

# 1 The Thai language

The file `thai.dtx`<sup>1</sup> defines language-specific macros for Thai language.

Thai documents to be supported by this language definition can be encoded in TIS-620 (or ISO/IEC 8859-11) or UTF-8 (with the aids of `inputenc` package).

Thai is written continuously without word delimiters. The word boundary analysis is considered too complicated for rule-based approaches. Most good quality word analysis tools available employ special matching algorithms against pre-defined dictionaries. Some even use contextual analysis for ambiguous cases based on statistics. Therefore, no good hyphenation pattern is found to be comparable with those tools yet.

`\wbr` What the Thai language definition provides here for the word boundary problem is the `\wbr` command for separating words. It occupies no space but aids the  $\TeX$  typesetter in wrapping lines at proper positions, meanwhile leaves some room for distributing little spaces between words in case of narrow columns.

Some preprocessing tools that analyze word boundaries and insert the `\wbr` commands are available, for example

- *cttex* by Vuthichai Ampornaramveth
- *swath* by Phaisarn Charoenpornasawat, now maintained by Thai Linux Working Group, downloadable from:  
`ftp://linux.thai.net/pub/thailinux/software/swath`

Some certain Thai documents use Thai digits instead of Arabic. And Thai alphabetic numbering is also commonly used for appendices. This file provides a number of numbering styles that can apply to  $\LaTeX$  `\pagenumbering` command:

- `\thainum` for plain Thai digits
- `\thaibracenum` for Thai digits in parentheses
- `\thaialph` for Thai alphabetic numbering, using a reduced set (with three alphabets skipped: Kho Khuat, Kho Khon and Kho Rakhang)
- `\thaiAlph` for Thai alphabetic numbering, using the full set (with full alphabet set, plus two semi-vowels, Ru and Lu, in the order defined in Thai official dictionary)

`thainumber` The above numbering styles can be automatically chosen with the `thainumber` option. When supplying this option to the `babel` package, Thai numberings will be applied to pages, sections, enumerations, dates, etc.

---

<sup>1</sup>The file described in this section has version number v1.3 and was last revised on 2011/03/17. Contributions were made by Theppitak Karoonboonyanan (`thep@linux.thai.net`).

## 1.1 Thai language definition

The macro `\LdfInit` takes care of preventing that this file is loaded more than once, checking the category code of the `@` sign, etc.

```
1 ⟨*code⟩
2 \LdfInit\CurrentOption{captions\CurrentOption}
```

When this file is read as an option, i.e. by the `\usepackage{babel}` command, `thai` will be an ‘unknown’ language in which case we have to make it known. So we check for the existence of `\l@thai` to see whether we have to do something here.

```
3 \ifx\l@thai\@undefined
4   \nopatterns{thai}
5   \addialect\l@thai0\fi
```

### 1.1.1 Thai character encoding

In this language definition, we support TIS-620, the national standard 8-bit character encoding, and Unicode by means of `inputenc` package.

The encoding has been described in terms of TIS-620 as LTH in the `lthenc.def` file. So, we require it.

```
6 \InputIfFileExists{lthenc.def}{%
7   \message{Loading the definitions for the Thai font encoding}}{%
8   \errhelp{I can't find the lthenc.def file for the Thai fonts}%
9   \errmessage{Since I do not know what the LTH encoding means^^J
10    I can't typeset Thai.^^J
11    I stop here, while you get a suitable lthenc.def file}\@end
12 }
```

Then, we define default fonts for the document. `norasi` and `garuda` are Serif and San Serif fonts from the National Fonts Project, initiated by NECTEC. `ttypist` is a typewriter font created by Theppitak Karoonboonyanan from Thai Linux Working Group. All fonts are available in free license.

```
13 \def\thairmdefault{norasi}
14 \def\thaisfdefault{garuda}
15 \def\thaittdefault{ttypist}
16 \def\englishrmdefault{cmr}
17 \def\englishsfdefault{cmss}
18 \def\englishttdefault{cmtt}
```

The next step consists of defining commands to switch to the Thai language. The reason for this is that a user might want to switch back and forth between languages.

`\thaitext` We define `\thaitext` as a declarative switch to Thai font encoding.

```
19 \DeclareRobustCommand{\thaitext}{%
20   \fontencoding{LTH}\fontfamily{\thairmdefault}\selectfont%
21   \def\rmdefault{\thairmdefault}%
22   \def\sfontdefault{\thaisfdefault}%
```

```

23 \def\ttdefault{\thaittdefault}%
24 \def\encodingdefault{LTH}

```

`\textthai` This command takes an argument which is then typeset using Thai font encoding.

```

25 \DeclareRobustCommand{\textthai}[1]{\thaitext #1}

```

### 1.1.2 Pali-Sanskrit Characters

Thai script can also be used for writing Pali and Sanskrit. Additional conventions are applied when doing so: (a) Yo Ying and Tho Than must be written without descender; (b) Phinthu is used for marking cluster; (c) Nikhahit is used as a Pali-Sanskrit consonant.

(b) is inherently applicable as combining character. So is (c), with an exception for the case in which it is combined over upper vowel (namely, Sara I), where it must be shifted to higher position. Nikhahit shifting is implemented in the ligkern rules with the extra glyph provision in the fonts.

What is left here is (a). Yo Ying and Tho Than must be converted to their descender-less variations. The `\textpali` macro is defined for this purpose. Note that `\wbr` commands which are normally inserted by automatic tools are ignored here, as most of such tools are not designed for Pali/Sanskrit. Besides, Pali/Sanskrit is already space delimited.

`\textpali` This command converts all Yo Ying and Tho Than in its argument to their descender-less variations.

```

26 \DeclareRobustCommand{\textpali}[1]{%
27   \begingroup
28     \def\thaiYoYing{\textYoYingPali{}}%
29     \def\thaiThoThan{\textThoThanPali{}}%
30     \def\wbr{}%
31     \scantokens\expandafter{#1}\relax
32   \endgroup
33 }

```

### 1.1.3 Hyphenation

We define `\thaihyphenmins` macro for hyphenation parameters. This is one of the five macros required by `babel`.

`\thaihyphenmins` This macro is used to store the correct values of the hyphenation parameters `\lefthyphenmin` and `\righthyphenmin`. They are set to 11.

```

34 \providehyphenmins{thai}{11}

```

### 1.1.4 Captions translation

We define `\captionsthai` macro for translations of strings. This is one of the five macros required by `babel`.

`\captionsthai` The macro `\captionsthai` defines all strings used in the four standard document-classes provided with L<sup>A</sup>T<sub>E</sub>X.

```

35 \addto\captionsthai{%
36   \def\prefacename{\thaiKhoKhwai\thaiSaraAm\thaiNoNu\thaiSaraAm}%
37   \def\refname{\thaiSaraE\thaiOAng\thaiKoKai\thaiSoSua\thaiSaraAa\thaiRoRua%
38     \thaiOAng\thaiMaiTho\thaiSaraAa\thaiNgoNgu}%
39     \thaiOAng\thaiSaraI\thaiNgoNgu}%
40   \def\abstractname{\thaiBoBaimai\thaiThoThahan%
41     \thaiKhoKhwai\thaiMaiHanakat\thaiDoDek%
42     \thaiYoYak\thaiMaiEk\thaiOAng}%
43   \def\bibName{\thaiBoBaimai\thaiRoRua\thaiRoRua\thaiNoNen\thaiSaraAa%
44     \thaiNoNu\thaiSaraU\thaiKoKai\thaiRoRua\thaiMoMa}%
45   \def\chaptername{\thaiBoBaimai\thaiThoThahan%
46     \thaiThoThahan\thaiSaraIi\thaiMaiEk}%
47   \def\appendixname{\thaiPhoSamphao\thaiSaraAa\thaiKhoKhwai%
48     \thaiPhoPhung\thaiNoNu\thaiWoWaeen\thaiKoKai}%
49   \def\contentsname{\thaiSoSua\thaiSaraAa\thaiRoRua%
50     \thaiBoBaimai\thaiMaiHanakat\thaiYoYing}%
51   \def\listfigurename{\thaiSoSua\thaiSaraAa\thaiRoRua%
52     \thaiBoBaimai\thaiMaiHanakat\thaiYoYing%
53     \thaiRoRua\thaiSaraUu\thaiPoPla}%
54   \def\listtablename{\thaiSoSua\thaiSaraAa\thaiRoRua%
55     \thaiBoBaimai\thaiMaiHanakat\thaiYoYing%
56     \thaiToTao\thaiSaraAa\thaiRoRua\thaiSaraAa\thaiNgoNgu}%
57   \def\indexname{\thaiDoDek\thaiRoRua\thaiRoRua\thaiChoChang%
58     \thaiNoNu\thaiSaraIi}%
59   \def\figurename{\thaiRoRua\thaiSaraUu\thaiPoPla%
60     \thaiThoThahan\thaiSaraIi\thaiMaiEk}%
61   \def\tablename{\thaiToTao\thaiSaraAa\thaiRoRua\thaiSaraAa\thaiNgoNgu%
62     \thaiThoThahan\thaiSaraIi\thaiMaiEk}%
63   \def\partname{\thaiPhoSamphao\thaiSaraAa\thaiKhoKhwai}%
64   \def\enclname{\thaiSoSua\thaiSaraI\thaiMaiEk\thaiNgoNgu%
65     \thaiThoThahan\thaiSaraIi\thaiMaiEk%
66     \thaiSaraAe\thaiNoNu\thaiBoBaimai%
67     \thaiMoMa\thaiSaraAa%
68     \thaiDoDek\thaiMaiTho\thaiWoWaeen\thaiYoYak}%
69   \def\ccname{\thaiSoSua\thaiSaraAm\thaiSaraE\thaiNoNu\thaiSaraAa%
70     \thaiThoThung\thaiSaraUe\thaiNgoNgu}%
71   \def\headtoname{\thaiSaraE\thaiRoRua\thaiSaraIi\thaiYoYak\thaiNoNu}%
72   \def\pagename{\thaiHoHip\thaiNoNu\thaiMaiTho\thaiSaraAa}%
73   \def\seename{\thaiDoDek\thaiSaraUu}%
74   \def\alsoname{\thaiDoDek\thaiSaraUu%
75     \thaiSaraE\thaiPhoPhan\thaiSaraI\thaiMaiEk\thaiMoMa%
76     \thaiSaraE\thaiToTao\thaiSaraI\thaiMoMa}%
77   \def\proofname{\thaiPhoPhan\thaiSaraI%
78     \thaiSoSua\thaiSaraUu\thaiChoChan\thaiNoNu\thaiThanthakhat}%
79 }

```

### 1.1.5 Date

Here we define `\datethai` macro for Thai date format. This is one of the five macros required by `babel`.

First, let's define the months in Thai.

```
80 \def\th@month{%
81   \ifcase\month\or
82     \thaiMoMa\thaiKoKai\thaiRoRua\thaiSaraAa\thaiKhoKhwai\thaiMoMa \or
83     \thaiKoKai\thaiSaraU\thaiMoMa\thaiPhoSamphao\thaiSaraAa%
84     \thaiPhoPhan\thaiMaiHanakat\thaiNoNu\thaiThoThong\thaiThanthakhat \or
85     \thaiMoMa\thaiSaraIi\thaiNoNu\thaiSaraAa\thaiKhoKhwai\thaiMoMa \or
86     \thaiSaraE\thaiMoMa\thaiSoRusi\thaiSaraAa\thaiYoYak\thaiNoNu \or
87     \thaiPhoPhan\thaiRu\thaiSoRusi\thaiPhoSamphao\thaiSaraAa%
88     \thaiKhoKhwai\thaiMoMa \or
89     \thaiMoMa\thaiSaraI\thaiThoThong\thaiSaraU\thaiNoNu\thaiSaraAa%
90     \thaiYoYak\thaiNoNu \or
91     \thaiKoKai\thaiRoRua\thaiKoKai\thaiDoChada\thaiSaraAa%
92     \thaiKhoKhwai\thaiMoMa \or
93     \thaiSoSua\thaiSaraI\thaiNgonNgu\thaiHoHip\thaiSaraAa%
94     \thaiKhoKhwai\thaiMoMa \or
95     \thaiKoKai\thaiMaiHanakat\thaiNoNu\thaiYoYak\thaiSaraAa%
96     \thaiYoYak\thaiNoNu \or
97     \thaiToTao\thaiSaraU\thaiLoLing\thaiSaraAa\thaiKhoKhwai\thaiMoMa \or
98     \thaiPhoPhan\thaiRu\thaiSoSala\thaiChoChan\thaiSaraI\thaiKoKai\thaiSaraAa%
99     \thaiYoYak\thaiNoNu \or
100    \thaiThoThong\thaiMaiHanakat\thaiNoNu\thaiWoWae\thaiSaraAa%
101    \thaiKhoKhwai\thaiMoMa
102  \fi}
```

Thai official calendar uses Buddhist Era, the era whose start is marked by Buddha's entry into Parinirvana. In original form, it is a lunar calendar. But in Thai contemporary calendar, it is synchronized to Gregorian calendar, with offset of 543 years back.

```
103 \newcount\th@year
104 \th@year=\year
105 \advance\th@year by 543
```

Then, we come to the `\datethai` macro.

`\datethai` Thai date format is in the day-month-year order, using Buddhist Era.

```
106 \def\datethai{%
107   \def\today{\number\day \space \th@month\space %
108             \thaiPhoPhan.\thaiSoSala.\number\th@year}}
```

### 1.1.6 Extra definitions for language switching

Then, the last two macros required by `babel` are `\extrasthai` and `\noextrasthai` containing extra definitions needed for Thai language upon switching to and out of it, respectively.

```
109 \addto\extrasthai{\thaitext}
110 \addto\noextrasthai{\latintext}
```

## 1.2 Word break support

As Thai script is written continuously without word delimiters, we define `\wbr` command to mark word boundaries without taking space, so that  $\text{\TeX}$ typesetter can wrap Thai lines at proper positions.

```
111 \def\wbr{\hskip0pt plus0.6pt\relax}
112 \renewcommand{\baselinestretch}{1.2}
```

## 1.3 Thai numbering support

This section provides Thai numbering styles as described at the beginning of this document: `\thainum`, `\thaibracenum`, `\thaialph` and `\thaiAlpha`.

First, we define a macro for translating decimal digits into Thai digits.

```
\thaitranslate The \thaitranslate macro determines decimal digits in the argument and con-
                vert them to Thai digit one by one, until the ‘@’ terminator is found.
113 \def\thaitranslate#1{\ifx @#1%
114     \else\ifcase#1
115         \thaizero \or \thaione \or \thaitwo \or \thaithree \or \thaifour \or
116         \thaifive \or \thaisix \or \thaiseven \or \thaieight \or \thainine
117         \else\fi
118         \expandafter\thaitranslate
119         \fi
120 }
```

```
\thainum The \thainum macro is to be used as a numbering style in  $\text{\LaTeX}$  \pagenumbering
          command.
```

It takes a counter name and converts its value into Thai digits. In details, it prepends the counter name with ‘c@’ to access the counter value, then calls `\@thainum` to convert it into Thai digits.

The `\@thainum` macro converts a number into Thai digits. It expands the argument into a number, terminates it with ‘@’, and calls `\thaitranslate` to convert it into Thai digits.

```
121 \def\@thainum#1{\expandafter\thaitranslate\number#1@}
122 \def\thainum#1{\expandafter\@thainum\csname c@#1\endcsname}
```

```
\thaibracenum Similar to \thainum, the \thaibracenum macro is to be used as a numbering style
              in  $\text{\LaTeX}$  \pagenumbering command.
```

It provides Thai digits numbering, surrounded by parentheses.

```
123 \def\@thaibracenum#1{(\expandafter\thaitranslate\number#1@)}
124 \def\thaibracenum#1{\expandafter\@thaibracenum\csname c@#1\endcsname}
```

Now come to Thai alphabetic numbering, beginning with the reduced set.

`\thaialph` The `\thaialph` macro is to be used as a numbering style in L<sup>A</sup>T<sub>E</sub>X `\pagenumbering` command.

It converts a number not greater than 41 into Thai alphabet in the corresponding order in the reduced set. In this set, 3 characters are skipped: Kho Khuat, Kho Khon and Kho Rakhang.

```

125 \def\thaialph#1{\expandafter\@thaialph\cscname c@#1\endcscname}
126 \def\@thaialph#1{%
127   \ifcase#1\or \thaiKoKai\or \thaiKhoKhai\or \thaiKhoKhwai\or \thaiNgoNgu\or
128     \thaiChoChan\or \thaiChoChing\or \thaiChoChang\or \thaiSoSo\or
129     \thaiChoChoe\or \thaiYoYing\or \thaiDoChada\or \thaiToPatak\or
130     \thaiThoThan\or \thaiThoNangmontho\or \thaiThoPhuthao\or \thaiNoNen\or
131     \thaiDoDek\or \thaiToTao\or \thaiThoThung\or \thaiThoThahan\or
132     \thaiThoThong\or \thaiNoNu\or \thaiBoBaimai\or \thaiPoPla\or
133     \thaiPhoPhung\or \thaiFoFa\or \thaiPhoPhan\or \thaiFoFan\or
134     \thaiPhoSamphao\or \thaiMoMa\or \thaiYoYak\or \thaiRoRua\or
135     \thaiLoLing\or \thaiWoWaen\or \thaiSoSala\or \thaiSoRusi\or
136     \thaiSoSua\or \thaiHoHip\or \thaiLoChula\or \thaiOAng\or
137     \thaiHoNokhuk\else\@ctrerr\fi}

```

`\thaiAlpha` Similar to `\thaialph`, the `\thaiAlpha` macro provides Thai alphabetic numbering with full alphabet set in the order defined in Thai official dictionary. So, it supports up to 44 entries.

```

138 \def\thaiAlpha#1{\expandafter\@thaiAlpha\cscname c@#1\endcscname}
139 \def\@thaiAlpha#1{%
140   \ifcase#1\or \thaiKoKai\or \thaiKhoKhai\or \thaiKhoKhuat\or \thaiKhoKhwai\or
141     \thaiKhoKhon\or \thaiKhoRakhang\or \thaiNgoNgu\or \thaiChoChan\or
142     \thaiChoChing\or \thaiChoChang\or \thaiSoSo\or \thaiChoChoe\or
143     \thaiYoYing\or \thaiDoChada\or \thaiToPatak\or \thaiThoThan\or
144     \thaiThoNangmontho\or \thaiThoPhuthao\or \thaiNoNen\or \thaiDoDek\or
145     \thaiToTao\or \thaiThoThung\or \thaiThoThahan\or \thaiThoThong\or
146     \thaiNoNu\or \thaiBoBaimai\or \thaiPoPla\or \thaiPhoPhung\or
147     \thaiFoFa\or \thaiPhoPhan\or \thaiFoFan\or \thaiPhoSamphao\or
148     \thaiMoMa\or \thaiYoYak\or \thaiRoRua\or \thaiLoLing\or
149     \thaiWoWaen\or \thaiSoSala\or \thaiSoRusi\or \thaiSoSua\or
150     \thaiHoHip\or \thaiLoChula\or \thaiOAng\or \thaiHoNokhuk\else\@ctrerr\fi}

```

### 1.3.1 thainumber option

Not all Thai documents use Thai digits. So, we support this as an option. If `thainumber` option is supplied in the `\usepackage` command, all numbering will use Thai digits.

```

151 \DeclareOption{thainumber}{

```

We need to use the ‘@’ character in macro implementations. So, make it a normal character.

```

152 \catcode‘\@=11

```

Then, set default page numbering to `thainum`, and redefine counters to `thainum`.

```

153 \pagenumbering{thainum}
154 \renewcommand\theenumi{\@thainum\c@enumi}
155 \renewcommand\theenumii{\@thaialph\c@enumii}
156 %\renewcommand\theenumiii{\@roman\c@enumiii}
157 %\renewcommand\theenumiv{\@Alph\c@enumiv}
158 \@ifundefined{thechapter}%
159   {\renewcommand\thesection{\@thainum\c@section}%
160    \renewcommand\thesubsection{\thesection.\@thainum\c@subsection}%
161    \renewcommand\thesubsubsection{\thesubsection.\@thainum\c@subsubsection}%
162    \renewcommand\theparagraph  {\thesubsubsection.\@thainum\c@paragraph}%
163    \renewcommand\thesubparagraph {\theparagraph.\@thainum\c@subparagraph}%
164    \renewcommand\theequation{\@thainum\c@equation}%
165    \renewcommand\thetable{\@thainum\c@table}%
166    \renewcommand\thefigure{\@thainum\c@figure}}%
167 {\renewcommand\thepart{\@thainum\c@part}%
168  \renewcommand\thechapter{\@thainum\c@chapter}%
169  \renewcommand\thesection{\thechapter.\@thainum\c@section}%
170  \renewcommand\thesubsection{\thesection.\@thainum\c@subsection}%
171  \renewcommand\thesubsubsection{\thesubsection.\@thainum\c@subsubsection}%
172  \renewcommand\theparagraph  {\thesubsubsection.\@thainum\c@paragraph}%
173  \renewcommand\thesubparagraph {\theparagraph.\@thainum\c@subparagraph}%
174  \renewcommand\theequation%
175    {\ifnum \c@chapter>\z@ \thechapter.\fi \@thainum\c@equation}%
176  \renewcommand \thetable%
177    {\ifnum \c@chapter>\z@ \thechapter.\fi \@thainum\c@table}%
178  \renewcommand \thefigure%
179    {\ifnum \c@chapter>\z@ \thechapter.\fi \@thainum\c@figure}}
180 \renewcommand\thefootnote{\@thainum\c@footnote}

```

For theorems, we support all custom theorem counters at once by redefining `\@thmcounter` macro.

```

181 \def\@thmcounter#1{\noexpand\thainum{#1}}

```

In book class, page numberings for frontmatter and mainmatter are different. So, redefine them.

```

182 \@ifclassloaded{book}{%
183   % redefine page numbering for frontmatter and mainmatter
184   \def\ps@headnum{\let\@mkboth\@gobbletwo
185     \def\@oddhead{\reset@font\hfil\thepage\hfil}\let\@oddfoot\@empty
186     \let\@evenhead\@oddhead\let\@evenfoot\@empty}
187   \let\@ltxfrontmatter\frontmatter
188   \renewcommand\frontmatter{\@ltxfrontmatter\pagestyle{headnum}\pagenumbering{thaibracenum}}
189   \let\@ltxmainmatter\mainmatter
190   \renewcommand\mainmatter{\@ltxmainmatter\pagestyle{headings}\pagenumbering{thainum}}
191 }{}

```

Redefine Thai date using Thai digits.



```

192 \def\datethai{%
193 \def\today{\@thainum\day \space \th@month\space \thaiPhoPhan.\thaiSoSala.\@thainum\th@yea

    And finish declaration of thainumber option

194 \relax
195 }

    Always use thailph as counter for appendix

196 \@ifclassloaded{book}{%
197 \renewcommand\appendix{\par
198 \setcounter{chapter}{0}%
199 \setcounter{section}{0}%
200 \gdef\@chapapp{\appendixname}%
201 \gdef\thechapter{\@thaialph\c@chapter}}
202 }{}
203 \@ifclassloaded{report}{%
204 \renewcommand\appendix{\par
205 \setcounter{chapter}{0}%
206 \setcounter{section}{0}%
207 \gdef\@chapapp{\appendixname}%
208 \gdef\thechapter{\@thaialph\c@chapter}}
209 }{}
210 \@ifclassloaded{article}{%
211 \renewcommand\appendix{\par
212 \setcounter{section}{0}%
213 \setcounter{subsection}{0}%
214 \gdef\thesection{\@thaialph\c@section}}
215 }{}

```

## 1.4 Miscellaneous

Initialize character codes for Thai

```

216 \catcode'\^^a1=11 \lccode'\^^a1='\^^a1 \uccode'\^^a1='\^^a1
217 \catcode'\^^a2=11 \lccode'\^^a2='\^^a2 \uccode'\^^a2='\^^a2
218 \catcode'\^^a3=11 \lccode'\^^a3='\^^a3 \uccode'\^^a3='\^^a3
219 \catcode'\^^a4=11 \lccode'\^^a4='\^^a4 \uccode'\^^a4='\^^a4
220 \catcode'\^^a5=11 \lccode'\^^a5='\^^a5 \uccode'\^^a5='\^^a5
221 \catcode'\^^a6=11 \lccode'\^^a6='\^^a6 \uccode'\^^a6='\^^a6
222 \catcode'\^^a7=11 \lccode'\^^a7='\^^a7 \uccode'\^^a7='\^^a7
223 \catcode'\^^a8=11 \lccode'\^^a8='\^^a8 \uccode'\^^a8='\^^a8
224 \catcode'\^^a9=11 \lccode'\^^a9='\^^a9 \uccode'\^^a9='\^^a9
225 \catcode'\^^aa=11 \lccode'\^^aa='\^^aa \uccode'\^^aa='\^^aa
226 \catcode'\^^ab=11 \lccode'\^^ab='\^^ab \uccode'\^^ab='\^^ab
227 \catcode'\^^ac=11 \lccode'\^^ac='\^^ac \uccode'\^^ac='\^^ac
228 \catcode'\^^ad=11 \lccode'\^^ad='\^^ad \uccode'\^^ad='\^^ad
229 \catcode'\^^ae=11 \lccode'\^^ae='\^^ae \uccode'\^^ae='\^^ae
230 \catcode'\^^af=11 \lccode'\^^af='\^^af \uccode'\^^af='\^^af
231 \catcode'\^^b0=11 \lccode'\^^b0='\^^b0 \uccode'\^^b0='\^^b0
232 \catcode'\^^b1=11 \lccode'\^^b1='\^^b1 \uccode'\^^b1='\^^b1

```

```

233 \catcode'\^^b2=11 \lccode'\^^b2='\^^b2 \uccode'\^^b2='\^^b2
234 \catcode'\^^b3=11 \lccode'\^^b3='\^^b3 \uccode'\^^b3='\^^b3
235 \catcode'\^^b4=11 \lccode'\^^b4='\^^b4 \uccode'\^^b4='\^^b4
236 \catcode'\^^b5=11 \lccode'\^^b5='\^^b5 \uccode'\^^b5='\^^b5
237 \catcode'\^^b6=11 \lccode'\^^b6='\^^b6 \uccode'\^^b6='\^^b6
238 \catcode'\^^b7=11 \lccode'\^^b7='\^^b7 \uccode'\^^b7='\^^b7
239 \catcode'\^^b8=11 \lccode'\^^b8='\^^b8 \uccode'\^^b8='\^^b8
240 \catcode'\^^b9=11 \lccode'\^^b9='\^^b9 \uccode'\^^b9='\^^b9
241 \catcode'\^^ba=11 \lccode'\^^ba='\^^ba \uccode'\^^ba='\^^ba
242 \catcode'\^^bb=11 \lccode'\^^bb='\^^bb \uccode'\^^bb='\^^bb
243 \catcode'\^^bc=11 \lccode'\^^bc='\^^bc \uccode'\^^bc='\^^bc
244 \catcode'\^^bd=11 \lccode'\^^bd='\^^bd \uccode'\^^bd='\^^bd
245 \catcode'\^^be=11 \lccode'\^^be='\^^be \uccode'\^^be='\^^be
246 \catcode'\^^bf=11 \lccode'\^^bf='\^^bf \uccode'\^^bf='\^^bf
247 \catcode'\^^c0=11 \lccode'\^^c0='\^^c0 \uccode'\^^c0='\^^c0
248 \catcode'\^^c1=11 \lccode'\^^c1='\^^c1 \uccode'\^^c1='\^^c1
249 \catcode'\^^c2=11 \lccode'\^^c2='\^^c2 \uccode'\^^c2='\^^c2
250 \catcode'\^^c3=11 \lccode'\^^c3='\^^c3 \uccode'\^^c3='\^^c3
251 \catcode'\^^c4=11 \lccode'\^^c4='\^^c4 \uccode'\^^c4='\^^c4
252 \catcode'\^^c5=11 \lccode'\^^c5='\^^c5 \uccode'\^^c5='\^^c5
253 \catcode'\^^c6=11 \lccode'\^^c6='\^^c6 \uccode'\^^c6='\^^c6
254 \catcode'\^^c7=11 \lccode'\^^c7='\^^c7 \uccode'\^^c7='\^^c7
255 \catcode'\^^c8=11 \lccode'\^^c8='\^^c8 \uccode'\^^c8='\^^c8
256 \catcode'\^^c9=11 \lccode'\^^c9='\^^c9 \uccode'\^^c9='\^^c9
257 \catcode'\^^ca=11 \lccode'\^^ca='\^^ca \uccode'\^^ca='\^^ca
258 \catcode'\^^cb=11 \lccode'\^^cb='\^^cb \uccode'\^^cb='\^^cb
259 \catcode'\^^cc=11 \lccode'\^^cc='\^^cc \uccode'\^^cc='\^^cc
260 \catcode'\^^cd=11 \lccode'\^^cd='\^^cd \uccode'\^^cd='\^^cd
261 \catcode'\^^ce=11 \lccode'\^^ce='\^^ce \uccode'\^^ce='\^^ce
262 \catcode'\^^cf=11 \lccode'\^^cf='\^^cf \uccode'\^^cf='\^^cf
263 \catcode'\^^d0=11 \lccode'\^^d0='\^^d0 \uccode'\^^d0='\^^d0
264 \catcode'\^^d1=11 \lccode'\^^d1='\^^d1 \uccode'\^^d1='\^^d1
265 \catcode'\^^d2=11 \lccode'\^^d2='\^^d2 \uccode'\^^d2='\^^d2
266 \catcode'\^^d3=11 \lccode'\^^d3='\^^d3 \uccode'\^^d3='\^^d3
267 \catcode'\^^d4=11 \lccode'\^^d4='\^^d4 \uccode'\^^d4='\^^d4
268 \catcode'\^^d5=11 \lccode'\^^d5='\^^d5 \uccode'\^^d5='\^^d5
269 \catcode'\^^d6=11 \lccode'\^^d6='\^^d6 \uccode'\^^d6='\^^d6
270 \catcode'\^^d7=11 \lccode'\^^d7='\^^d7 \uccode'\^^d7='\^^d7
271 \catcode'\^^d8=11 \lccode'\^^d8='\^^d8 \uccode'\^^d8='\^^d8
272 \catcode'\^^d9=11 \lccode'\^^d9='\^^d9 \uccode'\^^d9='\^^d9
273 \catcode'\^^da=11 \lccode'\^^da='\^^da \uccode'\^^da='\^^da
274 \catcode'\^^df=12 \lccode'\^^df='\^^df \uccode'\^^df='\^^df
275 \catcode'\^^e0=11 \lccode'\^^e0='\^^e0 \uccode'\^^e0='\^^e0
276 \catcode'\^^e1=11 \lccode'\^^e1='\^^e1 \uccode'\^^e1='\^^e1
277 \catcode'\^^e2=11 \lccode'\^^e2='\^^e2 \uccode'\^^e2='\^^e2
278 \catcode'\^^e3=11 \lccode'\^^e3='\^^e3 \uccode'\^^e3='\^^e3
279 \catcode'\^^e4=11 \lccode'\^^e4='\^^e4 \uccode'\^^e4='\^^e4
280 \catcode'\^^e5=11 \lccode'\^^e5='\^^e5 \uccode'\^^e5='\^^e5
281 \catcode'\^^e6=11 \lccode'\^^e6='\^^e6 \uccode'\^^e6='\^^e6
282 \catcode'\^^e7=11 \lccode'\^^e7='\^^e7 \uccode'\^^e7='\^^e7

```

```

283 \catcode'\^^e8=11 \lccode'\^^e8='\^^e8 \uccode'\^^e8='\^^e8
284 \catcode'\^^e9=11 \lccode'\^^e9='\^^e9 \uccode'\^^e9='\^^e9
285 \catcode'\^^ea=11 \lccode'\^^ea='\^^ea \uccode'\^^ea='\^^ea
286 \catcode'\^^eb=11 \lccode'\^^eb='\^^eb \uccode'\^^eb='\^^eb
287 \catcode'\^^ec=11 \lccode'\^^ec='\^^ec \uccode'\^^ec='\^^ec
288 \catcode'\^^ed=11 \lccode'\^^ed='\^^ed \uccode'\^^ed='\^^ed
289 \catcode'\^^ee=11 \lccode'\^^ee='\^^ee \uccode'\^^ee='\^^ee
290 \catcode'\^^ef=12 \lccode'\^^ef='\^^ef \uccode'\^^ef='\^^ef
291 \catcode'\^^f0=12 \lccode'\^^f0='\^^f0 \uccode'\^^f0='\^^f0
292 \catcode'\^^f1=12 \lccode'\^^f1='\^^f1 \uccode'\^^f1='\^^f1
293 \catcode'\^^f2=12 \lccode'\^^f2='\^^f2 \uccode'\^^f2='\^^f2
294 \catcode'\^^f3=12 \lccode'\^^f3='\^^f3 \uccode'\^^f3='\^^f3
295 \catcode'\^^f4=12 \lccode'\^^f4='\^^f4 \uccode'\^^f4='\^^f4
296 \catcode'\^^f5=12 \lccode'\^^f5='\^^f5 \uccode'\^^f5='\^^f5
297 \catcode'\^^f6=12 \lccode'\^^f6='\^^f6 \uccode'\^^f6='\^^f6
298 \catcode'\^^f7=12 \lccode'\^^f7='\^^f7 \uccode'\^^f7='\^^f7
299 \catcode'\^^f8=12 \lccode'\^^f8='\^^f8 \uccode'\^^f8='\^^f8
300 \catcode'\^^f9=12 \lccode'\^^f9='\^^f9 \uccode'\^^f9='\^^f9
301 \catcode'\^^fa=12 \lccode'\^^fa='\^^fa \uccode'\^^fa='\^^fa
302 \catcode'\^^fb=12 \lccode'\^^fb='\^^fb \uccode'\^^fb='\^^fb
303 \ldf@finish{\CurrentOption}
304 </code>

```