


The tipauni package

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 <https://ctan.org/pkg/tipauni>

 <https://puszcza.gnu.org.ua/bugs/?group=tipauni>

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The L^AT_EX package tipauni

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Abstract

This package is the second step for L^AT_EX-internally bridging the gap between the Unicode and the TIPA package. The first step was the package `unitipa`. Users can now use their beloved TIPA shortcuts with the benefits of Unicode i.e. searchability, copy-pasting, changing the font and many more. As this package needs the package `fontspec` for loading an IPA font, it needs to be compiled with Lua/X_YL^AT_EX. This package can also be viewed as an ASCII-based input method for producing IPA characters in Unicode.

1 Acknowledgements

This package is completed because of the rigorous help by Jairo A. del Rio, Jonathan P. Spratte, Phelype Oleinik & Ulrike Fischer. Their suggestions and contributions are extremely valuable for the development of this package.

Jonathan P. Spratte has helped the package by building a parser based on `expl3`. Phelype Oleinik has helped the package by building a test-suit for regression-tests. The tests can be seen in the git-repository of the project.

Lemures Lemniscati pointed a few bugs in the documentation & the code. Their details are as follows. are as follows:

2022-01-03 A typo `\textsh` in `tipauni.dtx`. ([link](#))

2022-01-09 Avoid unconditional loading of CharisSIL. ([link](#))

2022-01-09 Fix typos in Input B of Raised and Lowered. ([link](#))

2022-01-09 `\textcorner` should be defined by `\DeclareTextSymbol`. ([link](#))

2022-01-09 Fix a typo in Input B of Near-close near-front rounded. ([link](#))

2023-02-13 Changed the default font to New Computer Modern instead of Charis SIL.

Anja Hasse pointed a bug in the package with an SE question¹. It got fixed in v0.6.1 of the package.

All of these contributions are highly valuable for the development of this package.

¹URL: <https://tex.stackexchange.com/q/662466>

2 Package options

documentfont `documentfont=<font-name>`

The default font for the entire document set by this package used to be [Charis SIL](#). From v0.7 the package has changed the default font to [New Computer Modern](#). The reason for this breaking change is that Charis SIL was just used because of its good support for IPA which was absent with the default Latin Modern shape. New Computer Modern has developed all the support for IPA & hence I am making this change. Users can easily change the default font with the package-option `documentfont` as documented below.

```
\usepackage[documentfont=DoulosSIL]{tipauni}
```

Please note that you must provide a value to this key. If you pass it an empty value; i.e., “`documentfont={}`”/“`documentfont=`” or no value, i.e., “`documentfont`”, you will be prompted with errors from package `tipauni`. If an empty/no-value `documentfont` is used & no other non-empty `documentfont` has been used so far; then the document is typeset with the default font-family of Lua/TeX, i.e., the Latin Modern family. If another `documentfont` has a non-empty value, the value of that option will be used as the font of the document.

fontspecoptions `fontspecoptions=<font-options>`

This option can be used to set options to the font set with `documentfont` package option. If the `recommendedfont` option is used & has the highest priority; the options set with `fontspecoptions` will be used with the default font. If the `preservefont` option has the highest priority, this parameter will be ineffective & throw a warning. In the argument of this option write as if you are writing in the optional parameter of the `\setmainfont` command, e.g.:

```
\usepackage[fontspecoptions={Scale=1.5}]{tipauni}
```

If this options is used with no value it will be ignored with a warning.
E.g. Try `\usepackage[fontspecoptions]{tipauni}`.

If it is used with an empty value it will reset the fontspec-options so far you have set, e.g., Try:

```
\usepackage[%  
  fontspecoptions={Scale=1.5},%  
  fontspecfontspecoptions={}%  
{tipauni}
```

Please note that the keys so far documented are the only keys which take values. Other than these the following keys *don't* take any value. You will be prompted with an error from package `expkv` if you use values for the following keys.

preservefont This option will omit executing the `\setmainfont` command with New Computer Modern. The typeset document will use the default font of Lua/TeX, i.e., the Latin Modern.

recommendedfont This option is used to override other font definitions made with option `documentfont`. New Computer Modern will be used as the main font of the document when this option is used.

Please note that every option so far mentioned can potentially override each other, e.g., If a `documentfont` is added after a `preservefont`, the former will override the latter (& vice versa). It is true for all these three package options.

resetfontspecoptions This option resets all the `fontspec`-options set with package option `fontspecoptions`. As noted for the font-options, these two options which deal with the options of the loaded fonts also can override each other. The last one loaded will be considered of the highest priority.

incompatible By default `tipauni` will throw a warning if symbols not contained in the `tipa` package were used. Using this option you can switch this check off if you don't have to stay compatible with `tipa` to silence this warning.

3 List of available commands

TIPA has two alternative methods for inputting IPA characters. In the following tables, **Input A** column lists all the long TIPA commands (e.g., `\textrtailt`) & **Input B** column lists the short ones (e.g., `\textipa{\:t}`)². This documentation lists down all the commands necessary for typing symbols in the IPA chart.

3.1 Pulmonic consonants

Description	- Input A	- Input B	- Symbol
Retroflex voiceless stop	- <code>\textrtailt</code>	- <code>\:t</code>	- [t̪]
Retroflex voiced stop	- <code>\textrtaild</code>	- <code>\:d</code>	- [d̪]
Palatal voiced stop	- <code>\textbardotlessj</code>	- <code>*j</code>	- [j]
Uvular voiced stop	- <code>\textscg</code>	- <code>\;G</code>	- [g]
Glottal voiceless stop	- <code>\textglotstop</code>	- P	- [ʔ]
Labiodental nasal	- <code>\textltailm</code>	- M	- [m̥]
Retroflex nasal	- <code>\textrtailn</code>	- <code>\:n</code>	- [ɳ]
Palatal nasal	- <code>\textltailn</code>	- <code>*n</code>	- [ɲ]
Velar nasal	- <code>\ng^s</code>	- N	- [ŋ]
Uvular nasal	- <code>\textscn</code>	- <code>\;N</code>	- [ɴ]
Bilabial trill	- <code>\textscb</code>	- <code>\;B</code>	- [β]
Uvular trill	- <code>\textscr</code>	- <code>\;R</code>	- [ʀ]
Labiodental flap ¹	- <code>\labdentflap</code>	- <code>*v</code>	- [v̥]
Alveolar tap	- <code>\textfishhookr</code>	- R	- [ɾ]
Retroflex flap	- <code>\textrtailr</code>	- <code>\:r</code>	- [ɽ]

²All of these commands must be enclosed in the `\textipa` command. (e.g., `\textipa{\:tP}` for [t̪ʰ])

Bilabial voiceless fricative	- \textphi	- F	- [ɸ]
Bilabial voiced fricative	- \textbeta	- B	- [β]
Dental voiceless fricative	- \texttheta	- T	- [θ]
Dental voiced fricative	- \dh [§]	- D	- [ð]
Palatal voiceless fricative	- \textesh	- S	- [ç]
Palatal voiced fricative	- \textyogh	- Z	- [ʒ]
Retroflex voiceless fricative	- \textrtails	- \:s	- [ʂ]
Retroflex voiceless fricative	- \textrtailz	- \:z	- [ʐ]
Palatal voiced fricative	- \textctj	- J	- [j]
Velar voiced fricative	- \textgamma	- G	- [ɣ]
Uvular voiceless fricative	- \textchi	- X	- [χ]
Uvular voiced fricative	- \textinvscr	- K	- [ʁ]
Pharyngeal voiceless fricative	- \textcrh	- *h	- [ħ]
Pharyngeal voiced fricative	- \textrevglotstop	- Q	- [ʕ]
Glottal voiced fricative	- \texthth	- H	- [ɦ]
Alveolar voiceless lateral fricative	- \textbeltl	- *l	- [ɬ]
Alveolar voiced lateral fricative	- \textlyoghlig	- *z	- [ɮ]
Labiodental approximant	- \labdentapp	- V	- [ʋ]
Alveolar approximant	- \textturnr	- *r	- [ɹ]
Retroflex approximant	- \textturnrrtail	- \:R	- [ɻ]
Velar approximant	- \textturnmrleg	- *m	- [ɰ]
Retroflex lateral approximant	- \textrtaill	- \:l	- [ɭ]
Palatal lateral approximant	- \textturny	- L	- [ʎ]
Velar lateral approximant	- \textsc1	- \;L	- [ɮ]

[§] These commands are also available without package `tipa`.

¹ A symbol for this sound was introduced in 2005. The last update of the package `tipa` was in 2004, so this character is missing in it. A command for it is provided by this package. Such `tipa`-exclusive commands are written with red color in this documentation.

3.2 Non-Pulmonic consonants

Description	- Input A	- Input B	- Symbol
Bilabial click	- \textbullseye	- \!o	- [ɔ̥]
Postalveolar click	- \pstalvclick	- !	- [!]̥
Palatoalveolar click	- \textdoublebarpipe	- \!c	- [ɕ̥]
Alveolar lateral click	- \textdoublepipe	-	- [ll̥]
Bilabial implosive	- \texthtb	- \!b	- [ɓ̥]
Dental implosive	- \texthtd	- \!d	- [ɗ̥]
Palatal implosive	- \texthtbardotlessj	- \!j	- [ɟ̥]
Velar implosive	- \texthtg	- \!g	- [ɠ̥]
Uvular implosive	- \texthtscg	- \!G	- [ʕ̥]

3.3 Other symbols

Description	Input A	Input B	Symbol
Labial-velar voiceless fricative	<code>\textturnw</code>	<code>*w</code>	[ʷ]
Labial-palatal voiced approximant	<code>\textturnh</code>	4	[ɥ]
Epiglottal voiceless fricative	<code>\textsch</code>	; <code>H</code>	[ħ]
Epiglottal voiced fricative/approximant	<code>\textbarrevglotstop</code>	<code>*1</code>	[ʕ]
Alveolar voiced lateral flap	<code>\textturnlonglegr</code>	<code>\!r</code>	[ɺ]
Epiglottal plosive	<code>\textbarglotstop</code>	<code>*2</code>	[ʡ]
Alveolo-palatal voiceless fricative	<code>\textctc</code>	C	[ç]
Alveolo-palatal voiced fricative	<code>\textctz</code>	<code>*Z</code>	[ʒ]
Postalveolar-velar voiceless fricative	<code>\texttheng</code>	<code>*3</code>	[ɣ]

3.4 Vowels

Description	Input A	Input B	Symbol
Near-close near-front unrounded	<code>\textsci</code>	I	[ɪ]
Near-close near-front rounded	<code>\textscy</code>	Y	[ɥ]
Open-mid front unrounded	<code>\textepsilon</code>	E	[e]
Close central unrounded	<code>\textbari</code>	1	[ɨ]
Close central rounded	<code>\textbaru</code>	0	[ʉ]
Near-close near-back rounded	<code>\textupsilon</code>	U	[ɯ]
Close-mid central unrounded	<code>\textreve</code>	9	[ə]
Close-mid central rounded	<code>\textbaro</code>	8	[ɵ]
Mid central vowel	<code>\textschwa</code>	@	[ə]
Open-mid central unrounded	<code>\textrevepsilon</code>	3	[ɜ]
Open-mid central rounded	<code>\textcloserevepsilon</code>	<code>&</code>	[ɝ]
Near-open central	<code>\textturna</code>	5	[ɛ]
Close back unrounded	<code>\textturnm</code>	W	[ɯ]
Close-mid back unrounded	<code>\textramshorns</code>	7	[ɤ]
Open-mid back unrounded	<code>\textturnv</code>	2	[ʌ]
Open-mid back rounded	<code>\textopeno</code>	0	[ɔ]
Open back unrounded	<code>\textscripta</code>	A	[ɑ]
Open back rounded	<code>\textturnscripta</code>	6	[ɒ]

3.5 Independent diacritics

Description	Input A	Input B	Symbol
Rhoticity	<code>ə\textrhoticity</code>	<code>ə\tr</code>	[ə̃]
No audible release	<code>n\textcorner</code>	<code>n\tc</code>	[n̚]

Tie bar (standalone) - `\stdlnetiebar{ei}` - `\ts{ei}` - [e_i]

3.6 Dependent diacritics

Description	- Input A	- Input B	- Symbol
Voiceless	<code>\textsubring{m}</code>	<code>\r*m</code>	[m̥]
Voiced	<code>\textsubwedge{s}</code>	<code>\v*s</code>	[s̥]
More rounded	<code>\textsubrhalfring{w}</code>	<code>\)w</code>	[w̥]
Less rounded	<code>\textsublhalfring{w}</code>	<code>\ (w</code>	[w̥]
Advanced	<code>\textsubplus{ə}</code>	<code>\ +e</code>	[ə̥]
Retracted	<code>\textsubbar{l}</code>	<code>\=*l</code>	[l̥]
Mid-centralized	<code>\textovercross{e}</code>	<code>\ x{e}</code>	[e̥]
Syllabic	<code>\textsyllabic{n}</code>	<code>\s{n}</code>	[n̥]
Non-syllabic	<code>\textsubarch{a}</code>	<code>\ns{a}</code>	[ḁ]
Breathy voiced	<code>\textsubumlaut{b}</code>	<code>\"*b</code>	[b̥]
Creaky voiced	<code>\textsubtilde{ə}</code>	<code>\~*ə</code>	[ə̥]
Linguolabial	<code>\textseagull{l}</code>	<code>\ ml</code>	[l̥]
Velarized	<code>\textsuperimposetilde{i}</code>	<code>\vl{i}</code> ¹	[i̥]
Raised	<code>\textraising{ə}</code>	<code>\ 'ə</code>	[ə̥]
Lowered	<code>\textlowering{ə}</code>	<code>\ `ə</code>	[ə̥]
Advanced tongue root	<code>\textadvancing{ə}</code>	<code>\ <ə</code>	[ə̥]
Retracted tongue root	<code>\textretracting{ə}</code>	<code>\ >ə</code>	[ə̥]
Dental	<code>\textsubbridge{t}</code>	<code>\ [t</code>	[t̥]
Apical	<code>\textinvsubbridge{t}</code>	<code>\]t</code>	[t̥]
Laminal	<code>\textsubsquare{s}</code>	<code>\lmn{s}</code>	[s̥]
Tie bar (top)	<code>\texttoptiebar{ei}</code>	<code>\t{ei}</code>	[e_i̥]
Tie bar (bottom)	<code>\textbottomtiebar{ei}</code>	<code>\t*{ei}</code>	[e_i̥]

¹ The documentation of package `the tipa` on p. 53 describes a shorthand command i.e. `\|~{arg}` which is not functional. I haven't investigated the reasons, but instead provided a new shorthand command for this character.

4 Implementation

```

1 <@@=tipauni>
2 <*package>

```

Provide the package with some description & version specifications.

```

3 \ProvidesPackage{tipauni}[2023/02/13 v0.7a
4 Unicode characters with TIPA commands]

```

Load necessary packages.

```

5 \RequirePackage{xparse}
6 \RequirePackage{fontspec}
7 \RequirePackage{expkv-def,expkv-opt}

```

Package options are provided using the package `expkv`.

```

8 \newif\iftipauni@document@font
9 \def\tipauni@bookorregular{regular}
10 \def\tipauni@recommended@font{tipauni-newcm-\tipauni@bookorregular}
11 \tipauni@document@fonttrue
12 \let\tipauni@font@options\@empty
13 \ekvdefinekeys{tipauni}{%
14   bool incompatible           = \iftipauni@nontipa@ignore,%
15   noval preservefont         = {%
16     \let\tipauni@font\tipauni@undefined
17     \tipauni@document@fontfalse
18   },%
19   estore fontspecoptions     = \tipauni@font@options,%
20   new noval fontspecoptions  = {%
21     \PackageWarningNoLine{tipauni}{%
22       As you haven't given any value to package option\MessageBreak
23       `fontspecoptions'; it will be ignored. Please\MessageBreak
24       provide a valid (list of) fontspec option(s)%
25     }%
26   },%
27   noval resetfontspecoptions = {%
28     \let\tipauni@font@options\@empty
29   },%
30   noval documentfont         = {%
31     \PackageError{tipauni}{No value for the `documentfont' option}{%
32       The `documentfont' option has no value. Please provide a valid
33       font-name,\MessageBreak otherwise it will be ignored or
34       (if given) the value of another non-empty\MessageBreak
35       `documentfont' will be used.%
36     }%
37     \ifdefined\tipauni@font
38       \tipauni@document@fonttrue
39     \else
40       \tipauni@document@fontfalse
41     \fi
42   },%
43   new code documentfont      = {%
44     \edef\tipauni@temp{#1}%
45     \ifx\tipauni@temp\@empty
46       \PackageError{tipauni}{Empty `documentfont' option}{%
47         The `documentfont' option has an empty value. Please provide a valid%
48         \MessageBreak
49         font-name, otherwise it will be ignored or (if given) the value of%
50         \MessageBreak
51         another non-empty `documentfont' will be used.%
52       }%
53     \ifdefined\tipauni@font
54       \tipauni@document@fonttrue
55     \else
56       \tipauni@document@fontfalse
57     \fi
58   \else
59     \tipauni@document@fonttrue
60     \let\tipauni@font\tipauni@temp
61   \fi

```



```

62 },%
63 noval recommendedfont          = {%
64   \tipauni@document@fonttrue
65   \let\tipauni@font\tipauni@recommended@font
66 },%
67 noval newcmbook                 = {%
68   \def\tipauni@bookorregular{book}%
69   }%
70 }
71 \ekvoProcessLocalOptions{tipauni}

```

The following code executes the `\setmainfont` command & issues a warning in a special case.

```

72 \iftipauni@document@font
73 \ifdefined\tipauni@font
74 \else
75   \let\tipauni@font\tipauni@recommended@font
76 \fi
77 \expandafter\setmainfont\expandafter
78 [\expandafter{\tipauni@font@options}]{\tipauni@font}
79 \else
80 \ifx\tipauni@font@options\@empty
81 \else
82   \PackageWarningNoLine{tipauni}{%
83     An active font loaded with package fontspec is\MessageBreak
84     necessary for `fontspecoptions' to take effect.\MessageBreak
85     Please use the `documentfont'/'recommendedfont'\MessageBreak
86     option or load a font outside package `tipauni'\MessageBreak
87     to make your options active. Currently ignoring:\MessageBreak
88     [\tipauni@font@options]%
89   }%
90 \fi
91 \fi

```

The following commands were kindly suggested by Phelype Oleinik for developing a conditional which is always global.

```

92 \newif\ifnontipa
93 \protected\def\nontipatrue{\global\let\ifnontipa\iftrue}
94 \protected\def\nontipafalse{\global\let\ifnontipa\iffalse}
95 \iftipauni@nontipa@ignore
96 \protected\def\nontipatrue{}
97 \fi

```

The following commands provide the command `\tipaunicmd` for printing characters that are missing in the `tipa` package.

```

98 \NewDocumentCommand\tipaunicmd{ m m }{%
99   \NewDocumentCommand#1{ }{\nontipatrue #2}%
100 }%

```

As can be seen above, everytime when a command that is absent in the `tipa` package is provided, it sets the conditional `nontipa` to true value. At the end of the document this package checks if there is any instance of a non-TIPA command. If yes, it generates a warning in the `.log` file saying that this code is now incompatible with the TIPA package and some characters might be displayed with a different font. All of this is achieved with the help of following commands. The discussion on [this](#) question helped a lot for fine tuning the warning message.

```

101 \AtEndDocument{%
102   \ifnontipa
103   \PackageWarningNoLine{tipauni}{%
104     You have used a command(s) that is (are) not\MessageBreak
105     supported by package TIPA. Thus your current code is\MessageBreak
106     incompatible with that package. These commands are\MessageBreak
107     printed with a different Unicode font. Refer to the\MessageBreak
108     documentation of package tipauni for a list of\MessageBreak
109     commands that are not supported in TIPA%
110   }%
111   \else
112   \fi
113 }%

```

From here the code for obtaining Unicode characters with TIPA commands starts.

```

114 \DeclareTextCommand{\tipaunistar}{TU}[1]{{#1}}
115 \DeclareTextAccentDefault{\tipaunistar}{TU}
116 \DeclareTextCommand{\tipaunisemicolon}{TU}[1]{{#1}}
117 \DeclareTextAccentDefault{\tipaunisemicolon}{TU}
118 \DeclareTextCommand{\tipaunicolon}{TU}[1]{{#1}}
119 \DeclareTextAccentDefault{\tipaunicolon}{TU}
120 \DeclareTextCommand{\tipaunibang}{TU}[1]{{#1}}
121 \DeclareTextAccentDefault{\tipaunibang}{TU}
122 \DeclareTextCommand{\tipaunipipe}{TU}[2]{\@pipeshortands{#1}{#2}}
123 \DeclareTextAccentDefault{\tipaunipipe}{TU}
124 %% Pulmonic consonants
125 %%-- Stops
126 %%--- Retroflex
127 \DeclareTextSymbol{\texttrtailt}{TU}{"0288}%% t
128 \DeclareTextComposite{\tipaunicolon}{TU}{t}{"288}
129 \DeclareTextSymbol{\texttrtaild}{TU}{"0256}%% d
130 \DeclareTextComposite{\tipaunicolon}{TU}{d}{"256}
131 %%--- Palatal
132 \DeclareTextSymbol{\textbardotlessj}{TU}{"25F}%% j
133 \DeclareTextComposite{\tipaunistar}{TU}{j}{"25F}
134 %%--- Uvular
135 \DeclareTextSymbol{\textscg}{TU}{"262}%% g
136 \DeclareTextComposite{\tipaunisemicolon}{TU}{G}{"262}
137 %%--- Glottal
138 \DeclareTextSymbol{\textglotstop}{TU}{"294}%% ?
139 %%-- Nasals
140 %%--- Labiodental
141 \DeclareTextSymbol{\textltailm}{TU}{"271}%% m
142 %%--- Retroflex
143 \DeclareTextSymbol{\textrtailn}{TU}{"273}%% n
144 \DeclareTextComposite{\tipaunicolon}{TU}{n}{"273}
145 %%--- Palatal
146 \DeclareTextSymbol{\textltailn}{TU}{"272}%% p
147 \DeclareTextComposite{\tipaunistar}{TU}{n}{"272}
148 %%--- Uvular
149 \DeclareTextSymbol{\textscn}{TU}{"274}%% N
150 \DeclareTextComposite{\tipaunisemicolon}{TU}{N}{"274}
151 %%-- Affricates
152 \DeclareTextSymbol{\textdzlig}{TU}{"02A3}%% dz
153 \DeclareTextSymbol{\textdyoghlig}{TU}{"02A4}%% dʒ

```

```

154 \DeclareTextSymbol{\texttslig}{TU}{\02A6}%% ts
155 \DeclareTextSymbol{\texttshlig}{TU}{\02A7}%% tʃ
156 \DeclareTextSymbol{\textdblig}{TU}{\02A4}%% ð
157 \DeclareTextSymbol{\textqplig}{TU}{\00239}%% ø
158 \DeclareTextSymbol{\texthvlig}{TU}{\0195}%% h̄
159 \DeclareTextSymbol{\texttctclig}{TU}{\02A8}%% tʃ̣
160 %%-- Trills
161 %%--** Bilabial
162 \DeclareTextSymbol{\textscb}{TU}{\299}%% ɸ
163 \DeclareTextComposite{\tipaunisemicolon}{TU}{B}{\299}
164 %%--** Uvular
165 \DeclareTextSymbol{\textscr}{TU}{\280}%% ʀ
166 \DeclareTextComposite{\tipaunisemicolon}{TU}{R}{\280}
167 %%-- Taps or flaps
168 %%-- Labiodental flap
169 \tipaunicmd{\labdentflap}{v}%% tipauni-exclusive
170 \DeclareTextComposite{\tipaunistar}{TU}{v}{\2C71}%% tipauni-exclusive
171 %%--** Alveolar
172 \DeclareTextSymbol{\textfishhookr}{TU}{\27E}%% ɾ
173 %%--** Retroflex
174 \DeclareTextSymbol{\textrtailr}{TU}{\27D}%% ɽ
175 \DeclareTextComposite{\tipaunicolon}{TU}{r}{\27D}
176 %%-- Fricatives
177 %%--** Bilabial
178 \DeclareTextSymbol{\textphi}{TU}{\278}%% φ
179 \DeclareTextSymbol{\textbeta}{TU}{\3B2}%% β
180 %%--** Dental
181 \DeclareTextSymbol{\texttheta}{TU}{\3B8}%% θ
182 %%--** Postalveolar
183 \DeclareTextSymbol{\textesh}{TU}{\283}%% ʃ
184 \DeclareTextSymbol{\textyogh}{TU}{\292}%% ʒ
185 %%--** Retroflex
186 \DeclareTextSymbol{\textrtails}{TU}{\282}%% ʂ
187 \DeclareTextComposite{\tipaunicolon}{TU}{s}{\282}
188 \DeclareTextSymbol{\textrtailz}{TU}{\290}%% ʐ
189 \DeclareTextComposite{\tipaunicolon}{TU}{z}{\290}
190 %%--** Palatal
191 \DeclareTextSymbol{\textctj}{TU}{\29D}%% j
192 %%--** Velar
193 \DeclareTextSymbol{\textgamma}{TU}{\263}%% γ
194 %%--** Uvular
195 \DeclareTextSymbol{\textchi}{TU}{\3C7}%% χ
196 \DeclareTextSymbol{\textinvscr}{TU}{\281}%% ɮ
197 %%--** Pharyngeal
198 \DeclareTextSymbol{\textcrh}{TU}{\127}%% ħ
199 \DeclareTextComposite{\tipaunistar}{TU}{h}{\127}
200 \DeclareTextSymbol{\textrevglotstop}{TU}{\295}%% ʕ
201 %%--** Glottal
202 \DeclareTextSymbol{\textthth}{TU}{\266}%% ɦ
203 %%-- Lateral fricatives
204 %%--** Alveolar
205 \DeclareTextSymbol{\textbeltl}{TU}{\26C}%% ɬ
206 \DeclareTextComposite{\tipaunistar}{TU}{l}{\26C}
207 \DeclareTextSymbol{\textlyoghlig}{TU}{\26E}%% ɮ̣

```

```

208 \DeclareTextComposite{\tipaunistar}{TU}{z}{"26E}
209 %%-- Approximants
210 %%-- Labiodental approximant
211 \tipaunicmd{\labdentapp}{u}%% tipauni-exclusive
212 %%--** Alveolar
213 \DeclareTextSymbol{\textturnr}{TU}{"279}%% ɹ
214 \DeclareTextComposite{\tipaunistar}{TU}{r}{"279}
215 %%--** Retroflex
216 \DeclareTextSymbol{\textturnrrtail}{TU}{"27B}%% ɻ
217 \DeclareTextComposite{\tipaunicolon}{TU}{R}{"27B}
218 %%--** Velar
219 \DeclareTextSymbol{\textturnmrleg}{TU}{"270}%% ɣ
220 \DeclareTextComposite{\tipaunistar}{TU}{m}{"270}
221 %%-- Lateral approximants
222 %%--** Retroflex
223 \DeclareTextSymbol{\textrrtail}{TU}{"26D}%% ʀ
224 \DeclareTextComposite{\tipaunicolon}{TU}{l}{"26D}
225 \DeclareTextSymbol{\textturny}{TU}{"28E}%% ʎ
226 \DeclareTextSymbol{\textsc1}{TU}{"29F}%% ʟ
227 \DeclareTextComposite{\tipaunisemicolon}{TU}{L}{"29F}
228 %% Non-pulmonic consonants
229 %%-- Clicks
230 %%--** Bilabial
231 \DeclareTextSymbol{\textbullseye}{TU}{"298}%% ǀ
232 \DeclareTextComposite{\tipaunibang}{TU}{o}{"298}
233 %%-- Postalveolar click
234 \tipaunicmd{\pstalvclick}{!}%% tipauni-exclusive
235 %%--** Palato-alveolar
236 \DeclareTextSymbol{\textdoublebarpipe}{TU}{"1C2}%% ɸ
237 \DeclareTextComposite{\tipaunibang}{TU}{c}{"1C2}%% tipauni-exclusive
238 %%--** Alveolar lateral
239 \DeclareTextSymbol{\textdoublepipe}{TU}{"1C1}%% ɸ
240 %%-- Implosives
241 %%--** Bilabial
242 \DeclareTextSymbol{\texthtb}{TU}{"253}%% ɓ
243 \DeclareTextComposite{\tipaunibang}{TU}{b}{"253}
244 %%--** Dental
245 \DeclareTextSymbol{\texthtd}{TU}{"257}%% ɗ
246 \DeclareTextComposite{\tipaunibang}{TU}{d}{"257}
247 %%--** Palatal
248 \DeclareTextSymbol{\texthtbardotlessj}{TU}{"284}%% ɟ
249 \DeclareTextComposite{\tipaunibang}{TU}{j}{"284}
250 %%--** Velar
251 \DeclareTextSymbol{\texthtg}{TU}{"260}%% ɠ
252 \DeclareTextComposite{\tipaunibang}{TU}{g}{"260}
253 %%--** Uvular
254 \DeclareTextSymbol{\texthtscg}{TU}{"29B}%% ʁ
255 \DeclareTextComposite{\tipaunibang}{TU}{G}{"29B}
256 %% Other consonants
257 \DeclareTextSymbol{\textturnw}{TU}{"28D}%% ʍ
258 \DeclareTextSymbol{\textturnh}{TU}{"265}%% ɥ
259 \DeclareTextSymbol{\textsch}{TU}{"29C}%% ɥ
260 \DeclareTextSymbol{\textbarrevglotstop}{TU}{"2A2}%% ʁ̥
261 \DeclareTextComposite{\tipaunistar}{TU}{1}{"2A2}%% tipauni-exclusive

```

```

262 \DeclareTextSymbol{\textbarglotstop}{TU}{"2A1"}% ǿ
263 \DeclareTextComposite{\tipaunistar}{TU}{2}{"2A1"}% tipauni-exclusive
264 \DeclareTextSymbol{\textctc}{TU}{"255"}% Ɔ
265 \DeclareTextSymbol{\textctz}{TU}{"291"}% Ʒ
266 \DeclareTextComposite{\tipaunistar}{TU}{Z}{"291"}% tipauni-exclusive
267 \DeclareTextSymbol{\textturnlonglegr}{TU}{"27A"}% I
268 \DeclareTextComposite{\tipaunibang}{TU}{r}{"27A"}% tipauni-exclusive
269 \DeclareTextSymbol{\textthheng}{TU}{"267"}% ɰ
270 \DeclareTextComposite{\tipaunistar}{TU}{3}{"267"}% tipauni-exclusive
271 \DeclareTextComposite{\tipaunistar}{TU}{k}{"029E"}% ɻ
272 \DeclareTextComposite{\tipaunistar}{TU}{t}{"287"}% ɿ
273 \DeclareTextComposite{\tipaunistar}{TU}{w}{"28D"}% ɿ
274 \DeclareTextComposite{\tipaunisemicolon}{TU}{E}{"1D07"}% Ǝ
275 \DeclareTextComposite{\tipaunisemicolon}{TU}{J}{"1D0A"}% Ɔ
276 \DeclareTextComposite{\tipaunisemicolon}{TU}{A}{"1D00"}% Ɔ
277 \DeclareTextComposite{\tipaunisemicolon}{TU}{H}{"29C"}% ɰ
278 \DeclareTextComposite{\tipaunisemicolon}{TU}{U}{"1D1C"}% Ɔ
279 %% Vowels
280 \DeclareTextSymbol{\textsci}{TU}{"26A"}% ɪ
281 \DeclareTextSymbol{\textscy}{TU}{"28F"}% ɻ
282 \DeclareTextSymbol{\textepsilon}{TU}{"25B"}% ɛ
283 \DeclareTextSymbol{\textbari}{TU}{"268"}% ɪ
284 \DeclareTextSymbol{\textbaru}{TU}{"289"}% ɿ
285 \DeclareTextSymbol{\textupsilon}{TU}{"28A"}% ɿ
286 \DeclareTextSymbol{\textreve}{TU}{"258"}% ɛ
287 \DeclareTextSymbol{\textbaro}{TU}{"275"}% ɛ
288 \DeclareTextSymbol{\textschwa}{TU}{"259"}% ə
289 \DeclareTextSymbol{\textrevepsilon}{TU}{"25C"}% ɛ
290 \DeclareTextSymbol{\textcloserevepsilon}{TU}{"25E"}% ɛ
291 \DeclareTextSymbol{\textturna}{TU}{"250"}% ɛ
292 \DeclareTextSymbol{\textturnm}{TU}{"26F"}% ɿ
293 \DeclareTextSymbol{\textramshorns}{TU}{"264"}% ɻ
294 \DeclareTextSymbol{\textturnv}{TU}{"28C"}% ɻ
295 \DeclareTextSymbol{\textopeno}{TU}{"254"}% ɔ
296 \DeclareTextSymbol{\textscripta}{TU}{"251"}% ɑ
297 \DeclareTextSymbol{\textturnscripta}{TU}{"252"}% ɒ
298 %% Independent diacritic marks
299 %%-- Rhoticity
300 \DeclareTextSymbol{\textrhoticity}{TU}{"2DE"}% ~
301 \tipaunicmd{\tr}{~}
302 %%-- Tie bar (below)
303 \DeclareTextCommand{\tipaunitextbottomtiebar}{TU}[2]{#1\symbol{"035C}#2}
304 \NewDocumentCommand\textbottomtiebar{ m }{\tipaunitextbottomtiebar#1}
305 %%-- Tie bar (below) - standalone character
306 \DeclareTextCommand{\tipaunits}{TU}[2]{#1\symbol{"203F}#2}
307 \NewDocumentCommand\stdlnetiebar{ m }{\tipaunits#1}
308 \NewDocumentCommand\ts{ m }{\tipaunits#1}

```

The following commands redefine the TIPA shorthand input for dependent diacritics.

```

309 %% No audible release
310 \DeclareTextSymbol{\textcorner}{TU}{"31A"}% ˘
311 \tipaunicmd{\tc}{}
312 %% Syllabic
313 \DeclareUnicodeAccent{\textsyllabic}{TU}{"0329"}% ̣
314 \NewDocumentCommand\s{ m }{\textsyllabic{\texttipa{#1}}\nontipatrue}

```

```

315 %% Non-syllabic
316 \DeclareUnicodeAccent{\textsubarch}{TU}{"032F}%%_
317 \NewDocumentCommand\ns{ m }{\textsubarch{\textipa{#1}}}
318 %% Laminal
319 \DeclareUnicodeAccent{\textsubsquare}{TU}{"033B}%%
320 \NewDocumentCommand\lmn{ m }{\textsubsquare{\textipa{#1}}\nontipatru}
321 %% Other complex shorthand commands
322 \DeclareTextCommand{\@pipeshorthands}{TU}[2]{%
323   \if #1[\tipaunisubbridge{\textipa{#2}}\else
324   \if #1]\tipauniinvsubbridge{\textipa{#2}}\else
325   \if #1(\tipaunisublhalfring{\textipa{#2}}\else
326   \if #1)\tipaunisubrhalfring{\textipa{#2}}\else
327   \if #1+\tipaunisubplus{\textipa{#2}}\else
328   \if #1'\tipauniraising{\textipa{#2}}\else
329   \if #1\tipaunilowering{\textipa{#2}}\else
330   \if #1<\tipauniadvancing{\textipa{#2}}\else
331   \if #1>\tipauniretracting{\textipa{#2}}\else
332   \if #1x\tipauniovercross{\textipa{#2}}\else
333   \if #1m\tipauniseagull{\textipa{#2}}\else #1#2%
334   \fi\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi\fi
335 }%
336 \DeclareTextAccentDefault{\@pipeshorthands}{TU}
337 \ExplSyntaxOn
338 \NewDocumentCommand \super { m }
339   {%
340     \str_case:nn {#1}
341     {
342       {h} {ḥ}
343       {w} {ẉ}
344       {j} {j̣}
345       {y} {ỵ}
346       {ŕ} {ṛ́}
347       {n} {ṇ}
348       {l} {ḷ}
349     }
350   }

```

We need a few variables.

```

351 \seq_new:N \l__tipauni_remove_from_accents_seq
352 \tl_new:N \l__tipauni_textipa_tl

```

Since we have a non-standard syntax for some of the accent macros (having a starred variant) we have to exclude them from the list of accents which get special handling from `\text_expand:n` or else the stars will be surrounded by braces and not found by `\@ifstar`. This sequence stores the problematic accents which need to be excluded.

```

353 \seq_set_split:Nnn \l__tipauni_remove_from_accents_seq { , }
354 { \~, \=, \", \r, \v, \t }

```

We only search for the macros not contained in `tipa` if this is requested by the user.

```

355 \iftipauini@nontipa@ignore
356   \cs_new_eq:NN \__tipauni_nontipa_search: \prg_do_nothing:
357   \cs_new_eq:NN \__tipauni_nontipa_search:n \use_none:n
358 \else
359   \cs_new_protected:Npn \__tipauni_nontipa_search:
360     {
361       \unless\ifnontipa

```

```

362     \exp_args:No \_tipauni_nontipa_search:n \l__tipauni_textipa_tl
363     \fi
364 }

```

The warning thrown at the end of the run doesn't list which symbols were incompatible, so we stop searching when we found one incompatible symbol. We use `\str_if_in:nnT` so that groups don't affect the search. The alternative would be the much slower `\regex_match:nnT`.

```

365 \cs_new_protected:Npn \_tipauni_nontipa_search:n #1
366 {
367   \str_if_in:nnT {#1} {v} { \nontipatruue \use_none_delimit_by_s_stop:w }
368   \str_if_in:nnT {#1} {e} { \nontipatruue \use_none_delimit_by_s_stop:w }
369   \str_if_in:nnT {#1} {u} { \nontipatruue \use_none_delimit_by_s_stop:w }
370   \str_if_in:nnT {#1} {!} { \nontipatruue \use_none_delimit_by_s_stop:w }
371   \str_if_in:nnT {#1} {+} { \nontipatruue \use_none_delimit_by_s_stop:w }
372   \str_if_in:nnT {#1} {&} { \nontipatruue \use_none_delimit_by_s_stop:w }
373   \str_if_in:nnT {#1} {J} { \nontipatruue \use_none_delimit_by_s_stop:w }
374   \str_if_in:nnT {#1} {z} { \nontipatruue \use_none_delimit_by_s_stop:w }
375   \str_if_in:nnT {#1} {j} { \nontipatruue \use_none_delimit_by_s_stop:w }
376   \use_none:nnn \s_stop
377   \use:n { \cs_gset_eq:NN \_tipauni_nontipa_search: \prg_do_nothing: }
378 }
379 \fi

```

The user facing macro needs to make some local settings.

```

380 \NewDocumentCommand\textipa{ +m }%
381 {
382   \begingroup
383   \let*\tipaunistar
384   \let\:\tipaunicolon
385   \let\;\tipaunisemicolon
386   \let\!\tipaunibang
387   \let\|\tipaunipipe
388   \let\t\tipaunit

```

Here we locally remove the accents which have a starred variant from the exclusion list of `\text_expand:n`.

```

389   \seq_map_inline:Nn \l__tipauni_remove_from_accents_seq
390   { \tl_remove_all:Nn \l_text_accents_tl {##1} }

```

Here is the real replacement. First we carefully expand the input using `\text_expand:n`, then we'll loop over the token list with a construct similar to the `expl3` internal `__tl_act:NNNn` (hence the name `_tipauni_act:n`). Since the replacement code depends on the correct string representation of things we explicitly set the `\escapechar` to a backslash and reset it afterwards.

```

391   \tl_set:Nx \l__tipauni_textipa_tl { \text_expand:n {#1} }
392   \use:x
393   {
394     \exp_not:n
395     {
396       \escapechar = \\\
397       \tl_set:Nx \l__tipauni_textipa_tl
398         { \exp_args:No \_tipauni_act:n \l__tipauni_textipa_tl }
399       \escapechar =
400     }
401     \int_use:N \escapechar

```

```

402     }
403     \exp_stop_f:
404     \l__tipauni_textipa_tl

```

Finally test for tipa-incompatible symbols.

```

405     \__tipauni_nontipa_search:
406     \endgroup
407 }

```

We'll need a scan mark for the act code, so we initialise it.

```

408 \scan_new:N \s__tipauni_act_stop
409 \cs_new:Npn
410 \__tipauni_use_none_delimit_by_act_stop:w
411 #1
412 \s__tipauni_act_stop
413 {}

```

The act macro uses a bit of low level coding to get good performance. It implements a loop which does the replacement of single letters, bigraphs or combinations of one macro and one letter (which might be separated from the macro by multiple spaces, or contained in braces as an argument, or both). `__tipauni_act:n` should be used inside an x-expansion context. The only token which is not allowed to be ever part of the argument for `__tipauni_act:n` is `\s__tipauni_act_stop`.

```

414 \cs_new:Npn
415 \__tipauni_act:n
416 #1
417 { \__tipauni_act_loop:w #1 {\s__tipauni_act_stop} . \s__tipauni_act_stop }

```

Just to have an easier to spot output we use a private copy of `\exp_not:n`, meaning we leave the output in the input stream (but since the whole loop should be used in an x-expansion context this is fine, anything expecting arguments will get those later).

```

418 \cs_new_eq:NN \__tipauni_act_output:n \exp_not:n

```

The current loop status is indicated by one macro – `\use_none:nn` for the initial state; `__tipauni_act_macro:nn` if a macro being the start of a bigraph was encountered; or `__tipauni_act_char:nn` if a character being the start of a bigraph or a monograph was encountered – followed by one n-type argument containing information depending on the state. So for `__tipauni_act_loop:Nnw` the arguments are: #1 is the status macro, #2 more status information, #3 the remainder of the argument list. It'll branch off depending on the first token in #3 being either a space, a group (anything started by a character of category 1, typically an opening brace) and anything else (a valid N-type argument).

```

419 \cs_new:Npn \__tipauni_act_loop:w { \__tipauni_act_loop:Nnw \use_none:nn {} }
420 \cs_new:Npn \__tipauni_act_loop:Nnw #1#2#3 \s__tipauni_act_stop
421 {
422   \__tipauni_act_if_head_is_space:nTF {#3}
423   { \__tipauni_act_space:Nnw }
424   {
425     \tl_if_head_is_group:nTF {#3}
426     \__tipauni_act_group:Nnn
427     \__tipauni_act_normal:NnN
428   }
429   #1 {#2} #3 \s__tipauni_act_stop
430 }

```

We'll need a few explicit space tokens in the following definitions, so we use a temporary macro to set this up.


```

431 \group_begin:
432   \cs_set:Npn \__tipauni_tmp:n #1
433     {
Quick test for a leading space using the stop-marker.
434     \cs_new:Npn \__tipauni_act_if_head_is_space:nTF ##1
435       {
436         \__tipauni_act_if_head_is_space:w
437         \s_tipauni_act_stop ##1 \s_tipauni_act_stop
438         \__tipauni_act_if_head_is_space_true:w
439         \s_tipauni_act_stop #1 \s_tipauni_act_stop
440         \use_ii:nn
441       }
442     \cs_new:Npn \__tipauni_act_if_head_is_space:w
443       ##1 \s_tipauni_act_stop #1 ##2 \s_tipauni_act_stop
444     {}
445     \cs_new:Npn \__tipauni_act_if_head_is_space_true:w
446       \s_tipauni_act_stop #1 \s_tipauni_act_stop \use_ii:nn ##1 ##2
447     {##1}

```

The case with a space needs a bit of special treatment if the current state is `macro`. In that case we defer the decision and save the space inside the additional status `n`-type argument. That consists of two nested `n`-type arguments, the first being the control sequence under test and the second tokens which need to be reinserted should the replacement fail.

```

448     \cs_new:Npn \__tipauni_act_space:Nnw ##1 ##2 #1
449       {
450         \token_if_eq_meaning:NNTF ##1 \__tipauni_act_macro:nn
451         { \__tipauni_act_space_macro:nn ##2 }
452         {
453           \cs_if_exist_use:cTF {
454             __tipauni_act_char_mono_
455             \tl_to_str:n { ##2 } :
456           }
457           { \__tipauni_act_output:n {~} }
458           { \__tipauni_act_output:n { ##2 ~ } }
459           \__tipauni_act_loop:w
460         }
461       }
462   }
463   \__tipauni_tmp:n {~}
464 \group_end:

```

This macro just works as a helper to get the two separate arguments in the status and append a space token to the deferred list.

```

465 \cs_new:Npn \__tipauni_act_space_macro:nn #1#2
466   { \__tipauni_act_loop:Nnw \__tipauni_act_macro:nn { {#1} { #2 ~ } } }

```

The end marker is a single `\s_tipauni_act_stop` in a group, hence we need to test for that. If this isn't the end we need to handle two different cases, if the current state is a macro the group might actually be the correct argument to that macro, else a bigraph shouldn't contain a group, so we output what ever the current status deferred information was (either as a `mono` replacement or just as `is`) and act on the group.

```

467 \cs_new:Npn \__tipauni_act_group:Nnn #1#2#3
468   {
469     \__tipauni_use_none_delimit_by_act_stop:w
470     #3 \__tipauni_act_final:Nnw #1 {#2} \s_tipauni_act_stop

```

```

471 \token_if_eq_meaning:NNTF #1 \__tipauni_act_macro:nn
472 { \__tipauni_act_group_macro:nn {#2} {#3} }
473 {
474   \cs_if_exist_use:cF
475   { \__tipauni_act_char_mono_ \tl_to_str:n { #2 } : }
476   { \__tipauni_act_output:n {#2} }
477   {
478     \__tipauni_act_loop:w
479     #3
480     {\s__tipauni_act_stop}
481     .
482     \s__tipauni_act_stop
483   }
484 }
485 \__tipauni_act_loop:w
486 }

```

The final code needs to remove the remainder of the loop and reinsert whatever was deferred, unless that happens to be one of the single tokens to be replaced in which case we do the replacement.

```

487 \cs_new:Npn \__tipauni_act_final:Nnw
488   #1#2 \s__tipauni_act_stop #3 \__tipauni_act_loop:w #4 \s__tipauni_act_stop
489   {
490     \cs_if_exist_use:cF { \__tipauni_act_char_mono_ \tl_to_str:n { #2 } : }
491     {
492       \token_if_eq_meaning:NNTF #1 \__tipauni_act_macro:nn
493       { \exp_args:No \__tipauni_act_output:n { \use:nn #2 } }
494       { \__tipauni_act_output:n {#2} }
495     }
496   }

```

The normal case is pretty straight forward, if the current state is the initial state, check whether the token under test is the start of one of the replacement sequences (this would be stored inside a macro), if it isn't directly output it. If it is the code in that macro will do the right thing. If the current state is something else the state macro will handle things, so we just call it with the arguments it should get.

```

497 \cs_new:Npn \__tipauni_act_normal:NnN #1#2#3
498   {
499     \token_if_eq_meaning:NNTF #1 \use_none:nn
500     {
501       \cs_if_exist_use:cF { \__tipauni_act_normal_ \tl_to_str:n {#3} :nw }
502       { \__tipauni_act_output:n }
503       {#3}
504     }
505     { #1 {#2} {#3} }
506     \__tipauni_act_loop:w
507   }

```

The code that should handle a macro will test whether a replacement occurs (stored inside a macro), if it does calls that macro, else outputs the deferred information. Since the macro state will have two groups in the deferred state we need to handle that using `\use_i:nn` to get the macro name, and `\use:nn` to just unbrace the macro and the other deferred tokens (which might be any number of spaces).

```

508 \cs_new:Npn \__tipauni_act_macro:nn #1#2
509   {

```

```

510 \cs_if_exist_use:cF
511 {
512   __tipauni_act_macro_
513   \exp_args:No
514   \tl_to_str:n {
515     \use_i:nn #1 / #2
516   }
517   :
518 }
519 { \exp_args:No \__tipauni_act_output:n { \use:nn #1 #2 } }
520 }

```

If the macro state was active when a group was encountered we need to check whether that group was the correct argument for the replacement, if it was do the replacement, else reinsert the macro and deferred tokens and loop through the group.

```

521 \cs_new:Npn \__tipauni_act_group_macro:nn #1#2
522 {
523   \cs_if_exist_use:cF
524   {
525     __tipauni_act_macro_
526     \exp_args:No
527     \tl_to_str:n {
528       \use_i:nn #1 / #2
529     }
530     :
531   }
532   {
533     \exp_args:No
534     \__tipauni_act_output:n {
535       \use:nn #1
536     }
537     {
538       \__tipauni_act_loop:w
539       #2
540       {\s__tipauni_act_stop} . \s__tipauni_act_stop
541     }
542   }
543 }

```

If the char state is active we need to check whether a bigraph was found, if so do that replacement, else test whether the single char is to be replaced without being part of a bigraph, if not output it unchanged. If there was no bigraph the newly found character might be the start of a mono- or bigraph so we pass it back to the N-type act to evaluate that, in which case we need to remove a trailing `__tipauni_act_loop:w` which would start the next loop which we do using `\use_i:nn`.

```

544 \cs_new:Npn \__tipauni_act_char:nn #1#2
545 {
546   \cs_if_exist_use:cF {
547     __tipauni_act_char_bigraph_
548     \tl_to_str:n
549     { #1/#2 }
550     :
551   }
552   {
553     \cs_if_exist_use:cF {

```

```

554     __tipauni_act_char_mono_
555     \tl_to_str:n { #1 }
556     :
557   }
558   { \__tipauni_act_output:n {#1} }
559   \use_i:nn {
560     \__tipauni_act_normal:NnN
561     \use_none:nn {} {#2}
562   }
563 }
564 }

```

To register new bigraphs we use the following functions. The information is always stored inside two macros, the first is called `@@_act_normal_⟨first token⟩:nw` and will set the correct state, the second is named dependent on the state it should be found in, either `@@_act_macro_⟨first token⟩/⟨second token⟩:`, `@@_act_char_bigraph_⟨first token⟩/⟨second token⟩:`, or `@@_act_char_mono_⟨token⟩:`. Those second macros contain the actual replacement.

`__tipauni_new_macro_bigraph:NNn` is input for the two macros in #1 and #2 by the first macro which is a wrapper.

```

565 \cs_new_protected:Npn \__tipauni_new_macro_pair_bigraph:NNNn #1#2#3#4
566 {
567   \__tipauni_new_macro_bigraph:NNn #1 #3 {#4}
568   \__tipauni_new_macro_bigraph:NNn #2 #3 {#4}
569 }

```

A macro bigraph should consist of a control sequence followed by another token. It'll switch the state to `macro`.

```

570 \cs_new_protected:Npn \__tipauni_new_macro_bigraph:NNn #1#2#3
571 {
572   \cs_gset:cpn {
573     \__tipauni_act_normal_
574     \tl_to_str:n
575     {#1}
576     :nw
577   }
578   ##1##2
579   \__tipauni_act_loop:w
580   {
581     \__tipauni_act_loop:Nnw
582     \__tipauni_act_macro:nn
583     { {##1} {} }
584   }
585   \cs_gset:cpn
586   { \__tipauni_act_macro_ \tl_to_str:n { #1/#2 } : }
587   { \__tipauni_act_output:n {#3} }
588 }

```

A character bigraph should consist of two characters. It'll switch the state to `char`.

```

589 \cs_new_protected:Npn \__tipauni_new_char_bigraph:NNn #1#2#3
590 {
591   \cs_gset:cpn {
592     \__tipauni_act_normal_
593     \tl_to_str:n
594     {#1}

```

```

595         :nw
596     } ##1##2
597     \__tipauni_act_loop:w
598     {
599         \__tipauni_act_loop:Nnw
600         \__tipauni_act_char:nn {##1}
601     }
602     \cs_gset:cpn {
603         __tipauni_act_char_biggraph_
604         \tl_to_str:n { #1/#2 } :
605     }
606     { \__tipauni_act_output:n {#3} }
607 }

```

And lastly the single replacements which should just be a single character. These will also switch the state to `char` (as they might be also a start of a bigraph).

```

608 \cs_new_protected:Npn \__tipauni_new_char_mono:Nn #1#2
609 {
610     \cs_gset:cpn {
611         __tipauni_act_normal_
612         \tl_to_str:n
613         {#1}
614         :nw
615     } ##1##2
616     \__tipauni_act_loop:w
617     { \__tipauni_act_loop:Nnw
618         \__tipauni_act_char:nn
619         {##1}
620     }
621     \cs_gset:cpn
622     { __tipauni_act_char_mono_
623         \tl_to_str:n {#1} :
624     }
625     { \__tipauni_act_output:n {#2} }
626 }

```

Everything that's now missing is defining the macros storing the replacements as described above.

```

627 \__tipauni_new_macro_pair_bigraph:NNNn \! \tipaunibang      G {G}
628 \__tipauni_new_macro_pair_bigraph:NNNn \! \tipaunibang      g {g}
629 \__tipauni_new_macro_pair_bigraph:NNNn \* \tipaunistar      1 {1}
630 \__tipauni_new_macro_pair_bigraph:NNNn \* \tipaunistar      2 {2}
631 \__tipauni_new_macro_pair_bigraph:NNNn \* \tipaunistar      3 {3}
632 \__tipauni_new_macro_pair_bigraph:NNNn \* \tipaunistar      Z {Z}
633 \__tipauni_new_macro_pair_bigraph:NNNn \: \tipaunicolon      R {r}
634 \__tipauni_new_macro_pair_bigraph:NNNn \; \tipaunisemicolon A {A}
635 \__tipauni_new_macro_pair_bigraph:NNNn \; \tipaunisemicolon G {G}
636 \__tipauni_new_macro_pair_bigraph:NNNn \; \tipaunisemicolon B {B}
637 \__tipauni_new_macro_pair_bigraph:NNNn \; \tipaunisemicolon E {E}
638 \__tipauni_new_macro_pair_bigraph:NNNn \; \tipaunisemicolon H {H}
639 \__tipauni_new_macro_pair_bigraph:NNNn \; \tipaunisemicolon J {J}
640 \__tipauni_new_macro_pair_bigraph:NNNn \; \tipaunisemicolon L {L}
641 \__tipauni_new_macro_pair_bigraph:NNNn \; \tipaunisemicolon N {N}
642 \__tipauni_new_macro_pair_bigraph:NNNn \; \tipaunisemicolon R {R}
643 \__tipauni_new_macro_pair_bigraph:NNNn \; \tipaunisemicolon U {U}

```

```

644 \__tipauni_new_char_bigraph:NNn || {}
645 \__tipauni_new_char_bigraph:NNn "" {,}
646 \clist_map_inline:nn
647 {
648   {5}{e}, {A}{a}, {6}{v}, {2}{^}, {B}{b}, {C}{c}, {D}{d}, {9}{e}, {E}{e},
649   {3}{z}, {g}{g}, {G}{y}, {7}{r}, {H}{h}, {L}{l}, {4}{u}, {1}{i}, {I}{i},
650   {J}{j}, {M}{m}, {W}{w}, {N}{n}, {8}{o}, {O}{o}, {F}{f}, {R}{r}, {K}{k},
651   {S}{s}, {T}{t}, {0}{u}, {U}{u}, {V}{v}, {X}{x}, {Y}{y}, {Z}{z},
652   {P}{p}, {Q}{q},
653   {:}{:}, {;}{;}, {!}{!}, {&}{&}, {@}{@}, {||}{||}, {"}{'}
654 }
655 { \__tipauni_new_char_mono:Nn #1 }
656 \ExplSyntaxOff

```

The following commands define the long commands for dependent diacritics.

```

657 %%-- Dependent diacritic marks
658 %%--** Voiceless
659 \DeclareUnicodeAccent{\textsupring}{TU}{"030A}%%^
660 \DeclareUnicodeAccent{\textsubring}{TU}{"0325}%% .
661 \DeclareTextCommand{\r}{TU}{\tipauniring}
662 \protected\def\tipauniring{\@ifstar{\TipaUniSubRing}{\TipaUniSupRing}}
663 \NewDocumentCommand\TipaUniSupRing{ m }{\textsupring{\textipa{#1}}}
664 \NewDocumentCommand\TipaUniSubRing{ m }{\textsubring{\textipa{#1}}}
665 %%--** Voiced
666 \DeclareUnicodeAccent{\textsupwedge}{TU}{"030C}%%^
667 \DeclareUnicodeAccent{\textsubwedge}{TU}{"032C}%% .
668 \DeclareTextCommand{\v}{TU}{\tipauniwedge}
669 \protected\def\tipauniwedge{\@ifstar{\TipaUniSubWedge}{\TipaUniSupWedge}}
670 \NewDocumentCommand\TipaUniSupWedge{ m }{\textsupwedge{\textipa{#1}}}
671 \NewDocumentCommand\TipaUniSubWedge{ m }{\textsubwedge{\textipa{#1}}}
672 %%--** More rounded
673 \DeclareUnicodeAccent{\textsubrhalfring}{TU}{"0339}%% ,
674 \NewDocumentCommand\tipaunisubrhalfring{ m }{\textsubrhalfring{\textipa{#1}}}
675 %%--** Less rounded
676 \DeclareUnicodeAccent{\textsublhalfring}{TU}{"031C}%% .
677 \NewDocumentCommand\tipaunisublhalfring{ m }{\textsublhalfring{\textipa{#1}}}
678 %%--** Advanced
679 \DeclareUnicodeAccent{\textsubplus}{TU}{"031F}%% +
680 \NewDocumentCommand\tipaunisubplus{ m }{\textsubplus{\textipa{#1}}}
681 %%--** Retracted
682 \DeclareUnicodeAccent{\textsupbar}{TU}{"0304}%%^
683 \DeclareUnicodeAccent{\textsubbar}{TU}{"0320}%% _
684 \DeclareTextCommand{\=}{TU}{\tipaunibar}
685 \protected\def\tipaunibar{\@ifstar{\TipaUniSubBar}{\TipaUniSupBar}}
686 \NewDocumentCommand\TipaUniSupBar{ m }{\textsupbar{\textipa{#1}}}
687 \NewDocumentCommand\TipaUniSubBar{ m }{\textsubbar{\textipa{#1}}}
688 %%--** Mid-centralized
689 \DeclareUnicodeAccent{\textovercross}{TU}{"033D}%% ^
690 \NewDocumentCommand\tipauniovercross{ m }{\textovercross{\textipa{#1}}}
691 %%--** Breathy voiced
692 \DeclareUnicodeAccent{\textsupumlaut}{TU}{"0308}%%^
693 \DeclareUnicodeAccent{\textsubumlaut}{TU}{"0324}%% ..
694 \DeclareTextCommand{\"}{TU}{\tipauniumlaut}
695 \protected\def\tipauniumlaut{\@ifstar{\TipaUniSubUmlaut}{\TipaUniSupUmlaut}}
696 \NewDocumentCommand\TipaUniSupUmlaut{ m }{\textsupumlaut{\textipa{#1}}}

```

```

697 \NewDocumentCommand\TipaUniSubUmlaut{ m }{\textsubumlaut{\textipa{#1}}}
698 %%--** Creaky voiced
699 \DeclareUnicodeAccent{\textsuptilde}{TU}{"0303}%%~
700 \DeclareUnicodeAccent{\textsubtilde}{TU}{"0330}%%_
701 \DeclareTextCommand{\~}{TU}{\tipaunitilde}
702 \protected\def\tipaunitilde{\@ifstar{\TipaUniSubTilde}{\TipaUniSupTilde}}
703 \NewDocumentCommand\TipaUniSupTilde{ m }{\textsuptilde{\textipa{#1}}}
704 \NewDocumentCommand\TipaUniSubTilde{ m }{\textsubtilde{\textipa{#1}}}
705 %%--** Linguo-labialized
706 \DeclareUnicodeAccent{\textseagull}{TU}{"033C}%% ~
707 \NewDocumentCommand\tipauniseagull{ m }{\textseagull{#1}}
708 %%--** Velarized
709 \DeclareUnicodeAccent{\textsuperimposetilde}{TU}{"0334}%% ~
710 \NewDocumentCommand\tipaunisuperimposetilde{ m }{\textsuperimposetilde{#1}}
711 \NewDocumentCommand\vl{ m }{\textsuperimposetilde{\textipa{#1}}}
712 %%--** Raised
713 \DeclareUnicodeAccent{\textraising}{TU}{"031D}%% ː
714 \NewDocumentCommand{\tipauniraising}{m}{\textraising{#1}}
715 %%--** Lowered
716 \DeclareUnicodeAccent{\textlowering}{TU}{"031E}%% ˑ
717 \NewDocumentCommand{\tipaunilowering}{m}{\textlowering{#1}}
718 %%--** Advanced tongue root
719 \DeclareUnicodeAccent{\textadvancing}{TU}{"0318}%% ̠
720 \NewDocumentCommand{\tipauniadvancing}{m}{\textadvancing{#1}}
721 %%--** Retracted tongue root
722 \DeclareUnicodeAccent{\textretracting}{TU}{"0319}%% ̡
723 \NewDocumentCommand{\tipauniretracting}{m}{\textretracting{#1}}
724 %%--** Dental
725 \DeclareUnicodeAccent{\textsubbridge}{TU}{"032A}%% ̪
726 \NewDocumentCommand\tipaunisubbridge{ m }{\textsubbridge{#1}}
727 %%--** Apical
728 \DeclareUnicodeAccent{\textinvsubbridge}{TU}{"033A}%% ̫
729 \NewDocumentCommand\tipauniinvsubbridge{ m }{\textinvsubbridge{#1}}
730 %%--** Tie bar (above)
731 \DeclareTextCommand{\tipaunitexttoptiebar}{TU}[2]{#1\symbol{"0361}#2}
732 \NewDocumentCommand\texttoptiebar{ m }{\tipaunitexttoptiebar#1}
733 \DeclareTextCommand{\tipaunit}{TU}{%
734   \@ifstar{\textbottomtiebar}{\texttoptiebar}%
735 }

```

Lastly the code for environment IPA is provided by the following.

```

736 \NewDocumentEnvironment{IPA}{+b}{\textipa{#1}}{}
737 </package>

```

Since we want to add certain features to the `NewCM` font, we generate two `.fontspec` files with this package. The following is the tag used for generating the `.fontspec` file of the regular weight.

```

738 (*regularfontspec)
739 \defaultfontfeatures[tipauni-newcm-regular]{%
740   Renderer          = {Harfbuzz},%
741   Extension         = {.otf},%
742   UprightFont       = {NewCM10-Regular},%
743   ItalicFont        = {NewCM10-Italic},%
744   BoldFont          = {NewCM10-Bold},%
745   BoldItalicFont    = {NewCM10-BoldItalic},%

```

```
746 StylisticSet      = {5}%  
747 }  
748 </regularfontspec>
```

With the following tag generates the .fontspec file for the book weight of the font.

```
749 <*bookfontspec>  
750 \defaultfontfeatures[tipauni-newcm-book]{%  
751   Renderer          = {Harfbuzz},%  
752   Extension         = {.otf},%  
753   UprightFont       = {NewCM10-Book},%  
754   ItalicFont        = {NewCM10-BookItalic},%  
755   BoldFont          = {NewCM10-Bold},%  
756   BoldItalicFont    = {NewCM10-BoldItalic},%  
757   StylisticSet      = {5}%  
758 }  
759 </bookfontspec>
```


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