull{t}</code> <i>Input2:</i> <code>\ m{t}</code> <i>Sources:</i> IPA '89–'96
'030		Over-cross <i>Usage:</i> mid-centralized <i>Input1:</i> <code>\textovercross{e}</code> <i>Input2:</i> <code>\ x{e}</code> <i>Sources:</i> IPA '49–'96
'033		Subscript plus ²⁵ <i>Usage:</i> advanced <i>Input1:</i> <code>\textsubplus{\textopeno}</code> <i>Input2:</i> <code>\ +o</code> <i>Sources:</i> IPA '49–'96
'034		Raising sign <i>Usage:</i> raised <i>Input1:</i> <code>\textraising{\textepsilon}</code> <i>Input2:</i> <code>\ 'E</code> <i>Sources:</i> IPA '49–'96
'035		Lowering sign <i>Usage:</i> lowered <i>Input1:</i> <code>\textlowering{e}</code> <i>Input2:</i> <code>\ 'e</code> <i>Sources:</i> IPA '49–'96
'036		Advancing sign <i>Usage:</i> advanced tongue root <i>Input1:</i> <code>\textadvancing{u}</code> <i>Input2:</i> <code>\ <u</code> <i>Sources:</i> IPA '49–'96
'037		Retracting sign <i>Usage:</i> retracted tongue root <i>Input1:</i> <code>\textretracting{\textschwa}</code> <i>Input2:</i> <code>\ >@</code> <i>Sources:</i> IPA '49–'96

²⁴Diacritics `\textsubrhalfring` and `\textsublhalfring` can be placed after a symbol by inputting, for example, `[e\textsubrhalfring{e}]` [e_ɿ].

²⁵The diacritics such as `\textsubplus`, `\textraising`, `\textlowering`, `\textadvancing` and `\textretracting` can be placed after a symbol by inputting `[e\textsubplus{e}]` [e₊], for example.







A.3. Accents and Diacritics

'003		Subscript tilde <i>Usage:</i> creaky voiced <i>Input1:</i> <code>\textsubtilde{e}</code> <i>Input2:</i> <code>\~*e</code> <i>Sources:</i> IPA '89–'96
'004		Subscript umlaut <i>Usage:</i> breathy voiced <i>Input1:</i> <code>\textsubumlaut{e}</code> <i>Input2:</i> <code>\"*e</code> <i>Sources:</i> IPA '79, '89, '93
'006		Subscript ring <i>Usage:</i> voiceless <i>Input1:</i> <code>\textsubring{u}</code> <i>Input2:</i> <code>\r*u</code> <i>Sources:</i> IPA '49–'96
'007		Subscript wedge <i>Usage:</i> voiced <i>Input1:</i> <code>\textsubwedge{e}</code> <i>Input2:</i> <code>\v*e</code> <i>Sources:</i> IPA '49–'96
'011		Subscript bar <i>Usage:</i> retracted <i>Input1:</i> <code>\textsubbar{e}</code> <i>Input2:</i> <code>\=*e</code> <i>Sources:</i> IPA '49–'96
'012		Subscript dot <i>Usage:</i> *retroflex <i>Input1:</i> <code>\textsubdot{e}</code> <i>Input2:</i> <code>\.*e</code> <i>Sources:</i>
'020		Subscript arch <i>Usage:</i> non-syllabic <i>Input:</i> <code>\textsubarch{e}</code> <i>Sources:</i>
'042		Syllabicity mark <i>Usage:</i> syllabic <i>Input1:</i> <code>\textsyllabic{m}</code> <i>Input2:</i> <code>\s{m}</code> <i>Sources:</i> IPA '49–'96
'046		Superimposed tilde <i>Usage:</i> velarized or pharyngealized <i>Input1:</i> <code>\textsuperimposetilde{t}</code> <i>Input2:</i> <code>\ ~{t}</code> <i>Sources:</i> IPA '49–'96
'136		Corner <i>Usage:</i> no audible release <i>Input:</i> <code>t\textcorner</code> <i>Sources:</i> IPA '89–'96
'137		Open corner <i>Usage:</i> *release/burst <i>Input:</i> <code>t\textopencorner</code> <i>Sources:</i>
'176		Rhoticity <i>Usage:</i> rhoticity <i>Input:</i> <code>\textschwa\textrhoticity</code> <i>Sources:</i> IPA '89–'96
'040		Celtic palatalization mark <i>Usage:</i> *as in <i>Irish</i> b'an 'woman'. <i>Input:</i> <code>b\textceltpal</code> <i>Sources:</i>
'275		Left pointer <i>Input:</i> <code>k\textlptr</code> <i>Sources:</i>
'276		Right pointer <i>Input:</i> <code>k\textrptr</code> <i>Sources:</i>

'004		Rectangle ²⁶ <i>Usage:</i> *equivalent to IPA ʷ (Corner) <i>Input:</i> <code>p\textrectangle</code> <i>Sources:</i>
'006		Retracting sign (a variety) <i>Input:</i> <code>\textretractingvar</code> <i>Sources:</i> IPA '49
'076		Top tie bar <i>Usage:</i> affricates and double articulations <i>Input1:</i> <code>\texttoptiebar{gb}</code> <i>Input2:</i> <code>\t{gb}</code> <i>Sources:</i>
See page 47 for 'Bottom tie bar'.		
'047		Apostrophe <i>Usage:</i> ejective <i>Input:</i> <code>'</code> <i>Sources:</i> IPA '49–'96
'134		Reversed apostrophe <i>Usage:</i> (obsolete) weak aspiration <i>Input:</i> <code>\textrevapostrophe</code> <i>Sources:</i> IPA '49, '79
'056		Period <i>Usage:</i> syllable break as in [ɪ.ækt] <i>Input:</i> <code>.</code> <i>Sources:</i> IPA '89–'96
'043		Hooktop <i>Input:</i> <code>\texthooktop</code> <i>Sources:</i>
'044		Right hook <i>Input:</i> <code>\textrthook</code> <i>Sources:</i>
'001		Right hook (long) <i>Input:</i> <code>\textrthooklong</code> <i>Sources:</i>
'045		Palatalization hook <i>Input:</i> <code>\textpalhook</code> <i>Sources:</i>
'002		Palatalization hook (long) <i>Input:</i> <code>\textpalhooklong</code> <i>Sources:</i>
'003		Palatalization hook (a variety) <i>Input:</i> <code>\textpalhookvar</code> <i>Sources:</i>
Macro		Superscript H <i>Usage:</i> aspirated <i>Input1:</i> <code>ph</code> <i>Input2:</i> <code>p\super h</code> <i>Sources:</i> IPA '49–'96







²⁶This symbol is used among Japanese linguists as a diacritical symbol indicating no audible release (IPA ʷ), because the symbol ʷ is used to indicate pitch accent in Japanese.

A.4. Diacritics for ExtIPA, VoQS














Macro		Superscript W <i>Usage:</i> labialized <i>Input1:</i> <code>kw</code> <i>Input2:</i> <code>k\super w</code> <i>Sources:</i> IPA '49–'96
Macro		Superscript J <i>Usage:</i> palatalized <i>Input1:</i> <code>tj</code> <i>Input2:</i> <code>t\super j</code> <i>Sources:</i> IPA '49–'96
Macro		Superscript gamma <i>Usage:</i> velarized <i>Input1:</i> <code>t\textgamma</code> <i>Input2:</i> <code>t\super G</code> <i>Sources:</i> IPA '89–'96
Macro		Superscript reversed glottal stop <i>Usage:</i> pharyngealized <i>Input1:</i> <code>d\textrevglotstop</code> <i>Input2:</i> <code>d\super Q</code> <i>Sources:</i> IPA '89–'96
Macro		Superscript N <i>Usage:</i> nasal release <i>Input1:</i> <code>dn</code> <i>Input2:</i> <code>d\super n</code> <i>Sources:</i> IPA '89–'96
Macro		Superscript L <i>Usage:</i> lateral release <i>Input1:</i> <code>dl</code> <i>Input2:</i> <code>d\super l</code> <i>Sources:</i> IPA '89–'96

A.4 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 section 3.1.3). 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} §`).

'011		Subscript double arrow <i>Usage:</i> *labial spreading <i>Input:</i> <code>\spreadlips{s}</code> <i>Sources:</i> ExtIPA '94
Macro		Overbridge <i>Usage:</i> *dentolabial <i>Input:</i> <code>\overbridge{v}</code> <i>Sources:</i> ExtIPA '94
Macro		Bibridge <i>Usage:</i> *interdental/bidental <i>Input:</i> <code>\bibridge{n}</code> <i>Sources:</i> ExtIPA '94
Macro		Subscript double bar <i>Usage:</i> *alveolar <i>Input:</i> <code>\subdoublebar{t}</code> <i>Sources:</i> ExtIPA '94
Macro		Subscript double vertical line <i>Usage:</i> *strong articulation <i>Input:</i> <code>\subdoublevert{f}</code> <i>Sources:</i> ExtIPA '94
Macro		Subscript corner <i>Usage:</i> *weak articulation <i>Input:</i> <code>\subcorner{v}</code> <i>Sources:</i> ExtIPA '94

Appendix A. Annotated List of TIPA Symbols

Macro		Up arrow <i>Usage:</i> *whistled articulation <i>Input:</i> \whistle{s} <i>Sources:</i> ExtIPA '94
'012		Subscript right arrow <i>Usage:</i> *sliding articulation <i>Input:</i> \sliding{\textipa{Ts}} <i>Sources:</i> ExtIPA '94
Macro		Crossed tilde <i>Usage:</i> *denasal <i>Input:</i> \crtilde{m} <i>Sources:</i> ExtIPA '94
Macro		Dotted tilde <i>Usage:</i> *nasal escape <i>Input:</i> \dottedtilde{a} <i>Sources:</i> ExtIPA '94
Macro		Double tilde <i>Usage:</i> *velopharyngeal friction <i>Input:</i> \doubletilde{s} <i>Sources:</i> ExtIPA '94
Macro		Parenthesis plus ring <i>Usage:</i> *partial voiceless <i>Input:</i> \partvoiceless{n} <i>Sources:</i> ExtIPA '94
Macro		Parenthesis plus ring <i>Usage:</i> *initial partial voiceless <i>Input:</i> \inipartvoiceless{n} <i>Sources:</i> ExtIPA '94
Macro		Parenthesis plus ring <i>Usage:</i> *final partial voiceless <i>Input:</i> \finpartvoiceless{n} <i>Sources:</i> ExtIPA '94
Macro		Parenthesis plus subwedge <i>Usage:</i> *partial voicing <i>Input:</i> \partvoice{s} <i>Sources:</i> ExtIPA '94
Macro		Parenthesis plus subwedge <i>Usage:</i> *initial partial voicing <i>Input:</i> \inipartvoice{s} <i>Sources:</i> ExtIPA '94
Macro		Parenthesis plus subwedge <i>Usage:</i> *final partial voicing <i>Input:</i> \finpartvoice{s} <i>Sources:</i> ExtIPA '94
'275		Subscript left pointer <i>Usage:</i> *right offset jaw voice <i>Input:</i> \sublptr{J} <i>Sources:</i> VoQS '94
'276		Subscript right pointer <i>Usage:</i> *left offset jaw voice <i>Input:</i> \subrptr{J} <i>Sources:</i> VoQS '94

Appendix B

Recent Changes

B.1 Changes from Version 1.2 to 1.3

Some symbols included in the xipa and related font families have been modified.

B.2 Changes from Version 1.1 to 1.2

The following

- The following symbols are added to the `tipx` fonts:
Varieties of glottal stop symbols and a new symbol:
`? (\textglotstopvari)`
`? (\textglotstopvarii)`
`? (\textglotstopvariii)`
`ʔ (\textlfishhookrlig)`
- Symbol shapes of the `xipa` and `xipx` font families slightly modified.

B.3 Changes from Version 1.0 to 1.1

The following changes have been made since the first release of TIPA¹.

- The following typefaces are newly added in Version 1.1. Font description files (`*.fd`) modified accordingly.
Bold Extended Slanted Roman: $[,ɛksplə'neɪfən]$
Sans Serif Bold Extended: $[,ɛksplə'neɪfən]$
Sans Serif Slanted: $[,ɛksplə'neɪfən]$
Typewriter Text: $[,ɛksplə'neɪfən]$
Typewriter Text Slanted: $[,ɛksplə'neɪfən]$
- Many bugs fixed in the METAFONT source codes; modifications made for almost every symbol. The `xipa` family of fonts now more closely simulates

¹The first release of TIPA has been known as ‘beta0624’. I originally intended to change it to something like ‘tipa-1.0’ soon after the release but unfortunately I didn’t have the opportunity to do so.

Times Roman style.²

- `t3enc.def` and `tipa.sty` modified.
- New series of fonts, **tipx** and **xipx** have been created. These fonts are collections of symbols missing in the previous version of TIPA and cover almost all the symbols that appear in the second edition of *PSG* (1996). (Remember that TIPA was released in 1996 and at the time the second edition of *PSG* was not available.) Some of the symbols included in the previous version of TIPA are now moved into **tipx** and **xipx**. Thus the T3 encoding is slightly modified.

In order to use newly created fonts, add the following after the declaration of TIPA.

```
\usepackage{tipx}
```

For a list of newly created symbols, see next section.

The encoding of **tipx** and **xipx** still has no definite name. The style file (`tipx.sty`) uses the U encoding and new family names (`tipx` and `xipx` which are arbitrary). In the future, it may be possible to use a new encoding name TS3 (I experimentally put `ts3enc.def` and `ts3*.fd` in the `sty` directory of the package. Use these files at your own risk, if the system doesn't complain.)

- Some new tone letter commands, `\stone` and `\rtone`.
- Manual updated.
- Manual for the `vowel.sty` completed.
- Some diacritic commands added.

B.3.1 Newly created symbols

The following two symbols are newly adopted in the **tipa** encoding (i.e., T3).

Hooktop right-tail D — \mathfrak{d}
 Left-hooktop long Y — \mathfrak{y}

The following command was realized by a macro in the previous version but now is assigned a code of its own in the **tipa** encoding (i.e., T3).

Crossed lambda — λ

The following symbols are (mostly) newly created symbols in the **tipx** fonts. (Note that some are moved from the **tipa** because of the encoding change.)

²I'm not fully satisfied with the result of this simulation and further changes will be made in the next release. However, I have no intention of simulating too closely in order to avoid any possible copyright problems.

B.3. Changes from Version 1.0 to 1.1

Right-hook A — a_᳚
Left-hook four — 4
Inverted script A — α
A-O ligature — æ
Inverted small capital A — ʋ
Small capital A-O ligature — ʌ
Stretched C (original form) — c
Curly-tail stretched C — ĸ
Curly-tail stretched C (original form) — ĸ
Front-hook D — ɖ
Front-hook D (Original) — ɖ
D-B ligature — ɒ
Small capital delta — Δ
Right-hook E — e_᳚
Right-hook epsilon — ε_᳚
Small capital F — Ƒ
Greek gamma — γ
Front-tail gamma — γ
Back-tail gamma — γ
Right-tail hooktop H — ħ
Heng — ʝ
Curly-tail J (a variety found in 1996 IPA) — j
Hooktop barred dotless J (a variety) — ƶ
Small capital K — Ƒ
Turned small capital K — Ƒ
Reversed small capital L — ɿ
H-M ligature — ɹ
Small capital M — ɱ
Front-bar N — ɳ
Right leg N — ɳ
Bull's eye (an old version) — ⊙
Female sign — ♀
Uncrossed female sign — ♀
Right-hook open O — ɔ̣
Inverted omega — ɰ
Left-hook P — ɸ
Small capital P — Ƒ
A variety of thorn (1) — þ
A variety of thorn (2) — þ
A variety of thorn (3) — þ
A variety of thorn (4) — þ
Q-P ligature — ɸ
Reversed small capital R — ɹ
Reversed esh with top loop — ɹ
Front-hook T — ɾ
Curly-tail turned T — ɹ
Turned small capital U — ɯ
Turned two — ɹ
Bent-tail yogh — ɹ
Turned three — ɹ

Curly-tail inverted glottal stop — ɰ
 Turned glottal stop (PSG 1996:211) — Ɂ
 Pipe (a variety with no descender) — |
 Double pipe (a variety with no descender) — ||
 Double-barred pipe (a variety with no descender) — ‡
 Superscript left arrow — ←
 Down full arrow — ↓
 Up full arrow — ↑
 Subscript right arrow — →
 Subscript double arrow — ↔
 Reversed Polish hook — an accent command e.g., 9
 Retracting sign (a variety) — ɸ
 Right hook (long) — ɹ
 Palatalization hook (long) — ɻ
 Palatalization hook (a variety) — ɹ̥

B.3.2 Symbol shape changes

Shapes of the following symbols have been modified from the first version to the present.

Name	Macro name	New	Old	Old symbol name
Pipe	<code>\textpipe</code>			<code>\textpipevar</code>
Double pipe	<code>\textdoublepipe</code>			<code>\textdoublepipevar</code>
Double-barred pipe	<code>\textdoublebarpipe</code>	‡	‡	<code>\textdoublebarpipevar</code>
Down arrow	<code>\textdownstep</code>	↓	↓	<code>\textdownfullarrow</code>
Up arrow	<code>\textupstep</code>	↑	↑	<code>\textupfullarrow</code>
Bull's eye	<code>\textbullseye</code>	⊙	⊙	<code>\text0bullseye</code>
Hooktop barred dotless J	<code>\texthtbardotlessj</code>	ƒ	ƒ	<code>\texthtbardotlessjvar</code>

For each symbol, the old shape is preserved in the `tipx` fonts and can be accessed by a new name (in most cases `var` or `0` is attached) indicated at the rightmost column of the above table.

Appendix C

Symbols not included in TIPA

Although the present version of TIPA includes almost all the symbols found in *PSG* and *Handbook*, there are still some symbols not included or defined in TIPA.

Some 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 T_EX's macro level and/or by using symbols from other fonts.
- (2) Symbols that can be imitated by T_EX'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.

With the addition of the TIPA fonts, symbols that belong to the third category are virtually non-existent now.

As for the symbols that belong to the first and second categories, TIPA provides a variety of macros and parts of symbols that can be used to compose a desired symbol if you can write an appropriate macro for it.

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.

Barred small capital I	<code>\ipabar{\textsci}{.5ex}{1.1}{-}{-}</code>	ɪ
Barred J	<code>\ipabar{j}{.5ex}{1.1}{-}{-}</code>	ĵ
Crossed K	<code>\ipabar{k}{1.2ex}{.6}{-}{.4}</code>	ķ
Barred open O	<code>\ipabar{\textopeno}{.5ex}{.6}{-}{.4}{-}</code>	ø
Barred small capital omega	<code>\ipabar{\textscomega}{.5ex}{1.1}{-}{-}</code>	Ϸ
Barred P	<code>\ipabar{p}{.5ex}{1.1}{-}{-}</code>	Ṗ
Half-barred U	<code>\ipabar{u}{.5ex}{.5}{-}{.5}</code>	ụ
Barred small capital U	<code>\ipabar{\textscu}{.5ex}{1.1}{-}{-}</code>	Ϥ
Double slash	<code>/\kern-.25em/</code>	//
Triple slash	<code>/\kern-.25em/\kern-.25em/</code>	///

The next definitions attach a tiny 'left hook' (which shows palatalization) to a symbol. For example:

Appendix C. Symbols not included in TIPA

```
% Left-hook B
\newcommand\textlhookb{\tipaencoding
  b\hspace{-.15em}\raisebox{.0ex}{\textpalhookvar}}
% Left-hook M
\newcommand\textlhookm{\tipaencoding
  m\hspace{-.15em}\raisebox{.0ex}{\textpalhook}}
```

The former example uses a left-hook called `\textpalhookvar`, (,) and the latter uses a hook called `\textpalhook`, (,).

Left-hook B — \mathfrak{b}
 Left-hook M — \mathfrak{m}

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 slashed b i.e., \mathfrak{b} can be made by `\ipaclap{\textipa{b}}{\textipa{/}}`. 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.

Slashed B	\mathfrak{b}
Slashed C	\mathfrak{c}
Slashed D	\mathfrak{d}
Slashed U	\mathfrak{u}
Slashed W	\mathfrak{w}

Appendix D

FAQ

Q1: I have installed all the TIPA fonts. But the system can't find them. What's wrong?

A1: Please don't forget to run the command `mktextlsr` after the installation. Also, try to run the command:

```
kpsewhich tipa10.mf
```

If the system shows nothing in return, you must have installed them in a wrong place.

Q2: I'm using shortcut letters but there are still many symbols which have no shortcut letters. What can I do? Do I have to use all these long names?

A2: You are free to define shorter names. L^AT_EX's `\newcommand` is a safe way to do this. For example:

```
\newcommand{\vef}{\textbarrevglotstop}
```

Input: `[\vef]` is a voiced epiglottal fricative.

Output: [ɸ] is a voiced epiglottal fricative.

Q3: I want to use the L^AT_EX command `\l` in the IPA environment. But I don't want to specify the `safe` option. Is it possible?

A3: Use a command called `\Vert` instead of `\l`. It has the same meaning. Other possibly dangerous commands such as `\:`, `\:` and `\!` have a similar substitute command. For more details, see page 12.

Q4: I can't input Eng (`\ng`) properly. Why?

A4: Use `\textipa{N}`. Technically speaking, this is a matter of priority among the OT1, T1 and T3 encodings. But may be called a bug. I'll work out this problem in the next release.

Q5: How can I input *capital letters*, I mean real capital letters, not small capitals, within the IPA environment?

A5: Use the command `*`. For example:

Input: `\textipa{["pI*Di]}`
Output: `['pɪDi]`

This command is explained in section 3.2.4.

Q6: How can I output an accent or diacritic symbol alone? For example, I want to print the umlaut symbol alone, in order to explain the usage of this symbol.

A6: Try to add an empty argument to the umlaut command.

Input: `\texipa{["{}]}`
Output: `[""]`

Q7: Are there only a limited number of tone letters?

A7: Absolutely not! Please read section 3.2.8 carefully.

Q8: How to create a PDF file?

A8: You can find a few examples in section 1.1.2.

Q9: I have succeeded in creating a PDF document. But TIPA fonts don't look good (jaggy). What's wrong?

A9: Type1 fonts are not embedded in your document and pk fonts are used instead. Install Type1 font files and/or map file correctly.

Q10: I have succeeded in creating a PDF document with Type1 fonts embedded. But some symbols are missing. Why?

A10: In some versions of `dvips`, the character shifting switch is turned on by default. In order to prevent this, try to invoke `dvips` in the following way.

`dvips -Ppdf -G0 filename`

Q11: I find no description on hyphenation of phonetic texts in this manual.

A11: I haven't seen any description on hyphenation in *Handbook* nor in *Principles*.

Q12: Why is italic font not included in TIPA? Slanted fonts can be used as substitutes. But I want real italic fonts.

A12: It isn't difficult to create italic shapes for a limited number of symbols such as Schwa, Turned script A, and so on. However, creating a whole set of IPA symbols in italic is quite a different story. It is difficult to distinguish, for example, Lower-case A and Script A in italic. In the IPA's *Principles*, it is recommended that the IPA symbols should be roman, excluding italic

shapes in some of the examples. Another point that should be made is that there exist several systems of phonetic symbols in which all the symbols appear in italic. These are the ones mainly used in Scandinavian countries, and the problem is, there is no one-to-one correspondences between such systems and the IPA. Aside from the strictly phonetic use of symbols, however, there is a practical need for italic versions of symbols such as italic Schwa. Therefore, it may be helpful to create a new auxiliary font containing limited number of italic symbols.

Q13: Which is the first name of the author of TIPA? I'm confused.

A13: Rei is his first name.

Q14: I can't send e-mail to the author.

A14: I recently changed my e-mail address.

fkr@l.u-tokyo.ac.jp

For instance,
the Greek letters included in the International Alphabet
are cut in roman adaptations. Thus, since the ordinary shape of
the Greek letter β does not harmonise with roman type,
in the International Phonetic Alphabet it is given the form β .
(*Principles*, 1949, p. 1)

... And of the two form of Greek theta, θ and ϑ ,
it has been necessary to choose the first (in vertical form),
since the second cannot be made to harmonise with
roman letters. (*Principles*, 1949, p. 2)

Appendix E

Specimens

This section displays all the symbols included in the TIPA font families. Sample texts are taken from the *Principles* (1949). The languages taken up here include: One variety of Southern British English (in a narrower transcription), one form of Parisian French, one variety of North German (in a narrower transcription), Cairene Arabic (spoken language) and Swahili of Zanzaibar.

E.1 tipa10 and tipx10

[illegible]

ðə 'nɔ:θ 'wɪnd ænd ðə 'sæn wə dɪs'pjʊ:tɪŋ wɪtʃ wəz ðə 'strɒŋgə, wen ə 'trævlə
keɪm ə'ləŋ 'ræpt ɪn ə 'wɔ:m 'klouk. ðeɪ ə'grɪ:d ðæt ðə 'wʌn huː 'fɜ:st sək'sɪ:dɪd ɪn
'meɪkɪŋ ðə 'trævlə teɪk hɪz 'klouk ɒf fʊd bɪ kən'sɪdəd 'strɒŋgə ðən ðɪ 'lʌðə.

E.2 tipa12 and tipx12

() * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [\] ^ _ ` a b c d e f g h i j k l m n o p q r s t u v w x y z { | } ~ ¡ ¢ £ ¤ ¥ ¦ § ¨ © ª « ¬ ® ¯ ° ± ² ³ ´ µ ¶ · ¸ ¹ º » ¼ ½ ¾ ¿ À Á Â Ã Ä Å Æ Ç È É Ê Ë Ì Í Î Ï Ñ Ò Ó Ô Õ Ö × Ø Ù Ú Û Ü Ý Þ ß à á â ã ä å æ ç è é ê ë ì í î ï ð ñ ò ó ô õ ö ÷ ø ù ú û ü ý þ ÿ

la bi:z e l sɔlɛ:ʃ sə dispytɛ, ʃakœ asyrã k il etɛ l ply fɔ:r, kât iz ô vy
œ vwajazœ:r ki s avâsɛ, âvlɔpɛ dâ sô mâtɔ. i sô tôbe dakɔ:r, kə
səlyi ki arive l prəmje a fɛr ote sô mâtɔ o vwajazœ:r, sərə rgarde
kəm l ply fɔ:r.

E.3 tipa17 and tipx17

[illegible]

j j j j k l m n o p q r s t u v w x y z aa ab ac ad ae af ag ah ai aj ak al am an ao ap ar as at av aw ax ay az ba bb bc bd be bf bg bh bi bj bk bl bm bn bo bp bq br bs bt bu bv bw bx by bz ca cb cc cd ce cf cg ch ci cj ck cl cm cn co cp cq cr cs ct cu cv cw cx cy cz da db dc dd de df dg dh di dj dk dl dm dn do dp dq dr ds dt du dv dw dx dy dz ea eb ec ed ee ef eg eh ei ej ek el em en eo ep eq er es et eu ev ew ex ey ez fa fb fc fd fe ff fg fh fi fj fk fl fm fn fo fp fq fr fs ft fu fv fw fx fy fz ga gb gc gd ge gf gg gh gi gj gk gl gm gn go gp gq gr gs gt gu gv gw gx gy gz ha hb hc hd he hf hg hi hj hk hl hm hn ho hp hq hr hs ht hu hv hw hx hy hz ia ib ic id ie if ig ih ii ij ik il im in io ip iq ir is it iu iv iw ix iy iz ja jb jc jd je jf jg jh ji jj jk jl jm jn jo jp jq jr js jt ju jv jw jx jy jz ka kb kc kd ke kf kg kh ki kj kl km kn ko kp kq kr ks kt ku kv kw kx ky kz la lb lc ld le lf lg lh li lj lk ll lm ln lo lp lq lr ls lt lu lv lw lx ly lz ma mb mc md me mf mg mh mi mj mk ml mn mo mp mq mr ms mt mu mv mw mx my mz na nb nc nd ne nf ng nh ni nj nk nl no np nq nr ns nt nu nv nw nx ny nz oa ob oc od oe of og oh oi oj ok ol om on oo op oq or os ot ou ov ow ox oy oz pa pb pc pd pe pf pg ph pi pj pk pl pm pn po pp pq pr ps pt pu pv pw px py pz qa qb qc qd qe qf qg qh qi qj qk ql qm qn qo qp qr qs qt qu qv qw qx qy qz ra rb rc rd re rf rg rh ri rj rk rl rm rn ro rp rq rr rs rt ru rv rw rx ry rz sa sb sc sd se sf sg sh si sj sk sl sm sn so sp sq sr ss st su sv sw sx sy sz ta tb tc td te tf tg th ti tj tk tl tm tn to tp tq tr ts tt tu tv tw tx ty tz ua ub uc ud ue uf ug uh ui uj uk ul um un uo up uq ur us ut uu uv uw ux uy uz va vb vc vd ve vf vg vh vi vj vk vl vm vn vo vp vq vr vs vt vu vv vw vx vy vz wa wb wc wd we wf wg wh wi wj wk wl wm wn wo wp wq wr ws wt wu ww wx wy wz xa xb xc xd xe xf xg xh xi xj xk xl xm xn xo xp xq xr xs xt xu xv xw xx xy xz ya yb yc yd ye yf yg yh yi yj yk yl ym yn yo yp yq yr ys yt yu yv yw yx yy yz za zb zc zd ze zf zg zh zi zj zk zl zm zn zo zp zq zr zs zt zu zv zw zx zy zz

'Painst ʃtrɪtən zɪç 'nəʊtvɪnt ʔʊnt 'zənə, 'veɪr fən
ʔiːnən 'baɪdən voɪl dəʊ ʃtɛʊkɐrə vɛːrə, ʔals ʔain
'vandɐrɐʊ, deːʊ ʔɪn ʔainən vɑʊmən 'mantəl
gə'hɪlt vɑːʊ, dəs vɛːgəs daː'heːʊ kɑːm. zɪː vʊʊdən
'ʔainɪç, das 'deːʊjeːnɪçə fyːʊ dən ʃtɛʊkɐrən
gɛltən zɔltə, deːʊ dən 'vandɐrɐʊ 'tsvɪŋən vʊʊdə,
zainən 'mantəl 'ʔaptsuːneɪmən.

E.4 tipa8 and tipx8

[illegible]

E.5. *tipa9* and *tipx9*

[illegible]

marra f jamsi wi r ri:h ka:nu bi jitxan?um ?inhu l ?a?wa fi:hum. u ba?de:n ja:fu ra:gil sa:jih
gaj mim ba?i:d mitlaffa? bi ?aba:ja t?:la. fa ttafa?um ?ala ?in illi jixalli:h ji?la? il ?aba:ja fi
l ?awwal jiku:n huwwa ?a?wa mit ta:ni.

E.5 tipa9 and tipx9

[illegible]

0 1 2 3 4 5 6 7 8 9 A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [\] ^ _ ` { | } ~ ¡ ¢ £ ¤ ¥ ¦ § ¨ © ª « ¬ ® ¯ ° ± ² ³ ´ µ ¶ · ¸ ¹ º » ¼ ½ ¾ ¿ À Á Â Ã Ä Å Æ Ç È É Ê Ë Ì Í Î Ï Ñ Ò Ó Ô Õ Ö × Ø Ù Ú Û Ü Ý Þ à á â ã

upepo ulikuwa ukififana na jua kuwa nani mwenye nguvu kupita mwenziwe, mara
 akapita masafiri alijekua amevaa juba. walipatana kuwa atakajemvua juba kwanza
 msafiri ndiye mwenye nguvu.

E.6 tipabx10 and tipxbx10

) * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [\] ^ _ ` a b c d e f g h i j k l m n o p q r s t u v w x y z { | } ~ ¡ ¢ £ ¤ ¥ ¦ § ¨ © ª « ¬ ® ¯ ° ± ² ³ ´ µ ¶ · ¸ ¹ º » ¼ ½ ¾ ¿ À Á Â Ã Ä Å Æ Ç È É Ê Ë Ì Í Î Ï Ñ Ò Ó Ô Õ Ö × Ø Ù Ú Û Ü Ý Þ ß à á â ã

[illegible]

ðə 'nɔ:θ 'wind ənd ðə 'sʌn wə dɪs'pju:tɪŋ wɪtʃ wəz ðə 'strɒŋgə, wən ə
'trævlə keɪm ə'lɒŋ 'ræpt ɪn ə 'wɔ:m 'kloʊk. ðeɪ ə'grɪ:d ðæt ðə 'wʌn
hʊ fɜ:st sək'sɪdɪd ɪn 'meɪkɪŋ ðə 'trævlə teɪk hɪz 'kloʊk ɒf fʊd bɪ
kən'sɪdəd 'strɒŋgə ðən ðɪ 'ʌðə.

E.7 tipabx12 and tipxbx12

0 1 2 3 4 5 6 7 8 9 A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [\] ^ _ ` { | } ~ ¡ ¢ £ ¤ ¥ ¦ § ¨ © ª « ¬ ® ¯ ° ± ² ³ ´ µ ¶ · ¸ ¹ º » ¼ ½ ¾ ¿ À Á Â Ã Ä Å Æ Ç È É Ê Ë Ì Í Î Ï Ñ Ò Ó Ô Õ Ö × Ø Ù Ú Û Ü Ý Þ à á â ã

[illegible]

la bi:z e l sɔləj sə dispytɛ, ʃakœ asyrã k il etɛ l ply fɔ:r,
kāt iz ɔ vy œ vwajazœ:r ki s avãsɛ, ɔvlɔpɛ dã sɔ mātɔ. i
sɔ tɔbɛ dakɔ:r, kə sɔlyi ki arivɛ l prəmje a fɛr ote sɔ mātɔ
o vwajazœ:r, sərə rgarde kɔm l ply fɔ:r.

E.8 tipabx8 and tipxbx8

[illegible]

ʔaɪnst ʃtɪtən zɪç ʔnɔɐ̯tvɪnt ʔunt ʔzənə, ʔe:ɐ̯ fən ʔi:nən ʔaɪdən vɔɪl dɐʁ
ʔʃtɛkɐrə vɛ:rə, ʔals ʔaɪn ʔvəndɐrɐʁ, dɛ:ɐ̯ ʔɪn ʔaɪnən vɑɐ̯mən ʔmantəl gəʔhɪlt
vɑ:ɐ̯, dəs vɛ:ɡəs da:ʔe:ɐ̯ kaɪm. zɪ vʊɐ̯dən ʔaɪnɪç, dəs ʔdɛ:ɐ̯jɛ:nɪɡə fy:ɐ̯ dən
ʔʃtɛkɐrən gɛltən zɔltə, dɛ:ɐ̯ dən ʔvəndɐrɐʁ ʔsvɪnən vʏɐ̯də, zɑɪnən ʔmantəl
ʔaɐ̯ʔsʊnɛ:mən.

E.9 tipabx9 and tipxbx9

, - . / u i l z u e r x e o : ' ~ = ^ ? a b c d e f g h i j k l m n o p q r s t u v w x y z || | + ~
 _ - \ \ \ \ / / / - \ \ \ \ / / / | || ↑ ↓ ↗ ↘ ~ ~ ~ ' " ~ " b d d d e g i j k l k l k l
 x b n æ o n f t t s u u z z ь ь ? < > | A C C C g x o e z v C f h i j k l k l k l
 q r l f æ i t f u b ? f z p b b c d g G æ z h j f i i l u n n O r i u r e o s
 t m z z p h

 , ~ ~ ° ^ ~ ↓ ↑ a s a 4 c c c d d d e e γ γ γ h h i j f h m n n o o ⊙ o p p p
 l t i z z z e b l || | b b b b ? ? ? v w Δ f k x j m p q r n

marra f famsi wi r ri:h ka:nu bi jitxan?um ?inhu l ?a?wa fi:hum. u
ba:fde:n fa:fu ra:gil sa:ji:h gaj mim ba:fi:d mitlaffa? bi ?aba:ja t?i:la. fa
ttafa?um ?ala ?in illi jixalli:h ji?la? il ?aba:ja fi l ?awwal jiku:n huwwa
?a?wa mit ta:ni.

E.10 tipasl10 and tipxsl10

upepo ulikuwa ukibifana na jua kuwa nani mweje nguvu kupita mwenziwe, mara akapita masafiri alijekuwa amevaa juba. walipatana kuwa atakajemvua juba kwanza msafiri ndije mweje nguvu.

E.11 tipas112 and tipxs112

ðə 'nɔ:θ 'wɪnd ənd ðə 'sʌn wə dɪs'pju:tɪŋ wɪtʃ wəz ðə 'strɒŋgə, wən ə 'trævlə keɪm ə'lɒŋ 'ræpt m ə 'wɔ:m 'kloʊk. ðeɪ ə'grɪ:d ðət ðə 'wʌn huː fɜːst sək'sɪdɪd m 'meɪkɪŋ ðə 'trævlə teɪk hɪz 'kloʊk ɒf fʊd bɪ kən'sɪdəd 'strɒŋgə ðən ðɪ 'ʌðə.

E.12 tipas18 and tipxs18

la bi:z e l sɔ:lɛj sɔ dispɥtɛ, ʃakɔ̃ asyɾɔ k il etɛ l ply fɔ:r, kɑ̃t iz ɔ vy ɔ̃ vwajazɔ:r ki s avɑ̃sɛ,
 ɔ̃vlɔpɛ dɑ̃ sɔ̃ mɑ̃to. i sɔ̃ tɔbɛ dakɔ:r, kɔ̃ sɔ̃lyi ki arivɛ l prɔ̃mjɛ a fɛr ote sɔ̃ mɑ̃to o vwajazɔ:r,
 sɛrɛ rgarde kɔ̃m l ply fɔ:r.

E.13 tipasl9 and tipxsl9

[illegible][illegible]

ʔamst ʃtrɪtən zɪç 'nɔɐ̯vɪnt ʔunt 'zɔnə, 'vɛːɐ̯ fɔn ʔi'nən 'baɪdən vɔːl dɐʁ ʃtɛkɐrə
vɛːrə, ʔals ʔam 'vandɐrɐʁ, dɛːʁ ʔɪ ʔamən vaxmən 'mantəl gə'hʏlt vax, dəs vɛːgəs
daːhɛːʁ kaːm. zɪ vʊbdən ʔamiç, das 'dɛːkʲeːnɪç fʏːɐ̯ dən ʃtɛkɐrən gɛltən zɔltə,
dɛːʁ dən 'vandɐrɐʁ 'tsʏnən vʏdə, zamən 'mantəl ʔaptʁuːnɛmən.

E.14 tipass10 and tipxss10

[illegible][illegible]

marra f famsi wi r ri:h ka:nu bi jitxa:n?um ?inhu l ?a?wa fi:hum. u ba:de:n
fa:fu ra:gil sa:ji:h gaj mim ba:fi:d mitlaffa:f bi fabaxja t?:ila. fa ttafa?um ?ala
?in illi jixalli:h ji?la:f il fabaxja fi l ?awwal jiku:n huwwa ?a?wa mit tani.

E.15 tipass12 and tipxss12

() * + , - . / # ! @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [\] ^ _ ` { | } ~ ¡ ¢ £ ¤ ¥ ¦ § ¨ © ª « ¬ ® ¯ ° ± ² ³ ´ µ ¶ · ¸ ¹ º » ¼ ½ ¾ ¿ À Á Â Ã Ä Å Æ Ç È É Ê Ë Ì Í Î Ï Ñ Ò Ó Ô Õ Ö × Ø Ù Ú Û Ü Ý Þ ß à á â ã ä å æ ç

[illegible]

upepo ulikuwa ukibifana na jua kuwa nani mwenye nguvu kupita mwenziwe, mara akapita masafiri alijekuwa amevaa juba. walipatana kuwa atakajiemvua juba kwanza msafiri ndiye mwenye nguvu.

E.16 tipass17 and tipxss17

[illegible]

ðə 'nɔ:θ 'wind ənd ðə 'sʌn wə dɪs'pju:tɪŋ wɪtʃ wəz
ðə 'strɒŋge, wɛn ə 'trævlə keɪm ə'ləŋ 'ræpt ɪn ə
'wɔ:m 'klɒv. ðeɪ ə'grɪ:d ðæt ðə 'wʌn hu' fɜ:st
sək'sɪdɪd ɪn 'meɪkɪŋ ðə 'trævlə teɪk hɪz 'klɒv ɒf ʃʊd
bɪ kən'sɪdəd 'strɒŋgə ðən ðɪ 'ʌðə.

E.17 tipass8 and tipxss8

[illegible]

la bi:z e l sɔlɛ:j sɛ dɪspʏtɛ, ʃakœ asyrä k il etɛ l ply fɔ:r, kät iz ʔ vy œ vwajazœ:r ki s aväse,
ävlɔpɛ dā sʃ mätɔ. i sʃ tʃbɛ dakɔ:r, kə səlyi ki arɪvɛ l prəmje a fɛr ote sʃ mätɔ o vwajazœ:r, sɛrɛ
rgardɛ kɔm l ply fɔ:r.

E.18 tipass9 and tipxss9

[illegible]

𐌰 𐌱 𐌲 𐌳 𐌴 𐌵 𐌶 𐌷 𐌸 𐌹 𐌺 𐌻 𐌼 𐌽 𐌾 𐌿 𐍀 𐍁 𐍂 𐍃 𐍄 𐍅 𐍆 𐍇 𐍈 𐍉 𐍊 𐍋 𐍌 𐍍 𐍎 𐍏 𐍐 𐍑 𐍒 𐍓 𐍔 𐍕 𐍖 𐍗 𐍘 𐍙 𐍚 𐍛 𐍜 𐍝 𐍞 𐍟 𐍠 𐍡 𐍢 𐍣 𐍤 𐍥 𐍦 𐍧 𐍨 𐍩 𐍪 𐍫 𐍬 𐍭 𐍮 𐍯 𐍰 𐍱 𐍲 𐍳 𐍴 𐍵 𐍶 𐍷 𐍸 𐍹 𐍺 𐍻 𐍼 𐍽 𐍾 𐍿 𐎀 𐎁 𐎂 𐎃 𐎄 𐎅 𐎆 𐎇 𐎈 𐎉 𐎊 𐎋 𐎌 𐎍 𐎎 𐎏 𐎐 𐎑 𐎒 𐎓 𐎔 𐎕 𐎖 𐎗 𐎘 𐎙 𐎚 𐎛 𐎜 𐎝 𐎞 𐎟 𐎠 𐎡 𐎢 𐎣 𐎤 𐎥 𐎦 𐎧 𐎨 𐎩 𐎪 𐎫 𐎬 𐎭 𐎮 𐎯 𐎰 𐎱 𐎲 𐎳 𐎴 𐎵 𐎶 𐎷 𐎸 𐎹 𐎺 𐎻 𐎼 𐎽 𐎾 𐎿 𐏀 𐏁 𐏂 𐏃 𐏄 𐏅 𐏆 𐏇 𐏈 𐏉 𐏊 𐏋 𐏌 𐏍 𐏎 𐏏 𐏐 𐏑 𐏒 𐏓 𐏔 𐏕 𐏖 𐏗 𐏘 𐏙 𐏚 𐏛 𐏜 𐏝 𐏞 𐏟 𐏠 𐏡 𐏢 𐏣 𐏤 𐏥 𐏦 𐏧 𐏨 𐏩 𐏪 𐏫 𐏬 𐏭 𐏮 𐏯 𐏰 𐏱 𐏲 𐏳 𐏴 𐏵 𐏶 𐏷 𐏸 𐏹 𐏺 𐏻 𐏼 𐏽 𐏾 𐏿 𐐀 𐐁 𐐂 𐐃 𐐄 𐐅 𐐆 𐐇 𐐈 𐐉 𐐊 𐐋 𐐌 𐐍 𐐎 𐐏 𐐐 𐐑 𐐒 𐐓 𐐔 𐐕 𐐖 𐐗 𐐘 𐐙 𐐚 𐐛 𐐜 𐐝 𐐞 𐐟 𐐠 𐐡 𐐢 𐐣 𐐤 𐐥 𐐦 𐐧 𐐨 𐐩 𐐪 𐐫 𐐬 𐐭 𐐮 𐐯 𐐰 𐐱 𐐲 𐐳 𐐴 𐐵 𐐶 𐐷 𐐸 𐐹 𐐺 𐐻 𐐼 𐐽 𐐾 𐐿 𐑀 𐑁 𐑂 𐑃 𐑄 𐑅 𐑆 𐑇 𐑈 𐑉 𐑊 𐑋 𐑌 𐑍 𐑎 𐑏 𐑐 𐑑 𐑒 𐑓 𐑔 𐑕 𐑖 𐑗 𐑘 𐑙 𐑚 𐑛 𐑜 𐑝 𐑞 𐑟 𐑠 𐑡 𐑢 𐑣 𐑤 𐑥 𐑦 𐑧 𐑨 𐑩 𐑪 𐑫 𐑬 𐑭 𐑮 𐑯 𐑰 𐑱 𐑲 𐑳 𐑴 𐑵 𐑶 𐑷 𐑸 𐑹 𐑺 𐑻 𐑼 𐑽 𐑾 𐑿 𐒀 𐒁 𐒂 𐒃 𐒄 𐒅 𐒆 𐒇 𐒈 𐒉 𐒊 𐒋 𐒌 𐒍 𐒎 𐒏 𐒐 𐒑 𐒒 𐒓 𐒔 𐒕 𐒖 𐒗 𐒘 𐒙 𐒚 𐒛 𐒜 𐒝 𐒞 𐒟 𐒠 𐒡 𐒢 𐒣 𐒤 𐒥 𐒦 𐒧 𐒨 𐒩 𐒪 𐒫 𐒬 𐒭 𐒮 𐒯 𐒰 𐒱 𐒲 𐒳 𐒴 𐒵 𐒶 𐒷 𐒸 𐒹 𐒺 𐒻 𐒼 𐒽 𐒾 𐒿 𐓀 𐓁 𐓂 𐓃 𐓄 𐓅 𐓆 𐓇 𐓈 𐓉 𐓊 𐓋 𐓌 𐓍 𐓎 𐓏 𐓐 𐓑 𐓒 𐓓 𐓔 𐓕 𐓖 𐓗 𐓘 𐓙 𐓚 𐓛 𐓜 𐓝 𐓞 𐓟 𐓠 𐓡 𐓢 𐓣 𐓤 𐓥 𐓦 𐓧 𐓨 𐓩 𐓪 𐓫 𐓬 𐓭 𐓮 𐓯 𐓰 𐓱 𐓲 𐓳 𐓴 𐓵 𐓶 𐓷 𐓸 𐓹 𐓺 𐓻 𐓼 𐓽 𐓾 𐓿 𐔀 𐔁 𐔂 𐔃 𐔄 𐔅 𐔆 𐔇 𐔈 𐔉 𐔊 𐔋 𐔌 𐔍 𐔎 𐔏 𐔐 𐔑 𐔒 𐔓 𐔔 𐔕 𐔖 𐔗 𐔘 𐔙 𐔚 𐔛 𐔜 𐔝 𐔞 𐔟 𐔠 𐔡 𐔢 𐔣 𐔤 𐔥 𐔦 𐔧 𐔨 𐔩 𐔪 𐔫 𐔬 𐔭 𐔮 𐔯 𐔰 𐔱 𐔲 𐔳 𐔴 𐔵 𐔶 𐔷 𐔸 𐔹 𐔺 𐔻 𐔼 𐔽 𐔾 𐔿 𐕀 𐕁 𐕂 𐕃 𐕄 𐕅 𐕆 𐕇 𐕈 𐕉 𐕊 𐕋 𐕌 𐕍 𐕎 𐕏 𐕐 𐕑 𐕒 𐕓 𐕔 𐕕 𐕖 𐕗 𐕘 𐕙 𐕚 𐕛 𐕜 𐕝 𐕞 𐕟 𐕠 𐕡 𐕢 𐕣 𐕤 𐕥 𐕦 𐕧 𐕨 𐕩 𐕪 𐕫 𐕬 𐕭 𐕮 𐕯 𐕰 𐕱 𐕲 𐕳 𐕴 𐕵 𐕶 𐕷 𐕸 𐕹 𐕺 𐕻 𐕼 𐕽 𐕾 𐕿 𐖀 𐖁 𐖂 𐖃 𐖄 𐖅 𐖆 𐖇 𐖈 𐖉 𐖊 𐖋 𐖌 𐖍 𐖎 𐖏 𐖐 𐖑 𐖒 𐖓 𐖔 𐖕 𐖖 𐖗 𐖘 𐖙 𐖚 𐖛 𐖜 𐖝 𐖞 𐖟 𐖠 𐖡 𐖢 𐖣 𐖤 𐖥 𐖦 𐖧 𐖨 𐖩 𐖪 𐖫 𐖬 𐖭 𐖮 𐖯 𐖰 𐖱 𐖲 𐖳 𐖴 𐖵 𐖶 𐖷 𐖸 𐖹 𐖺 𐖻 𐖼 𐖽 𐖾 𐖿 𐗀 𐗁 𐗂 𐗃 𐗄 𐗅 𐗆 𐗇 𐗈 𐗉 𐗊 𐗋 𐗌 𐗍 𐗎 𐗏 𐗐 𐗑 𐗒 𐗓 𐗔 𐗕 𐗖 𐗗 𐗘 𐗙 𐗚 𐗛 𐗜 𐗝 𐗞 𐗟 𐗠 𐗡 𐗢 𐗣 𐗤 𐗥 𐗦 𐗧 𐗨 𐗩 𐗪 𐗫 𐗬 𐗭 𐗮 𐗯 𐗰 𐗱 𐗲 𐗳 𐗴 𐗵 𐗶 𐗷 𐗸 𐗹 𐗺 𐗻 𐗼 𐗽 𐗾 𐗿 𐘀 𐘁 𐘂 𐘃 𐘄 𐘅 𐘆 𐘇 𐘈 𐘉 𐘊 𐘋 𐘌 𐘍 𐘎 𐘏 𐘐 𐘑 𐘒 𐘓 𐘔 𐘕 𐘖 𐘗 𐘘 𐘙 𐘚 𐘛 𐘜 𐘝 𐘞 𐘟 𐘠 𐘡 𐘢 𐘣 𐘤 𐘥 𐘦 𐘧 𐘨 𐘩 𐘪 𐘫 𐘬 𐘭 𐘮 𐘯 𐘰 𐘱 𐘲 𐘳 𐘴 𐘵 𐘶 𐘷 𐘸 𐘹 𐘺 𐘻 𐘼 𐘽 𐘾 𐘿 𐙀 𐙁 𐙂 𐙃 𐙄 𐙅 𐙆 𐙇 𐙈 𐙉 𐙊 𐙋 𐙌 𐙍 𐙎 𐙏 𐙐 𐙑 𐙒 𐙓 𐙔 𐙕 𐙖 𐙗 𐙘 𐙙 𐙚 𐙛 𐙜 𐙝 𐙞 𐙟 𐙠 𐙡

'ʔaɪnst fʁɪtən zɪç 'nɔʁtvɪnt ʔunt 'zɔnə, 'vɛ:r fɔn ʔi'nən 'baɪdən vo:l dɐʁ 'ʃtɛkɐrə vɛ:rə, ʔals ʔaɪn 'vandɐrɐ, dɛ:ʁ ʔɪn ʔaɪnən vaxmən 'mantəl gə'hʏlt va:x, dəs vɛ:ɡəs da:'hɛ:x ka:m. zɪ vʊdən 'ʔaɪnɪç, dəs 'dɛ:xjɛ:nɪɡə fy:x dən 'ʃtɛkɐrən ɡɛltən zɔltə, dɛ:x dən 'vandɐrɐ 'tʃvɪŋən vʏdə, zainən 'mantəl 'ʔaɪtsu:nɛ:mən.

E.19 tipab10 and tipxb10

[illegible][illegible]

marra f famsi wi r ri:h ka:nu bi jitxan?um ?inhu l ?a?wa fi:hum. u
ba?de:n fa:fu ra:gil sa:ji:h gaj mim ba?i:d mitlaffa? bi ?aba:ja t?i:la.
fa ttafa?um ?ala ?in illi jixalli:h ji?la? il ?aba:ja fi l ?awwal jiku:n
huwwa ?a?wa mit ta:ni.

E.20 tipabs10 and tipxbs10

) * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < = > ? @ A B C D E F G H I J K L M N O P Q R S T U V W X Y Z [\] ^ _ ` a b c d e f g h i j k l m n o p q r s t u v w x y z { | } ~ ¡ ¢ £ ¤ ¥ ¦ § ¨ © ª « ¬ ® ¯ ° ± ² ³ ´ µ ¶ · ¸ ¹ º » ¼ ½ ¾ ¿ À Á Â Ã Ä Å Æ Ç È É Ê Ë Ì Í Î Ï Ñ Ò Ó Ô Õ Ö × Ø Ù Ú Û Ü Ý Þ ß à á â ã

. , ; ' ° ~ ↓ ↑ α σ ω ϕ ζ ε ϰ ϱ ϲ ϳ ϴ ϵ Ϸ γ γ γ Ϻ ϻ ι j f h n π η φ ϑ ⊙ ρ ω
 p q r t i z z e s l || ≠ † ‡ § ¶ ? ? ? v x Δ Ε Κ Ξ Ι Μ Ρ Q Я Ω

upepo ulikuwa ukibifana na jua kuwa nani mwenye nguvu kupita mwenziwe, mara akapita masafiri alijekuwa amevaa juba. walipatana kuwa atakajemvua juba kwanza msafiri ndiye mwenye nguvu.

E.21 tipasb10 and tipxsb10

[illegible]

E.22 tipasi10 and tipxsi10

abcdefghijklmnopqrstuvwxyz

E.23 tipatt10 and tipxtt10

[illegible]

E.26. *tipatt9* and *tipxtt9*

E.26 tipatt9 and tipxtt9

[illegible]

ðə 'nɔ:θ 'wind ənd ðə 'sʌn wə dis'pjʊ:tiŋ wiθf wəz ðə 'strɒŋge, wən ə
'trævlə keɪm ə'ləŋ 'ræpt ɪn ə 'wɔ:m 'kloʊk. ðeɪ ə'grɪ:d ðæt ðə 'wʌn hu-
fə'st sək'si:dɪd ɪn 'meɪkiŋ ðə 'trævlə teɪk hɪz 'kloʊk ɒf ʃʊd bɪ
kən'sɪdəd 'strɒŋge ðæn ðɪ 'ʌðə.

E.27 tipats10 and tipxts10

[illegible]

la bi:z e l so:lɛ:j sɛ dispytɛ, ʃakə asyrā k il ete l ply fɔ:r,
kāt iz ʃ vy ə vwajazɛ:r ki s avāse, āvlope dā sʃ mātɔ. i sʃ tʃbe
dakɔ:r, kɛ sɛlyi ki arive l prɛmjɛ a fɛr ote sʃ mātɔ o vwajazɛ:r,
sɛrɛ rɔarde kɔm l ply fɔ:r.

E.28 xipa10 and xipx10

[illegible]

ʔamst ʃtɪtən zɪç ʔnɔʔvɪnt ʔʊnt ʔɔnə, ʔe:ɾ fən ʔi:nən ʔardən vɔl dɐʃ ʃtɛkɐrə
vɛ:rə, ʔals ʔam ʔvʌndɐrɐ, dɛ:ʃ ʔɪn ʔamən vʌmən ʔmantəl gəʔhɪlt vʌ:ɾ, dəs vɛ:gəs
daʔhe:ɾ kʌm. zɪ vʊbdən ʔamiç, dəs ʔe:ɾje:nɪç fɪ:ɾ dən ʃtɛkɐrən gɛltən zɔltə,
dɛ:ɾ dən ʔvʌndɐrɐ ʔsvɪnən vʊbdə. zʌmən ʔmantəl ʔʌptsʊne:mən.

E.29 xipab10 and xipxb10

[illegible]

. , ~ ¨ ° ´ ± ↓ ↑ α σ ω 4 C Ы Ğ Ę d d b e x γ γ χ ψ h j i j f l n η η ϕ ϕ ⊙ ρ ϖ p ϑ ι t
 æ ŧ ꝛ ε ß Ł || ‡ † ‡ ‡ ‡ ? ? ρ v Ѧ Δ F K X J M P Q Я Ω

marra f famsi wi r ri:h ka:nu bi jitxan?um ?inhu l ?a?wa fi:h:hum. u ba:fde:n
fa:fu ra:gil sa:jih gaj mim ba:fi:d mitlaffa:f bi ?aba:ja t?i:la. fa ttafa?um ?ala
?in illi jixalli:h ji?la:f il ?aba:ja fi l ?awwal jiku:n huwwa ?a?wa mit tani.

E.30 xipas110 and xipxs110

[illegible]

, . : ; ' " % & * + - = / \ | ^ _ { } ~ ¡ ¢ £ ¤ ¥ ¦ § ¨ © ª « ¬ ® ¯ ° ± ² ³ ´ µ ¶ · ¸ ¹ º » ¼ ½ ¾ ¿ À Á Â Ã Ä Å Æ Ç È É Ê Ë Ì Í Î Ï Ñ Ò Ó Ô Õ Ö × Ø Ù Ú Û Ü Ý Þ à á â ã

upepo ulikuwa ukififana na jua kuwa nani mwenje nguvu kupita mwenziwe, mara akapita masafiri alijekuwa amevaa juba. walipatana kuwa atakajemvua juba kwanza msafiri ndije mwenje nguvu.

E.31 xipass10 and xipxss10

[illegible][illegible]

ðə 'wɪnd ənd ðə 'sʌn wə dɪs'pjʊrtɪŋ wɪtʃ wəz ðə 'strɒŋge, wɛn ə 'trævlə keɪm ə'laŋ 'ræpt ɪn ə 'wɔ:ɪm 'kloʊk. ðeɪ ə'grɪd ðæt ðə 'wʌn hu' fɜ:st sək'sɪ'dɪd ɪn 'meɪkɪŋ ðə 'trævlə teɪk hɪz 'kloʊk ɒf ʃʊd bɪ kən'sɪdəd 'strɒŋgə ðən ðɪ 'ʌðə.

Appendix F

Layout of TIPA fonts

Some phoneticians refer to Upsilon by the name *Bucket*,
but it looks more like an urn to us.

(*PSG*, 1996, p. 185)

.....
.....

O Attic shape! Fair attitude! with brede
Of marble men and maidens overwrought,
With forest branches and the trodden weed;
Thou, silent form, dost tease us out of thought
As doth eternity: Cold Pastoral!
When old age shall this generation waste,
Thou shalt remain, in midst of other woe
Than ours, a friend to man, to whom thou say'st,
“Beauty is truth, truth beauty, —that is all
Ye know on earth, and all ye need to know.”

(John Keats, *Ode on a Grecian Urn*)

F.1 tipa10

	'0	'1	'2	'3	'4	'5	'6	'7	
'00x	`	'	^	~	¨	"	°	˘	"0x
'01x	˘	–	•	›	€	“	˘	˙	
'02x	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	"1x
'03x	×	1	J	+	+	+	+	+	
'04x	˙	!	!	!	!	!	~	˙	"2x
'05x	()	*	+	,	-	.	/	
'06x	h	i	Λ	3	u	v	D	Y	"3x
'07x	θ	θ	ː	˙	˘	=	˘	?	
'10x	ə	ɑ	β	ε	ð	ε	Φ	Y	"4x
'11x	fi	ı	j	ʁ	ʌ	ŋ	ŋ	ɔ	
'12x	ʔ	ʔ	r	f	θ	ʊ	ʊ	u	"5x
'13x	χ	Y	3	[˙]	˘	˘	
'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	b	d	d	d	E	g	l	l	"Ax
'25x	J	ŋ	ı	λ	λ	h	u	æ	
'26x	ω	Ω	∫	‡	‡	ts	u	u	"Bx
'27x	3	ε	ʁ	ʁ	?	<	>		
'30x	A	c	C	ç	æ	ø	3	3	"Cx
'31x	Y	G	h	H	ı	J	k	L	
'32x	h	o	β	d	Γ	I	f	œ	"Dx
'33x	ı	ŋ	u	ı	ʔ	ʔ	z	p	
'34x	B	6	d	d	g	G	æ	ç	"Ex
'35x	h	J	f	ı	ı	l	u	u	
'36x	N	ı	Ö	ı	ı	ı	R	œ	"Fx
'37x	ø	ŋ	t	M	z	z	p	h	
	"8	"9	"A	"B	"C	"D	"E	"F	

F.2. tipx10

F.2 tipx10

	'0	'1	'2	'3	'4	'5	'6	'7	
'00x	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	ˆ	"0x
'01x	↑	→	↔						
'04x	ä	σ	æ	4	c	6	c	d	"2x
'05x	d	db	e	ε	γ	γ	γ	h	
'06x	h	ı	j	f	h	n	η	♀	"3x
'07x	φ	⊙	ρ	ω	p	φ	l	t	
'10x	‡	z	z	ε	đ	l			"4x
'11x	‡	†							
'12x	þ	þ	þ	þ	?	?	?		"5x
'13x									
'16x	v	∅	Δ	F	K	⋈	⊔	M	"7x
'17x	P	Q	Я	Ω					
	"8	"9	"A	"B	"C	"D	"E	"F	