

Electronic Edition

This file is part of the electronic edition of *The Unicode Standard, Version 5.0*, provided for online access, content searching, and accessibility. It may not be printed. Bookmarks linking to specific chapters or sections of the whole Unicode Standard are available at

<http://www.unicode.org/versions/Unicode5.0.0/bookmarks.html>

Purchasing the Book

For convenient access to the full text of the standard as a useful reference book, we recommend purchasing the printed version. The book is available from the Unicode Consortium, the publisher, and booksellers. Purchase of the standard in book format contributes to the ongoing work of the Unicode Consortium. Details about the book publication and ordering information may be found at

<http://www.unicode.org/book/aboutbook.html>

Joining Unicode

You or your organization may benefit by joining the Unicode Consortium: for more information, see [Joining the Unicode Consortium](http://www.unicode.org/consortium/join.html) at

<http://www.unicode.org/consortium/join.html>

This PDF file is an excerpt from *The Unicode Standard, Version 5.0*, issued by the Unicode Consortium and published by Addison-Wesley. The material has been modified slightly for this electronic edition, however, the PDF files have not been modified to reflect the corrections found on the Updates and Errata page (<http://www.unicode.org/errata/>). For information on more recent versions of the standard, see <http://www.unicode.org/versions/enumeratedversions.html>.

Many of the designations used by manufacturers and sellers to distinguish their products are claimed as trademarks. Where those designations appear in this book, and the publisher was aware of a trademark claim, the designations have been printed with initial capital letters or in all capitals.

The Unicode® Consortium is a registered trademark, and Unicode™ is a trademark of Unicode, Inc. The Unicode logo is a trademark of Unicode, Inc., and may be registered in some jurisdictions.

The authors and publisher have taken care in the preparation of this book, but make no expressed or implied warranty of any kind and assume no responsibility for errors or omissions. No liability is assumed for incidental or consequential damages in connection with or arising out of the use of the information or programs contained herein.

The *Unicode Character Database* and other files are provided as-is by Unicode®, Inc. No claims are made as to fitness for any particular purpose. No warranties of any kind are expressed or implied. The recipient agrees to determine applicability of information provided. *Dai Kan-Wa Jiten*, used as the source of reference Kanji codes, was written by Tetsuji Morohashi and published by Taishukan Shoten.

Cover and CD-ROM label design: Steve Mehallo, www.mehallo.com

The publisher offers excellent discounts on this book when ordered in quantity for bulk purchases or special sales, which may include electronic versions and/or custom covers and content particular to your business, training goals, marketing focus, and branding interests. For more information, please contact U.S. Corporate and Government Sales, (800) 382-3419, corpsales@pearsoned.com. For sales outside the United States please contact International Sales, international@pearsoned.com

Visit us on the Web: www.awprofessional.com

Library of Congress Cataloging-in-Publication Data

The Unicode Standard / the Unicode Consortium ; edited by Julie D. Allen ... [et al.]. — Version 5.0.
p. cm.

Includes bibliographical references and index.

ISBN 0-321-48091-0 (hardcover : alk. paper)

1. Unicode (Computer character set) I. Allen, Julie D.

II. Unicode Consortium.

QA268.U545 2007

005.7'22—dc22

2006023526

Copyright © 1991–2007 Unicode, Inc.

All rights reserved. Printed in the United States of America. This publication is protected by copyright, and permission must be obtained from the publisher prior to any prohibited reproduction, storage in a retrieval system, or transmission in any form or by any means, electronic, mechanical, photocopying, recording, or likewise. For information regarding permissions, write to Pearson Education, Inc., Rights and Contracts Department, 75 Arlington Street, Suite 300, Boston, MA 02116. Fax: (617) 848-7047

ISBN 0-321-48091-0

Text printed in the United States on recycled paper at Courier in Westford, Massachusetts.

First printing, October 2006

Chapter 13

Additional Modern Scripts

This chapter contains a collection of additional scripts in modern use that do not fit well into the script categories featured in other chapters:

<i>Ethiopic</i>	<i>Tifinagh</i>	<i>Canadian Aboriginal Syllabics</i>
<i>Mongolian</i>	<i>N’Ko</i>	<i>Deseret</i>
<i>Osmanya</i>	<i>Cherokee</i>	<i>Shavian</i>

Ethiopic, Mongolian, and Tifinagh are scripts with long histories. Although their roots can be traced back to the original Semitic and North African writing systems, they would not be classified as Middle Eastern scripts today.

The remaining scripts in this chapter have been developed relatively recently. Some of them show roots in Latin and other letterforms, including shorthand. They are all original creative contributions intended specifically to serve the linguistic communities that use them.

13.1 Ethiopic

Ethiopic: U+1200–U+137F

The Ethiopic syllabary originally evolved for writing the Semitic language Ge’ez. Indeed, the English noun “Ethiopic” simply means “the Ge’ez language.” Ge’ez itself is now limited to liturgical usage, but its script has been adopted for modern use in writing several languages of central east Africa, including Amharic, Tigre, and Oromo.

Basic and Extended Ethiopic. The Ethiopic characters encoded here are the basic set that has become established in common usage for writing major languages. As with other productive scripts, the basic Ethiopic forms are sometimes modified to produce an extended range of characters for writing additional languages.

Encoding Principles. The syllables of the Ethiopic script are traditionally presented as a two-dimensional matrix of consonant-vowel combinations. The encoding follows this structure; in particular, the codespace range U+1200..U+137F is interpreted as a matrix of 43 consonants crossed with 8 vowels, making 344 conceptual syllables. Most of these consonant-vowel syllables are represented by characters in the script, but some of them happen to be unused, accounting for the blank cells in the matrix.

Variant Glyph Forms. A given Ethiopic syllable may be represented by different glyph forms, analogous to the glyph variants of Latin lowercase “a” or “g”, which do not coexist in the same font. Thus the particular glyph shown in the code chart for each position in the matrix is merely one representation of that conceptual syllable, and the glyph itself is not the object that is encoded.

Labialized Subseries. A few Ethiopic consonants have labialized (“W”) forms that are traditionally allotted their own consonant series in the syllable matrix, although only a subset of the possible vowel forms are realized. Each of these derivative series is encoded immediately after the corresponding main consonant series. Because the standard vowel series includes both “AA” and “WAA”, two different cells of the syllable matrix might represent the “consonant + W + AA” syllable. For example:

U+1257 = QH + WAA: potential but unused version of QHWAA

U+125B = QHW + AA: ETHIOPIC SYLLABLE QHWAA

In these cases, where the two conceptual syllables are equivalent, the entry in the labialized subseries is encoded and not the “consonant + WAA” entry in the main syllable series. The six specific cases are enumerated in *Table 13-1*. In three of these cases, the -WAA position in the syllable matrix has been reanalyzed and used for encoding a syllable in -OA for extended Ethiopic.

Table 13-1. Labialized Forms in Ethiopic -WAA

-WAA Form	Encoded as	Not Used	Contrast
QWAA	U+124B ቁ	1247	U+1247 ቆ QOA
QHWAA	U+125B ቁ	1257	
XWAA	U+128B ኃ	1287	U+1287 ኄ XOA
KWAA	U+12B3 ኃ	12AF	U+12AF ኄ KOA
KXWAA	U+12C3 ኃ	12BF	
GWAA	U+1313 ኃ	130F	

Also, *within* the labialized subseries, the sixth vowel (“-E”) forms are sometimes considered to be second vowel (“-U”) forms. For example:

U+1249 = QW + U: unused version of QWE

U+124D = QW + E: ETHIOPIC SYLLABLE QWE

In these cases, where the two syllables are nearly equivalent, the “-E” entry is encoded and not the “-U” entry. The six specific cases are enumerated in *Table 13-2*.

Keyboard Input. Because the Ethiopic script includes more than 300 characters, the units of keyboard input must constitute some smaller set of entities, typically 43+8 codes interpreted as the coordinates of the syllable matrix. Because these keyboard input codes are expected to be transient entities that are resolved into syllabic characters before they enter stored text, keyboard input codes are not specified in this standard.

Table 13-2. Labialized Forms in Ethiopic -WE

“-WE” Form	Encoded as	Not Used
QWE	U+124D ቅላ	1249
QHWE	U+125D ቅዌላ	1259
XWE	U+128D ገላ	1289
KWE	U+12B5 ኸላ	12B1
KXWE	U+12C5 ኸዌላ	12C1
GWE	U+1315 ገላ	1311

Syllable Names. The Ethiopic script often has multiple syllables corresponding to the same Latin letter, making it difficult to assign unique Latin names. Therefore the names list makes use of certain devices (such as doubling a Latin letter in the name) merely to create uniqueness; this device has no relation to the phonetics of these syllables in any particular language.

Encoding Order and Sorting. The order of the consonants in the encoding is based on the traditional alphabetical order. It may differ from the sort order used for one or another language, if only because in many languages various pairs or triplets of syllables are treated as equivalent in the first sorting pass. For example, an Amharic dictionary may start out with a section headed by *three* H-like syllables:

U+1200 ETHIOPIC SYLLABLE HA

U+1210 ETHIOPIC SYLLABLE HHA

U+1280 ETHIOPIC SYLLABLE XA

Thus the encoding order cannot and does not implement a collation procedure for any particular language using this script.

Word Separators. The traditional word separator is U+1361 ETHIOPIC WORDSPACE (:). In modern usage, a plain white whitespace (U+0020 SPACE) is becoming common.

Section Mark. One or more *section marks* are typically used on a separate line to mark the separation of sections. Commonly, an odd number is used and they are separated by spaces.

Diacritical Marks. The Ethiopic script generally makes no use of diacritical marks, but they are sometimes employed for scholarly or didactic purposes. In particular, U+135F ETHIOPIC COMBINING GEMINATION MARK and U+030E COMBINING DOUBLE VERTICAL LINE ABOVE are sometimes used to indicate emphasis or gemination (consonant doubling).

Numbers. Ethiopic digit glyphs are derived from the Greek alphabet, possibly borrowed from Coptic letterforms. In modern use, European digits are often used. The Ethiopic number system does not use a zero, nor is it based on digital-positional notation. A number is denoted as a sequence of powers of 100, each preceded by a coefficient (2 through 99). In each term of the series, the power 100^n is indicated by *n* HUNDRED characters (merged to a digraph when $n = 2$). The coefficient is indicated by a *tens* digit and a *ones* digit, either of which is absent if its value is zero.

For example, the number 2345 is represented by

$$\begin{aligned} 2345 &= (20 + 3) * 100^1 + (40 + 5) * 100^0 \\ &= 20 \quad 3 \quad 100 \quad 40 \quad 5 \\ &= \text{TWENTY THREE HUNDRED FORTY FIVE} \\ &= 1373 \quad 136B \quad 137B \quad 1375 \quad 136D \quad \text{ጳጵጵጵጵጵ} \end{aligned}$$

A language using the Ethiopic script may have a *word* for “thousand,” such as Amharic “SHI” (U+123A), and a quantity such as 2,345 may also be written as it is spoken in that language, which in the case of Amharic happens to parallel English:

$$\begin{aligned} 2,345 &= \text{TWO thousand THREE HUNDRED FORTY FIVE} \\ &= 136A \quad 123A \quad 136B \quad 137B \quad 1375 \quad 136D \quad \text{ጳሺ.ጳጵጵጵጵጵ} \end{aligned}$$

Ethiopic Extensions: U+1380–U+139F, U+2D80–U+2DDF

The Ethiopic script is used for a large number of languages and dialects in Ethiopia and in some instances has been extended significantly beyond the set of characters used for major languages such as Amharic and Tigre. There are two blocks of extensions to the Ethiopic script: Ethiopic Supplement U+1380..U+139F and Ethiopic Extended U+2D80..U+2DDF. Those extensions cover such languages as Me’en, Blin, and Sebatbeit, which use many additional characters. Several other characters for Ethiopic script extensions can be found in the main Ethiopic script block in the range U+1200..U+137F.

The Ethiopic Supplement block also contains a set of tonal marks. They are used in multi-line scored layout. Like other musical (an)notational systems of this type, these tonal marks require a higher-level protocol to enable proper rendering.

13.2 Mongolian

Mongolian: U+1800–U+18AF

The Mongolians are key representatives of a cultural-linguistic group known as Altaic, after the Altai mountains of central Asia. In the past, these peoples have dominated the vast expanses of Asia and beyond, from the Baltic to the Sea of Japan. Echoes of Altaic languages remain from Finland, Hungary, and Turkey, across central Asia, to Korea and Japan. Today the Mongolians are represented politically in Mongolia proper (formally the Mongolian People’s Republic, also known as Outer Mongolia) and Inner Mongolia (formally the Inner Mongolia Autonomous Region, China), with Mongolian populations also living in other areas of China.

The Mongolian block unifies Mongolian and the three derivative scripts Todo, Manchu, and Sibe. Each of the three derivative scripts shares some common letters with Mongolian,

and these letters are encoded only once. Each derivative script also has a number of modified letter forms or new letters, which are encoded separately.

Mongolian, Todo, and Manchu also have a number special “Ali Gali” letters that are used for transcribing Tibetan and Sanskrit in Buddhist texts.

History. The Mongolian script was derived from the Uighur script around the beginning of the thirteenth century, during the reign of Genghis Khan. The Uighur script, which was in use from about the eighth to the fifteenth centuries, was derived from Sogdian Aramaic, a Semitic script written horizontally from right to left. Probably under the influence of the Chinese script, the Uighur script became rotated 90 degrees counterclockwise so that the lines of text read vertically in columns running from left to right. The Mongolian script inherited this directionality from the Uighur script.

The Mongolian script has remained in continuous use for writing Mongolian within the Inner Mongolia Autonomous Region of the People’s Republic of China and elsewhere in China. However, in the Mongolian People’s Republic (Outer Mongolia), the traditional script was replaced by a Cyrillic orthography in the early 1940s. The traditional script has been revived to an extent since the early 1990s, so that now both the Cyrillic and the Mongolian scripts are used. The spelling used with the traditional Mongolian script represents the literary language of the seventeenth and early eighteenth centuries, whereas the Cyrillic script is used to represent the modern, colloquial pronunciation of words. As a consequence, there is no one-to-one relationship between the traditional Mongolian orthography and Cyrillic orthography. Approximate correspondence mappings are indicated in the code charts, but are not necessarily unique in either direction. All of the Cyrillic characters needed to write Mongolian are included in the Cyrillic block of the Unicode Standard.

In addition to the traditional Mongolian script of Mongolia, several historical modifications and adaptations of the Mongolian script have emerged elsewhere. These adaptations are often referred to as scripts in their own right, although for the purposes of character encoding in the Unicode Standard they are treated as styles of the Mongolian script and share encoding of their basic letters.

The Todo script is a modified and improved version of the Mongolian script, devised in 1648 by Zaya Pandita for use by the Kalmyk Mongolians, who had migrated to Russia in the sixteenth century, and who now inhabit the Republic of Kalmykia in the Russian Federation. The name *Todo* means “clear” in Mongolian; it refers to the fact that the new script eliminates the ambiguities inherent in the original Mongolian script. The orthography of the Todo script also reflects the Oirat-Kalmyk dialects of Mongolian rather than literary Mongolian. In Kalmykia, the Todo script was replaced by a succession of Cyrillic and Latin orthographies from the mid-1920s and is no longer in active use. Until very recently the Todo script was still used by speakers of the Oirat and Kalmyk dialects within Xinjiang and Qinghai in China.

The Manchu script is an adaptation of the Mongolian script used to write Manchu, a Tungusic language that is not closely related to Mongolian. The Mongolian script was first adapted for writing Manchu in 1599 under the orders of the Manchu leader Nurhachi, but few examples of this early form of the Manchu script survive. In 1632, the Manchu scholar

Dahai reformed the script by adding circles and dots to certain letters in an effort to distinguish their different sounds and by devising new letters to represent the sounds of the Chinese language. When the Manchu people conquered China to rule as the Qing dynasty (1644–1911), Manchu became the language of state. The ensuing systematic program of translation from Chinese created a large and important corpus of books written in Manchu. Over time the Manchu people became completely sinified, and as a spoken language Manchu is now almost extinct.

The Sibe (also spelled Sibo, Xibe, or Xibo) people are closely related to the Manchus, and their language is often classified as a dialect of Manchu. The Sibe people are widely dispersed across northwest and northeast China due to deliberate programs of ethnic dispersal during the Qing dynasty. The majority have become assimilated into the local population and no longer speak the Sibe language. However, there is a substantial Sibe population in the Sibe Autonomous County in the Ili River valley in Western Xinjiang, the descendants of border guards posted to Xinjiang in 1764, who still speak and write the Sibe language. The Sibe script is based on the Manchu script, with a few modified letters.

Directionality. The Mongolian script is written vertically from top to bottom in columns running from left to right. In modern contexts, words or phrases may be embedded in horizontal scripts. In such a case, the Mongolian text will be rotated 90 degrees counterclockwise so that it reads from left to right.

When rendering Mongolian text in a system that does not support vertical layout, the text should be laid out in horizontal lines running left to right, with the glyphs rotated 90 degrees counterclockwise with respect to their orientation in the code charts. If such text is viewed sideways, the usual Mongolian column order appears reversed, but this orientation can be workable for short stretches of text. There are no bidirectional effects in such a layout because all text is horizontal left to right.

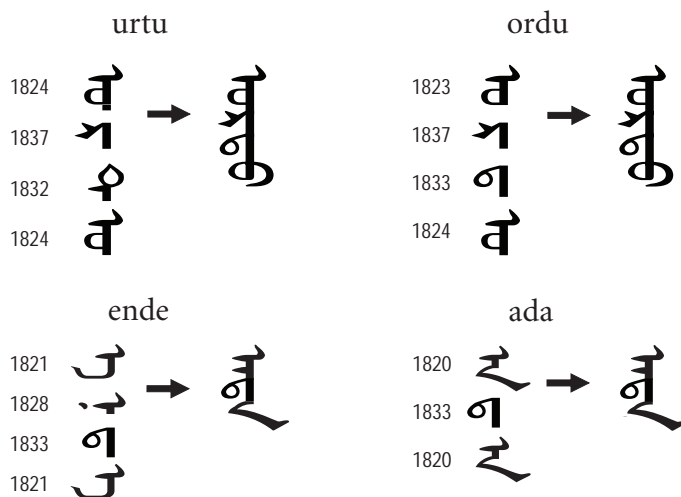
Encoding Principles. The encoding model for Mongolian is somewhat different from that for any other script within Unicode, and in many respects it is the most complicated. For this reason, only the essential features of Mongolian shaping behavior are presented here; the precise details are to be presented in a separate technical report.

The Semitic alphabet from which the Mongolian script was ultimately derived is fundamentally inadequate for representing the sounds of the Mongolian language. As a result, many of the Mongolian letters are used to represent two different sounds, and the correct pronunciation of a letter may be known only from the context. In this respect, Mongolian orthography is similar to English spelling, in which the pronunciation of a letter such as *c* may be known only from the context.

Unlike in the Latin script, in which *c* /*k*/ and *c* /*s*/ are treated as the same letter and encoded as a single character, in the Mongolian script different phonetic values of the same glyph may be encoded as distinct characters. Modern Mongolian grammars consider the phonetic value of a letter to be its distinguishing feature, rather than its glyph shape. For example, the four Mongolian vowels *o*, *u*, *ö*, and *ü* are considered four distinct letters and are encoded as four characters (U+1823, U+1824, U+1825, and U+1826, respectively), even though *o* is written identically to *u* in all positional forms, *ö* is written identically to *ü* in all

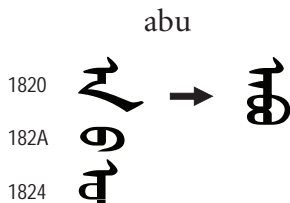
positional forms, *o* and *u* are normally distinguished from *ö* and *ü* only in the first syllable of a word. Likewise, the letters *t* (U+1832) and *d* (U+1833) are often indistinguishable. For example, pairs of Mongolian words such as *urtu* “long” and *ordu* “palace, camp, horde” or *ende* “here” and *ada* “devil” are written identically, but are represented using different sequences of Unicode characters, as shown in *Figure 13-1*. There are many such examples in Mongolian, but not in Todo, Manchu, or Sibe, which have largely eliminated ambiguous letters.

Figure 13-1. Mongolian Glyph Convergence



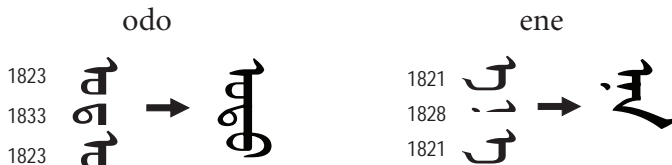
Cursive Joining. The Mongolian script is cursive, and the letters constituting a word are normally joined together. In most cases the letters join together naturally along a vertical stem, but in the case of certain “bowed” consonants (for example, U+182A MONGOLIAN LETTER BA and the feminine form of U+182C MONGOLIAN LETTER QA), which lack a trailing vertical stem, they may form ligatures with a following vowel. This is illustrated in *Figure 13-2*, where the letter *ba* combines with the letter *u* to form a ligature in the Mongolian word *abu* “father.”

Figure 13-2. Mongolian Consonant Ligation



Many letters also have distinct glyph forms depending on their position within a word. These positional forms are classified as initial, medial, final, or isolate. The medial form is often the same as the initial form, but the final form is always distinct from the initial or medial form. *Figure 13-3* shows the Mongolian letters U+1823 *o* and U+1821 *e*, rendered with distinct positional forms initially and finally in the Mongolian words *odo* “now” and *ene* “this.”

Figure 13-3. Mongolian Positional Forms



U+200C ZERO WIDTH NON-JOINER (ZWNJ) and U+200D ZERO WIDTH JOINER (ZWJ) may be used to select a particular positional form of a letter in isolation or to override the expected positional form within a word. Basically, they evoke the same contextual selection effects in neighboring letters as do non-joining or joining regular letters, but are themselves invisible (see *Chapter 16, Special Areas and Format Characters*). For example, the various positional forms of U+1820 MONGOLIAN LETTER A may be selected by means of the following character sequences:

- <1820> selects the isolate form.
- <1820 200D> selects the initial form.
- <200D 1820> selects the final form.
- <200D 1820 200D> selects the medial form.

Some letters have additional variant forms that do not depend on their position within a word, but instead reflect differences between modern versus traditional orthographic practice or lexical considerations—for example, special forms used for writing foreign words. On occasion, other contextual rules may condition a variant form selection. For example, a certain variant of a letter may be required when it occurs in the first syllable of a word or when it occurs immediately after a particular letter.

The various positional and variant glyph forms of a letter are considered presentation forms and are not encoded separately. It is the responsibility of the rendering system to select the correct glyph form for a letter according to its context.

Free Variation Selectors. When a glyph form that cannot be predicted algorithmically is required (for example, when writing a foreign word), the user needs to append an appropriate variation selector to the letter to indicate to the rendering system which glyph form is required. The following free variation selectors are provided for use specifically with the Mongolian block:

U+180B MONGOLIAN FREE VARIATION SELECTOR ONE (FVS1)

U+180C MONGOLIAN FREE VARIATION SELECTOR TWO (FVS2)

U+180D MONGOLIAN FREE VARIATION SELECTOR THREE (FVS3)

These format characters normally have no visual appearance. When required, a free variation selector immediately follows the base character it modifies. This combination of base character and variation selector is known as a standardized variant. The table of standardized variants, `StandardizedVariants.txt`, in the Unicode Character Database exhaustively lists all currently defined standardized variants. All combinations not listed in the table are unspecified and are reserved for future standardization; no conformant process may interpret them as standardized variants. Therefore, any free variation selector not immediately preceded by one of their defined base characters will be ignored.

Figure 13-4 gives an example of how a free variation selector may be used to select a particular glyph variant. In modern orthography, the initial letter *ga* in the Mongolian word *gal* “fire” is written with two dots; in traditional orthography, the letter *ga* is written without any dots. By default, the dotted form of the letter *ga* is selected, but this behavior may be overridden by means of FVS1, so that *ga* plus FVS1 selects the undotted form of the letter *ga*.

Figure 13-4. Mongolian Free Variation Selector



It is important to appreciate that even though a particular standardized variant may be defined for a letter, the user needs to apply the appropriate free variation selector only if the correct glyph form cannot be predicted automatically by the rendering system. In most cases, in running text, there will be few occasions when a free variation selector is required to disambiguate the glyph form.

Older documentation, external to the Unicode Standard, listed the action of the free variation selectors by using ZWJ to explicitly indicate the shaping environment affected by the variation selector. The relative order of the ZWJ and the free variation selector in these documents was different from the one required by *Section 16.4, Variation Selectors*. Older implementations of Mongolian free variation selectors may therefore interpret a sequence such as a base character followed by first by ZWJ and then by FVS1 as if it were a base character followed first by FVS1 and then by ZWJ.

Representative Glyphs. The representative glyph in the code charts is generally the isolate form for the vowels and the initial form for the consonants. Letters that share the same glyph forms are distinguished by using different positional forms for the representative glyph. For example, the representative glyph for U+1823 MONGOLIAN LETTER O is the isolate form, whereas the representative glyph for U+1824 MONGOLIAN LETTER U is the initial form. However, this distinction is only nominal, as the glyphs for the two characters are identical for the same positional form. Likewise, the representative glyphs for U+1863 MONGOLIAN LETTER SIBE KA and U+1874 MONGOLIAN LETTER MANCHU KA both take the final form, as their initial forms are identical to the representative glyph for U+182C MONGOLIAN LETTER QA (the initial form).

Vowel Harmony. Mongolian has a system of vowel harmony, whereby the vowels in a word are either all “masculine” and “neuter” vowels (that is, back vowels plus /i/) or all “feminine” and “neuter” vowels (that is, front vowels plus /i/). Words that are written with masculine/neuter vowels are considered to be masculine, and words that are written with feminine/neuter vowels are considered to be feminine. Words with only neuter vowels behave as feminine words (for example, take feminine suffixes). Manchu and Sibe have a similar system of vowel harmony, although it is not so strict. Some words in these two scripts may include both masculine and feminine vowels, and separated suffixes with masculine or feminine vowels may be applied to a stem irrespective of its gender.

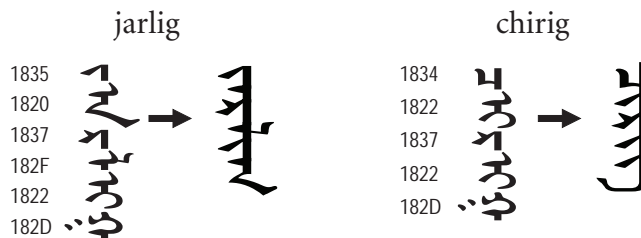
Vowel harmony is an important element of the encoding model, as the gender of a word determines the glyph form of the velar series of consonant letters for Mongolian, Todo, Sibe, and Manchu. In each script, the velar letters have both masculine and feminine forms. For Mongolian and Todo, the masculine and feminine forms of these letters have different pronunciations.

When one of the velar consonants precedes a vowel, it takes the masculine form before masculine vowels, and the feminine form before feminine or neuter vowels. In the latter case, a ligature of the consonant and vowel is required.

When one of these consonants precedes another consonant or is the final letter in a word, it may take either a masculine or feminine glyph form, depending on its context. The rendering system should automatically select the correct gender form for these letters based on the gender of the word (in Mongolian and Todo) or the gender of the preceding vowel (in Manchu and Sibe). This is illustrated by *Figure 13-5*, where U+182D MONGOLIAN LETTER GA takes a masculine glyph form when it occurs finally in the masculine word *jarlig* “order,” but takes a feminine glyph form when it occurs finally in the feminine word *chirig* “soldier.” In this example, the gender form of the final letter *ga* depends on whether the first vowel in the word is a back (masculine) vowel or a front (feminine or neuter) vowel. Where the gender is ambiguous or a form not derivable from the context is required, the user needs to specify which form is required by means of the appropriate free variation selector.

Narrow No-Break Space. In Mongolian, Todo, Manchu, and Sibe, certain grammatical suffixes are separated from the stem of a word or from other suffixes by a narrow gap. There are many such suffixes in Mongolian, usually occurring in masculine and feminine pairs (for example, the dative suffixes *-dur* and *-dür*), and a stem may take multiple suffixes. In

Figure 13-5. Mongolian Gender Forms



contrast, there are only six separated suffixes for Manchu and Sibe, and stems do not take more than one suffix at a time.

As any suffixes are considered to be an integral part of the word as a whole, a line break opportunity does not occur before a suffix, and the whitespace is represented using U+202F NARROW NO-BREAK SPACE (NNBSP). For a Mongolian font it is recommended that the width of NNBSP should be one-third the width of an ordinary space (U+0020 SPACE).

NNBSP affects the form of the preceding and following letters. The final letter of the stem or suffix preceding the NNBSP takes the final positional form, whereas the first letter of the suffix following NNBSP may take the normal initial form, a variant initial form, a medial form, or a final form, depending on the particular suffix.

Mongolian Vowel Separator. In Mongolian, the letters *a* (U+1820) and *e* (U+1821) in a word-final position may take a “forward tail” form or a “backward tail” form depending on the preceding consonant that they are attached to. In some words, a final letter *a* or *e* is separated from the preceding consonant by a narrow gap, in which case the vowel always takes the “forward tail” form. U+180E MONGOLIAN VOWEL SEPARATOR (MVS) is used to represent the whitespace that separates a final letter *a* or *e* from the rest of the word. MVS is very similar in function to NNBSP, as it divides a word with a narrow non-breaking whitespace. Whereas NNBSP marks off a grammatical suffix, however, the *a* or *e* following MVS is not a suffix but an integral part of the word stem. Whether a final letter *a* or *e* is joined or separated is purely lexical and is not a question of varying orthography. For example, the word *qana* <182C, 1820, 1828, 1820> without a gap before the final letter *a* means “the outer casing of a vein,” whereas the word *qana* <182C, 1820, 1828, 180E, 1820> with a gap before the final letter *a* means “the wall of a tent,” as shown in *Figure 13-6*.

Figure 13-6. Mongolian Vowel Separator

Qana with Connected Final



Qana with Separated Final



The MVS has a twofold effect on shaping. On the one hand, it always selects the forward tail form of a following letter *a* or *e*. On the other hand, it may affect the form of the preceding letter. The particular form that is taken by a letter preceding an MVS depends on the particular letter and in some cases on whether traditional or modern orthography is being used. The MVS is not needed for writing Todo, Manchu, or Sibe.

Numbers. The Mongolian and Todo scripts use a set of ten digits derived from the Tibetan digits. In vertical text, numbers are traditionally written from left to right across the width of the column. In modern contexts, they are frequently rotated so that they follow the vertical flow of the text.

The Manchu and Sibe scripts do not use any special digits, although Chinese number ideographs may be employed—for example, for page numbering in traditional books.

Punctuation. Traditional punctuation marks used for Mongolian and Todo include the U+1800 MONGOLIAN BIRGA (marks the start of a passage or the recto side of a folio), U+1802 MONGOLIAN COMMA, U+1803 MONGOLIAN FULL STOP, and U+1805 MONGOLIAN FOUR DOTS (marks the end of a passage). The *birga* occurs in several different glyph forms.

In writing Todo, U+1806 MONGOLIAN TODO SOFT HYPHEN is used at the beginning of the second line to indicate resumption of a broken word. It functions like U+2010 HYPHEN, except that U+1806 appears at the beginning of a line rather than at the end.

The Manchu script normally uses only two punctuation marks: U+1808 MONGOLIAN MANCHU COMMA and U+1809 MONGOLIAN MANCHU FULL STOP.

In modern contexts, Mongolian, Todo, and Sibe may use a variety of Western punctuation marks, such as parentheses, quotation marks, question marks, and exclamation marks. U+2048 QUESTION EXCLAMATION MARK and U+2049 EXCLAMATION QUESTION MARK are used for side-by-side display of a question mark and an exclamation mark together in vertical text. Todo and Sibe may additionally use punctuation marks borrowed from Chinese, such as U+3001 IDEOGRAPHIC COMMA, U+3002 IDEOGRAPHIC FULL STOP, U+300A LEFT DOUBLE ANGLE BRACKET, and U+300B RIGHT DOUBLE ANGLE BRACKET.

Nirugu. U+180A MONGOLIAN NIRUGU acts as a stem extender. In traditional Mongolian typography, it is used to physically extend the stem joining letters, so as to increase the separation between all letters in a word. This stretching behavior should preferably be carried out in the font rather than by the user manually inserting U+180A.

The *nirugu* may also be used to separate two parts of a compound word. For example, *altan-agula* “The Golden Mountains” may be written with the words *altan*, “golden,” and *agula*, “mountains,” joined together using the *nirugu*. In this usage the *nirugu* is similar to the use of hyphen in Latin scripts, but it is nonbreaking.

Syllable Boundary Marker. U+1807 MONGOLIAN SIBE SYLLABLE BOUNDARY MARKER, which is derived from the medial form of the letter *a* (U+1820), is used to disambiguate syllable boundaries within a word. It is mainly used for writing Sibe, but may also occur in Manchu texts. In native Manchu or Sibe words, syllable boundaries are never ambiguous; when transcribing Chinese proper names in the Manchu or Sibe script, however, the sylla-

ble boundary may be ambiguous. In such cases, U+1807 may be inserted into the character sequence at the syllable boundary.

13.3 Osmanya

Osmanya: U+10480–U+104AF

The Osmanya script, which in Somali is called **ሒፍገግ** *far Soomaali* “Somali writing” or **ሒፍገግ** *Cismaanya*, was devised in 1920–1922 by **ሒፍገግ ጽሑፊ ለሒፍገግ** (Cismaan Yuusuf Keenadiid) to represent the Somali language. It replaced an attempt by Sheikh Uweys of the Confraternity Qadiriyyah (died 1909) to devise an Arabic-based orthography for Somali. It has, in turn, been replaced by the Latin orthography of Muuse Xaaji Ismaaciil Galaal (1914–1980). In 1961, both the Latin and the Osmanya scripts were adopted for use in Somalia, but in 1969 there was a coup, with one of its stated aims being the resolution of the debate over the country’s writing system. A Latin orthography was finally adopted in 1973. Gregersen (1977) states that some 20,000 or more people use Osmanya in private correspondence and bookkeeping, and that several books and a biweekly journal *Horseed* (“*Vanguard*”) were published in cyclostyled format.

Structure. Osmanya is an alphabetic script, read from left to right in horizontal lines running from top to bottom. It has 22 consonants and 8 vowels. Unique long vowels are written for U+1049B **ፍ** OSMANYA LETTER AA, U+1049C **ሒ** OSMANYA LETTER EE, and U+1049D **ከ** OSMANYA LETTER OO; long *uu* and *ii* are written with the consonants U+10493 **ከ** OSMANYA LETTER WAW and U+10495 **ጽ** OSMANYA LETTER YA, respectively.

Ordering. Alphabetical ordering is based on the order of the Arabic alphabet, as specified by Osman Abdihalim Yuusuf Osman Keenadiid. This ordering is similar to the ordering given in Diringer (1996).

Names and Glyphs. The character names used in the Unicode Standard are as given by Osman. The glyphs shown in the code charts are taken from *Afkeenna iyo fartysa* (“Our language and its handwriting”) 1971.

13.4 Tifinagh

Tifinagh: U+2D30–U+2D7F

The Tifinagh script is used by approximately 20 million people who speak varieties of languages commonly called Berber or Amazigh. The three main varieties in Morocco are known as Tarifite, Tamazighe, and Tachelhite. In Morocco, more than 40% of the population speaks Berber. In accordance with recent governmental decisions, the teaching of the Berber language, written in the Tifinagh script, will be generalized and compulsory in Morocco in all public schools by 2008.

Tifinagh is an alphabetic writing system. It uses spaces to separate words and makes use of Western punctuation.

History. The earliest variety of the Berber alphabet is Libyan. Two forms exist: a Western form and an Eastern form. The Western variety was used along the Mediterranean coast from Kabylia to Morocco and most probably to the Canary Islands. The Eastern variety, Old Tifinagh, is also called Libyan-Berber or Old Tuareg. It contains signs not found in the Libyan variety and was used to transcribe Old Tuareg. The word *tifinagh* is a feminine plural noun whose singular would be *tafniqt*; it means “the Phoenician (letters).”

Neo-Tifinagh refers to the writing systems that were developed to represent the Maghreb Berber dialects. A number of variants of Neo-Tifinagh exist, the first of which was proposed in the 1960s by the Académie Berbère. That variant has spread in Morocco and in Algeria, especially in Kabylia. Other Neo-Tifinagh systems are nearly identical to the Académie Berbère system. The encoding in the Tifinagh block is based on the Neo-Tifinagh systems.

Source Standards. The encoding consists of four Tifinagh character subsets: the basic set of the Institut Royal de la Culture Amazighe (IRCAM), the extended IRCAM set, other Neo-Tifinagh letters in use, and modern Tuareg letters. The first subset represents the set of characters chosen by IRCAM to unify the orthography of the different Moroccan modern-day Berber dialects while using the historical Tifinagh script.

Ordering. The letters are arranged according to the order specified by IRCAM. Other Neo-Tifinagh and Tuareg letters are interspersed according to their pronunciation. The modifier letter U+2D6F TIFINAGH MODIFIER LETTER LABIALIZATION is found at the end of the block.

Directionality. Historically, Berber texts did not have a fixed direction. Early inscriptions were written horizontally from left to right, from right to left, vertically (bottom to top, top to bottom); boustrophedon directionality was also known. Modern-day Berber script is most frequently written in horizontal lines from left to right; therefore the bidirectional class for Tifinagh letters is specified as strong left to right. Displaying Berber texts in other directions can be accomplished by the use of directional overrides or by the use of higher-level protocols.

13.5 N’Ko

N’Ko: U+07C0–U+07FF

N’Ko is a literary dialect used by the Manden (or Manding) people, who live primarily in West Africa. The script was devised by Solomana Kante in 1949 as a writing system for the Manden languages. The Manden language group is known as *Mandenkan*, where the suffix *-kan* means “language of.” In addition to the substantial number of Mandens, some non-Mandens speak *Mandenkan* as a second language. There are an estimated 20 million Mandenkan speakers.

The major dialects of the Manden language are Bamanan, Jula, Maninka, and Mandinka. There are a number of other related dialects. When Mandens from different subgroups talk to each other, it is common practice for them to switch—consciously or subconsciously—from their own dialect to the conventional, literary dialect commonly known as *Kangbe*, “the clear language,” also known as N’Ko. This dialect switching can occur in conversations between the Bamanan of Mali, the Maninka of Guinea, the Jula of the Ivory Coast, and the Mandinka of Gambia or Senegal, for example. Although there are great similarities between their dialects, speakers sometimes find it necessary to switch to *Kangbe* (N’Ko) by using a common word or phrase, similar to the accommodations Danes, Swedes, and Norwegians sometimes make when speaking to one another. For example, the word for “name” in Bamanan is *togo*, while it is *tooh* in Maninka. Speakers of both dialects will write it as , although each may pronounce it differently.

Structure. The N’Ko script is written from right to left. It is phonetic in nature (one symbol, one sound). N’Ko has seven vowels, each of which can bear one of seven diacritical marks that modify the tone of the vowel as well as an optional diacritical mark that indicates nasalization. N’Ko has 19 consonants and two “abstract” consonants, U+07E0 NKO LETTER NA WOLOS0 and U+07E7 NKO LETTER NYA WOLOS0, which indicate original consonants mutated by a preceding nasal, either word-internally or across word boundaries. Some consonants can bear one of three diacritical marks to transcribe foreign sounds or to transliterate foreign letters.

U+07D2 NKO LETTER N is considered neither a vowel nor a consonant; it indicates a syllabic alveolar or velar nasal. It can bear a diacritical mark, but cannot bear the nasal diacritic. The letter U+07D1 NKO LETTER DAGBASINNA has a special function in N’Ko orthography. The standard spelling rule is that when two successive syllables have the same vowel, the vowel is written only after the second of the two syllables. For example, <ba, la, oo> is pronounced [bolo], but in a foreign syllable to be pronounced [blo], the *dagbasinna* is inserted for <ba, dagbasinna, la, oo> to show that a consonant cluster is intended.

Digits. N’Ko uses decimal digits specific to the script. These digits have strong right-to-left directionality. Numbers are stored in text in logical order with most significant digit first; when displayed, numerals are then laid out in right-to-left order, with the most significant digit at the rightmost side, as illustrated for the numeral 144 in *Figure 13-7*. This situation differs from how numerals are handled in Hebrew and Arabic, where numerals are laid out in left-to-right order, even though the overall text direction is right to left.

Diacritical Marks. N’Ko diacritical marks are script-specific, despite superficial resemblances to other diacritical marks encoded for more general use. Some N’Ko diacritics have a wider range of glyph representation than the generic marks do, and are typically drawn rather higher and bolder than the generic marks.

Table 13-3 shows the use of the tone diacritics when applied to vowels.

When applied to a vowel, U+07F2 NKO COMBINING NASALIZATION MARK indicates the nasalization of that vowel. In the text stream, this mark is applied before any of the tone marks because combining marks below precede combining marks above in canonical order.

Table 13-3. N’Ko Tone Diacritics on Vowels

Character	Tone	Applied To
U+07EB NKO COMBINING SHORT HIGH TONE	high	short vowel
U+07EC NKO COMBINING SHORT LOW TONE	low	short vowel
U+07ED NKO COMBINING SHORT RISING TONE	rising-falling	short vowel
U+07EE NKO COMBINING LONG DESCENDING TONE	descending	long vowel
U+07EF NKO COMBINING LONG HIGH TONE	high	long vowel
U+07F0 NKO COMBINING LONG LOW TONE	long low	long vowel
U+07F1 NKO COMBINING LONG RISING TONE	rising	long vowel

Two of the tone diacritics, when applied to consonants, indicate specific sounds from other languages—in particular, Arabic or French language sounds. U+07F3 NKO COMBINING DOUBLE DOT ABOVE is also used as a diacritic to represent sounds from other languages. The combinations used are as shown in *Table 13-4*.

Table 13-4. Other N’Ko Diacritic Usage

Character	Applied To	Represents
U+07EB NKO COMBINING SHORT HIGH TONE	SA	[s] or Arabic ص SAD
	GBA	[ʃ] or Arabic ش GHAIN
	KA	[q] or Arabic ق QAF
U+07ED NKO COMBINING SHORT RISING TONE	BA	[b ^h]
	TA	[t ^h] or Arabic ط TAH
	JA	[z] or Arabic ز ZAIN
	CA	[ð] or Arabic ذ THAL and also French [ʒ]
	DA	[d ^h] or Arabic ض ZAD
	RA	French [ʀ]
	SA	[ʃ] or Arabic ش SHEEN
	GBA	[g]
	FA	[v]
	KA	[ħ] or Arabic خ KHAH
	LA	[l ^h]
	MA	[m ^h]
	NYA	[n ^h]
HA	[h] or Arabic ح HAH	
YA	[y ^h]	
U+07F3 NKO COMBINING DOUBLE DOT ABOVE	A	[ʔa] or Arabic ع AIN + A
	EE	French [ə]
	U	French [y]
	JA	[z] or Arabic ظ ZAH
	DA	[d ^h]
	SA	[θ] or Arabic ث THEH
	GBA	[kp]

Ordinal Numbers. Diacritical marks are also used to mark ordinal numbers. The first ordinal is indicated by applying U+07ED NKO COMBINING SHORT RISING TONE (a dot above) to

U+07C1 NKO DIGIT ONE. All other ordinal numbers are indicated by applying U+07F2 NKO COMBINING NASALIZATION MARK (an oval dot below) to the last digit in any sequence of digits composing the number. Thus the nasalization mark under the digit two would indicate the ordinal value 2nd, while the nasalization mark under the final digit four in the numeral 144 would indicate the ordinal value 144th, as shown in *Figure 13-7*.

Figure 13-7. Examples of N’Ko Ordinals

ᵿ	1st
ᵿ̣	2nd
ᵿ̣̣	3rd
ᵿ̣̣ᵿ	144th

Punctuation. N’Ko uses a number of punctuation marks in common with other scripts. U+061F ARABIC QUESTION MARK, U+060C ARABIC COMMA, U+061B ARABIC SEMICOLON, and the paired U+FD3E ORNATE LEFT PARENTHESIS and U+FD3F ORNATE RIGHT PARENTHESIS are used, often with different shapes than are used in Arabic. A script-specific U+07F8 NKO COMMA and U+07F9 NKO EXCLAMATION MARK are encoded. The NKO COMMA differs in shape from the ARABIC COMMA, and the two are sometimes used distinctively in the same N’Ko text.

The character U+07F6 NKO SYMBOL OO DENNEN is used as an addition to phrases to indicate remote future placement of the topic under discussion. The decorative U+07F7 ᵿ NKO SYMBOL GBAKURUNEN represents the three stones that hold a cooking pot over the fire and is used to end major sections of text.

The two tonal apostrophes, U+07F4 NKO HIGH TONE APOSTROPHE and U+07F5 NKO LOW TONE APOSTROPHE, are used to show the elision of a vowel while preserving the tonal information of the syllable. Their glyph representations can vary in height relative to the baseline. N’Ko also uses a set of paired punctuation, U+2E1C LEFT LOW PARAPHRASE BRACKET and U+2E1D RIGHT LOW PARAPHRASE BRACKET, to indicate indirect quotations.

Character Names and Block Name. Although the traditional name of the N’Ko language and script includes an apostrophe, apostrophes are disallowed in Unicode character and block names. Because of this, the formal block name is “NKO” and the script portion of the Unicode character names is “NKO”.

Ordering. The order of N’Ko characters in the code charts reflects the traditional ordering of N’Ko. However, in collation, the three archaic letters U+07E8 NKO LETTER JONA JA, U+07E9 NKO LETTER JONA CHA, and U+07EA NKO LETTER JONA RA should be weighted as variants of U+07D6 NKO LETTER JA, U+07D7 NKO LETTER CHA, and U+07D9 NKO LETTER RA, respectively.

Rendering. N’Ko letters have shaping behavior similar to that of Arabic. Each letter can take one of four possible forms, as shown in *Table 13-5*.

Table 13-5. N’Ko Letter Shaping

Character	X _n	X _r	X _m	X _l
A	ⱱ	Ⱳ	ⱳ	ⱴ
EE	Ⱶ	ⱶ	ⱷ	ⱸ
I	ⱹ	ⱺ	ⱻ	ⱼ
E	ⱽ	Ȿ	Ɀ	Ɀ
U	Ɀ	Ɀ	Ɀ	Ɀ
OO	Ɀ	Ɀ	Ɀ	Ɀ
O	Ɀ	Ɀ	Ɀ	Ɀ
DAGBASINNA	Ɀ	Ɀ	Ɀ	Ɀ
N	Ɀ	Ɀ	Ɀ	Ɀ
BA	Ɀ	Ɀ	Ɀ	Ɀ
PA	Ɀ	Ɀ	Ɀ	Ɀ
TA	Ɀ	Ɀ	Ɀ	Ɀ
JA	Ɀ	Ɀ	Ɀ	Ɀ
CHA	Ɀ	Ɀ	Ɀ	Ɀ
DA	Ɀ	Ɀ	Ɀ	Ɀ
RA	Ɀ	Ɀ	Ɀ	Ɀ
RRA	Ɀ	Ɀ	Ɀ	Ɀ
SA	Ɀ	Ɀ	Ɀ	Ɀ
GBA	Ɀ	Ɀ	Ɀ	Ɀ
FA	Ɀ	Ɀ	Ɀ	Ɀ
KA	Ɀ	Ɀ	Ɀ	Ɀ
LA	Ɀ	Ɀ	Ɀ	Ɀ
NA WOLOSO	Ɀ	Ɀ	Ɀ	Ɀ
MA	Ɀ	Ɀ	Ɀ	Ɀ
NYA	Ɀ	Ɀ	Ɀ	Ɀ

Table 13-5. N’Ko Letter Shaping (Continued)

Character	X _n	X _r	X _m	X _l
NA	᠑	᠒	᠓	᠔
HA	᠕	᠖	᠗	᠘
WA	᠙	᠚	᠛	᠜
YA	᠝	᠞	᠟	ᠠ
NYA WOLOSO	ᠡ	ᠢ	ᠣ	ᠤ
JONA JA	ᠶ	ᠷ	ᠸ	ᠹ
JONA CHA	ᠺ	ᠻ	ᠼ	ᠽ
JONA RA	ᠾ	ᠿ	ᠰ	ᠱ

A noncursive style of N’Ko writing exists where no joining line is used between the letters in a word. This is a font convention, not a dynamic style like bold or italic, both of which are also valid dynamic styles for N’Ko. Noncursive fonts are mostly used as display fonts for the titles of books and articles. U+07FA NKO LAJANYALAN is sometimes used like U+0640 ARABIC TATWEEL to justify lines, although Latin-style justification where space is increased tends to be more common.

13.6 Cherokee

Cherokee: U+13A0–U+13FF

The Cherokee script is used to write the Cherokee language. Cherokee is a member of the Iroquoian language family. It is related to Cayuga, Seneca, Onondaga, Wyandot-Huron, Tuscarora, Oneida, and Mohawk. The relationship is not close because roughly 3,000 years ago the Cherokees migrated southeastward from the Great Lakes region of North America to what is now North Carolina, Tennessee, and Georgia. Cherokee is the native tongue of approximately 20,000 people, although most speakers today use it as a second language. The Cherokee word for both the language and the people is **ᏍᏏᏉ** *Tsalagi*.

The Cherokee syllabary, as invented by Sequoyah between 1815 and 1821, contained 6 vowels and 17 consonants. Sequoyah avoided copying from other alphabets, but his original letters were modified to make them easier to print. The first font for Cherokee was designed by Dr. Samuel A. Worcester. Using fonts available to him, he assigned a number of Latin letters to the Cherokee syllables. At this time the Cherokee letter “HV” was dropped, and the Cherokee syllabary reached its current size of 85 letters. Dr. Worcester’s press printed 13,980,000 pages of Native American-language text, most of it in Cherokee.

Tones. Each Cherokee syllable can be spoken on one of four pitch or tone levels, or can slide from one pitch to one or two others within the same syllable. However, only in certain words does the tone of a syllable change the meaning. Tones are unmarked.

Case and Spelling. The Cherokee script is caseless, although for purposes of emphasis occasionally one letter will be made larger than the others. Cherokee spelling is not standardized: each person spells as the word sounds to him or her.

Numbers. Although Sequoyah invented a Cherokee number system, it was not adopted and is not encoded here. The Cherokee Nation uses European numbers. Cherokee speakers pay careful attention to the use of ordinal and cardinal numbers. When speaking of a numbered series, they will use ordinals. For example, when numbering chapters in a book, Cherokee headings would use First Chapter, Second Chapter, and so on, instead of Chapter One, Chapter Two, and so on.

Rendering and Input. Cherokee is a left-to-right script, which requires no combining characters. Several keyboarding conventions exist for inputting Cherokee. Some involve dead-key input based on Latin transliterations; some are based on sound-mnemonics related to Latin letters on keyboards; and some are ergonomic systems based on frequency of the syllables in the Cherokee language.

Punctuation. Cherokee uses standard Latin punctuation.

Standards. There are no other encoding standards for Cherokee.

13.7 Canadian Aboriginal Syllabics

Canadian Aboriginal Syllabics: U+1400–U+167F

The characters in this block are a unification of various local syllabaries of Canada into a single repertoire based on character appearance. The syllabics were invented in the late 1830s by James Evans for Algonquian languages. As other communities and linguistic groups adopted the script, the main structural principles described in this section were adopted. The primary user community for this script consists of several aboriginal groups throughout Canada, including Algonquian, Inuktitut, and Athapascan language families. The script is also used by governmental agencies and in business, education, and media.

Organization. The repertoire is organized primarily on structural principles found in the CASEC [1994] report, and is essentially a glyphic encoding. The canonical structure of each character series consists of a consonant shape with five variants. Typically the shape points down when the consonant is combined with the vowel /e/, up when combined with the vowel /i/, right when combined with the vowel /o/, and left when combined with the vowel /a/. It is reduced and superscripted when in syllable-final position, not followed by a vowel. For example:

V	^	>	<	<
PE	PI	PO	PA	P

Some variations in vowels also occur. For example, in Inuktitut usage, the syllable U+1450 \supset CANADIAN SYLLABICS TO is transcribed into Latin letters as “TU” rather than “TO”, but the structure of the syllabary is generally the same regardless of language.

Arrangement. The arrangement of signs follows the Algonquian ordering (down-pointing, up-pointing, right-pointing, left-pointing), as in the previous example.

Sorted within each series are the variant forms for that series. Algonquian variants appear first, then Inuktitut variants, then Athapascan variants. This arrangement is convenient and consistent with the historical diffusion of Syllabics writing; it does not imply any hierarchy.

Some glyphs do not show the same down/up/right/left directions in the typical fashion—for example, beginning with U+146B \supset CANADIAN SYLLABICS KE. These glyphs are variations of the rule because of the shape of the basic glyph; they do not affect the convention.

Vowel length and labialization modify the character series through the addition of various marks (for example, U+143E \wedge CANADIAN SYLLABICS PWII). Such modified characters are considered unique syllables. They are not decomposed into base characters and one or more diacritics. Some language families have different conventions for placement of the modifying mark. For the sake of consistency and simplicity, and to support multiple North American languages in the same document, each of these variants is assigned a unique code point.

13.8 Deseret

Deseret: U+10400–U+1044F

Deseret is a phonemic alphabet devised to write the English language. It was originally developed in the 1850s by the regents of the University of Deseret, now the University of Utah. It was promoted by The Church of Jesus Christ of Latter-day Saints, also known as the “Mormon” or LDS Church, under Church President Brigham Young (1801–1877). The name *Deseret* is taken from a word in the Book of Mormon defined to mean “honeybee” and reflects the LDS use of the beehive as a symbol of cooperative industry. Most literature about the script treats the term *Deseret Alphabet* as a proper noun and capitalizes it as such.

Among the designers of the Deseret Alphabet was George D. Watt, who had been trained in shorthand and served as Brigham Young’s secretary. It is possible that, under Watt’s influence, Sir Isaac Pitman’s 1847 English Phonotypic Alphabet was used as the model for the Deseret Alphabet.

The Deseret Alphabet was a work in progress through most of the 1850s, with the set of letters and their shapes changing from time to time. The final version was used for the printed material of the late 1860s, but earlier versions are found in handwritten manuscripts.

The Church commissioned two typefaces and published four books using the Deseret Alphabet. The Church-owned *Deseret News* also published passages of scripture using the alphabet on occasion. In addition, some historical records, diaries, and other materials were handwritten using this script, and it had limited use on coins and signs. There is also one tombstone in Cedar City, Utah, written in the Deseret Alphabet. However, the script failed to gain wide acceptance and was not actively promoted after 1869. Today, the Deseret Alphabet remains of interest primarily to historians and hobbyists.

Letter Names and Shapes. Pedagogical materials produced by the LDS Church gave names to all of the non-vowel letters and indicated the vowel sounds with English examples. In the Unicode Standard, the spelling of the non-vowel letter names has been modified to clarify their pronunciations, and the vowels have been given names that emphasize the parallel structure of the two vowel runs.

The glyphs used in the Unicode Standard are derived from the second typeface commissioned by the LDS Church and represent the shapes most commonly encountered. Alternate glyphs are found in the first typeface and in some instructional material.

Structure. The final version of the script consists of 38 letters, LONG I through ENG. Two additional letters, OI and EW, found only in handwritten materials, are encoded after the first 38. The alphabet is bicameral; capital and small letters differ only in size and not in shape. The order of the letters is phonetic: letters for similar classes of sound are grouped together. In particular, most consonants come in unvoiced/voiced pairs. Forty-letter versions of the alphabet inserted OI after AY and EW after OW.

Sorting. The order of the letters in the Unicode Standard is the one used in all but one of the nineteenth-century descriptions of the alphabet. The exception is one in which the letters WU and YEE are inverted. The order YEE-WU follows the order of the “coalescents” in Pitman’s work; the order WU-YEE appears in a greater number of Deseret materials, however, and has been followed here.

Alphabetized material followed the standard order of the Deseret Alphabet in the code charts, except that the short and long vowel pairs are grouped together, in the order long vowel first, and then short vowel.

Typographic Conventions. The Deseret Alphabet is written from left to right. Punctuation, capitalization, and digits are the same as in English. All words are written phonemically with the exception of short words that have pronunciations equivalent to letter names, as shown in *Figure 13-8*.

Figure 13-8. Short Words Equivalent to Deseret Letter Names

- Ⓜ AY is written for *eye* or *I*
- Ⓨ YEE is written for *ye*
- ⓔ BEE is written for *be* or *bee*
- ⓐ GAY is written for *gay*
- Ⓣ THEE is written for *the* or *thee*

Phonetics. An approximate IPA transcription of the sounds represented by the Deseret Alphabet is shown in *Table 13-6*.

Table 13-6. IPA Transcription of Deseret

Ð	LONG I	ɪ:	ᄁ	BEE	b
ᄂ	LONG E	eɪ	ᄃ	TEE	t
ᄄ	LONG A	ɑ:	ᄅ	DEE	d
ᄆ	LONG AH	ɔ:	ᄇ	CHEE	tʃ
ᄈ	LONG O	o:	ᄉ	JEE	dʒ
ᄊ	LONG OO	u:	ᄋ	KAY	k
ᄌ	SHORT I	ɪ	ᄍ	GAY	g
ᄎ	SHORT E	ɛ	ᄏ	EF	f
ᄐ	SHORT A	æ	ᄑ	VEE	v
ᄒ	SHORT AH	ɔ	ᄓ	ETH	θ
ᄔ	SHORT O	ʌ	ᄕ	THEE	ð
ᄖ	SHORT OO	ʊ	ᄇ	ES	s
ᄘ	AY	aɪ	ᄉ	ZEE	z
ᄚ	OI	ɔɪ	ᄋ	ESH	ʃ
ᄜ	OW	aʊ	ᄍ	ZHEE	ʒ
ᄞ	EW	ju	ᄏ	ER	r
ᄠ	WU	w	ᄑ	EL	l
ᄢ	YEE	j	ᄓ	EM	m
ᄤ	H	h	ᄕ	EN	n
ᄦ	PEE	p	ᄇ	ENG	ŋ

13.9 Shavian

Shavian: U+10450–U+1047F

The playwright George Bernard Shaw (1856–1950) was an outspoken critic of the idiosyncrasies of English orthography. In his will, he directed that Britain's Public Trustee seek out and publish an alphabet of no fewer than 40 letters to provide for the phonetic spelling of English. The alphabet finally selected was designed by Kingsley Read and is variously

known as Shavian, Shaw's alphabet, and the Proposed British Alphabet. Also in accordance with Shaw's will, an edition of his play, *Androcles and the Lion*, was published and distributed to libraries, containing the text both in the standard Latin alphabet and in Shavian.

As with other attempts at spelling reform in English, the alphabet has met with little success. Nonetheless, it has its advocates and users. The normative version of Shavian is taken to be the version in *Androcles and the Lion*.

Structure. The alphabet consists of 48 letters and 1 punctuation mark. The letters have no case. The digits and other punctuation marks are the same as for the Latin script. The one additional punctuation mark is a "name mark," used to indicate proper nouns. U+00B7 MIDDLE DOT should be used to represent the "name mark." The letter names are intended to be indicative of their sounds; thus the sound /p/ is represented by U+10450 `SHAVIAN LETTER PEEP`.

The first 40 letters are divided into four groups of 10. The first 10 and second 10 are 180-degree rotations of one another; the letters of the third and fourth groups often show a similar relationship of shape.

The first 10 letters are tall letters, which ascend above the x-height and generally represent unvoiced consonants. The next 10 letters are "deep" letters, which descend below the baseline and generally represent voiced consonants. The next 20 are the vowels and liquids. Again, each of these letters usually has a close phonetic relationship to the letter in its matching set of 10.

The remaining 8 letters are technically ligatures, the first 6 involving vowels plus /r/. Because ligation is not optional, these 8 letters are included in the encoding.

Collation. The problem of collation is not addressed by the alphabet's designers.