Revised proposal to encode Book Pahlavi in Unicode

Anshuman Pandey

pandey@umich.edu
pandey.github.io/unicode

January 16, 2024

1   Introduction

This document supersedes the following:

- L2/18-276: "Preliminary proposal to encode Book Pahlavi in Unicode" (Pandey)
- L2/21-090: "Advancing the encoding model for Book Pahlavi letters" (Pandey)

It incorporates information presented in the following documents:

- L2/13-141: "Preliminary proposal to encode the Book Pahlavi script in [TUS]" (Pournader)
- L2/14-077R: "Proposal for Encoding Book Pahlavi in the Unicode Standard" (Meyers)
- L2/18-334: "A Critique of L2/18-276" (Meyers)
- L2/20-135: "Next Steps on Book Pahlavi" (Pournader & Hai)
- L2/20-141: "Response to 'Next Steps on Book Pahlavi' (L2/20-135)" (Zeini)
- L2/20-246: "Teeth and bellies: a proposed model for encoding Book Pahlavi" (Pournader)

This revision contains a revised character repertoire for Book Pahlavi that enables users to represent text as it appears in any given source.

2   The Script

The full repertoire for Book Pahlavi contains 25 letters, with Aramaic names as per scholarly convention:

aleph, heth	beth	gimel, daleth, yodh	curled gimel, daleth, yodh	old daleth	he	waw, ayin, nun, resh	zayin	kaph	old kaph	lamedh	stroked lamedh	looped lamedh

hooked lamedh	old lamedh	mem-qoph	hooked mem-qoph	old nun	samekh	Indian samekh	pe	sadhe	shin	curled shin	taw

It contains the following 3 atomic ligatures:

X_1	X_2	yh

The following 7 diacritic signs used for disambiguating specific values of merged letters:

dot above	dot below	two dots above	two dots below	three dots above	three dots below	hat above

Signs used for punctuation:

'otiose' sign	three dots	three circles

Primary numbers are written using the following forms, but there is a larger orthography for writing tens, compounds of tens and primary units, hundreds, and thousands:

1	2	3	4	5

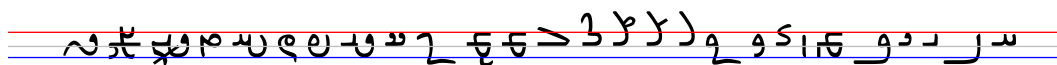| 6	7	8	9

Lastly, there is a convention for writing the name of Ahura Mazda's antagonist upside down:

ʾhlmn

2

2.1   Directionality

The script is written from right to left, with lines that advance from top to bottom. Letters are written along a baseline, which is not readily apparent, but may be identified as the bottom of ﺳ, ﺟ, ﺩ, ﺵ, ﺣ, ﺑ; the resting spot for the heads of ﻭ, ﻉ, ﻕ, ﺷ, ﻡ; the cross-bar of ﻑ and ﻒ.

The alignment of all letters with the baseline (gray) is shown below. The head-height is measured by the tops of these letters, while the below-base is determined by ﻭ, ﻉ, ﻡ, etc. The swash terminals of ﻝ, ﻑ run under the base, and in the case of ﻝ, the terminal extends beneath all letters that follow.
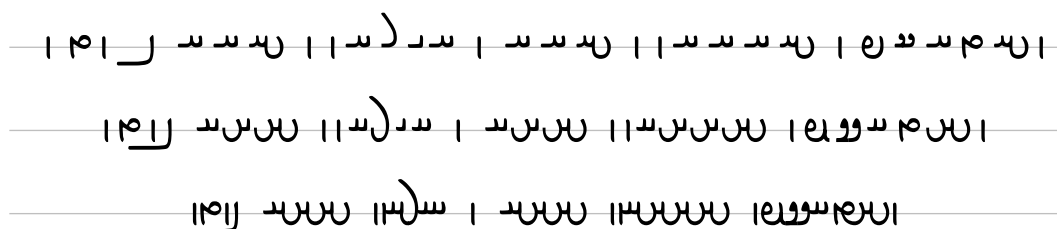

2.2   Joining behavior

Book Pahlavi is a cursive *abjad* script whose letters are dual-joining or right-joining:

During joining, a letter may be represented using a contextual or modified form, which is determined by its position within the string or by adjacent letters, and in many cases, by both. In the example below, the first line shows a string of independent letters, the second line shows the contextual forms of those letters when joining, and the third line shows the render forms of the letters:

<wšt⟩sp′ š⟩h⟩n′ š⟩h w ⟩yl⟩n′ š⟩h bwt′>
wištāsp šāhān šāh ud ērān šāh būd
Wištāsp was the king of kings and the king of the Iranians

As evident in the above, some letters have joining forms that may obscure their identity, especially when adjacent letters also have similar behaviors, ie. ﺳ *aleph-heth* and ﺷ *shin*. There are others letters that exhibit similar patterns. The following two tables show 1) the contextual forms of letters and 2) a classification of letters based on the complexity of their joining behavior. The lines highlighted red show the connection points for the positional forms of each letter.

Contextual forms of Book Pahlavi letters

		X_n	X_f	X_m	X_i
Minimal or no change in shape	beth	[glyph]	[glyph]	—	—
	old *daleth*	[glyph]	[glyph]	—	—
	kaph	[glyph]	[glyph], [glyph]	—	—
	old *kaph*	[glyph]	[glyph]	—	—
	hooked *lamedh*	[glyph]	[glyph]	[glyph]	[glyph]
	old *lamedh*	[glyph]	[glyph]	—	—
	old *nun*	[glyph]	—	—	—
	Indian *samekh*	[glyph]	[glyph]	[glyph]	[glyph]
	taw	[glyph]	[glyph]	—	—
	X_1	[glyph]	[glyph]	—	—
	X_2	[glyph]	[glyph]	—	—
	yodh-heth ligature	[glyph]	[glyph]	—	—
Height adjustments for below-base or baseline connections	*waw-nun-ayin-resh*	[glyph]	[glyph], [glyph], [glyph]	—	—
	zayin	[glyph]	[glyph], [glyph]	[glyph], [glyph], [glyph]	[glyph], [glyph], [glyph]
	lamedh	[glyph]	[glyph], [glyph]	[glyph], [glyph], [glyph]	[glyph], [glyph], [glyph]
	stroked *lamedh*	[glyph]	[glyph], [glyph]	[glyph], [glyph], [glyph]	[glyph], [glyph], [glyph]
	looped *lamedh*	[glyph]	[glyph], [glyph]	[glyph], [glyph], [glyph]	[glyph], [glyph], [glyph]
	samekh	[glyph]	[glyph], [glyph]	[glyph], [glyph], [glyph]	[glyph], [glyph]
Vertical positioning of body	*he*	[glyph]	[glyph], [glyph]	—	—
	mem-qoph	[glyph]	[glyph], [glyph]	[glyph], [glyph], [glyph]	[glyph], [glyph]
Stroke truncation or, no change	*pe*	[glyph]	[glyph], [glyph], [glyph]	—	—
	sadhe	[glyph]	[glyph], [glyph]	—	—
Descent of terminal	*aleph-heth*	[glyph]	[glyph]	[glyph], [glyph], [glyph]	[glyph], [glyph], [glyph]
	gimel-daleth-yodh	[glyph]	[glyph]	[glyph], [glyph]	[glyph], [glyph]
	curled *gimel-daleth-yodh*	[glyph]	[glyph]	[glyph], [glyph], [glyph]	[glyph], [glyph], [glyph]
	shin	[glyph]	[glyph]	[glyph], [glyph], [glyph]	[glyph], [glyph], [glyph]
	curled *shin*	[glyph]	[glyph]	[glyph], [glyph], [glyph]	[glyph], [glyph], [glyph]

Categorization of Book Pahlavi letters by joining complexity

		X_n	X_f	X_m	X_i
Simple letters	*beth*	⅃	⅃	—	—
	old *daleth*	و	و	—	—
	waw-nun-ayin-resh	۱	٤ , ٢ , ٦	—	—
	zayin	ک	ک , ک	ک- , ک , ک	ک- , ک , ک
	kaph	و	و , و	—	—
	old *kaph*	٢	٢	—	—
	lamedh	)	) , ٦	)- ,) , ٦	)- ,) , ٦
	stroked *lamedh*	⅄	⅄ , ⅄	⅄- , ⅄ , ⅄	⅄- , ⅄ , ⅄
	looped *lamedh*	⅄	⅄ , ⅄	⅄- , ⅄ , ⅄	⅄- , ⅄ , ⅄
	hooked *lamedh*	⅂	⅂	⅂	⅂
	old *lamedh*	⋗	⋗	—	—
	mem-qoph	⅌	⅌ , ⅌	⅌ , ⅌ , ⅌	⅌ , ⅌
	old *nun*	↳	—	—	—
	taw	⅁	⅁	—	—
	X_1	⅏	⅏	—	—
	X_2	ⅎ	ⅎ	—	—
	yodh-heth ligature	∿	∿	—	—
Complex letters	*aleph-heth*	⊥	⊥	ﺱ , ﻧ- , ⊥	⊥ , ﻧ , ﺱ
	gimel-daleth-yodh	⅃	⊥	⊥ , ﺭ-	⊥ , ﺭ
	curled *gimel-daleth-yodh*	ه	ٺ	ٺ , و , ٺ	ٺ , و , ٺ
	he	⅁	⅁ , ⅁	—	—
	samekh	ᴗ	ᴗ , ᴗ	ᴗ , ᴗ , ᴗ	ᴗ , ᴗ
	Indian *samekh*	ᴖ	ᴖ	ᴖ	ᴖ
	pe	ﻉ	ﻉ , ﻉ , ﻉ	—	—
	sadhe	ﻉ	ﻉ , ﻉ	—	—
	shin	ᴗ	ᴗ	ᴗ- , ᴗ- , ᴗ-	ᴗ- , ᴗ- , ᴗ-
	curled *shin*	ᴗ	ᴗ	ᴗ- , ᴗ- , ᴗ-	ᴗ- , ᴗ , ᴗ-

5

3   Complexities of the script

As shown in the tables, the joining behaviors of 'simple' letters generally preserve their graphical identities. The contextual forms are produced using minimal changes, such as vertical or horizontal elongation, or shortening of a stroke. Some letters in this category have notable contextual forms:

1. The l *waw-nun-ayin-resh* generally occurs as its regular form l, but in certain contexts it taken a height-reduced ι or curved ∟ form:

   - Typically after ᛒ *mem-qoph*, the l *waw-nun-ayin-resh* is shortened as ι to join with the left terminal of ᛒ; notice the height difference of the two instances of *waw-nun-ayin-resh* in ﺭᛒ <mwlw> *murv* 'bird'.

   - Numerous manuscripts exhibit a scribal preference for writing l *waw-nun-ayin-resh* using the curved form ∟ after ﻼ *aleph-heth* and ﺭ *daleth-gimel-yodh*, which is contrasted with the regular form, often within the same word, eg. ﺵﻟﺪﻉ <'ndlw'y> *andarway* 'interspace'; which is also be written ﺵﻟﺪﻉ without the stylized *waw-nun-ayin-resh*.

2. The ⟋ *zayin* is written as both ⟋ regular and ⟍ descending forms:

   - Before ﺭ *daleth-gimel-yodh*: The regular form ⟋ is used in ﻚ, as occurs in ﻮﻛﺪﻉ <pzdwk> *pazdok*. The descending form ⟍ occurs in ﺡﻭﺱ <zyd'n> *ziyān*, where its terminal connected to *daleth-gimel-yodh* from below the baseline. The forms of *zayin* in these contexts is unpredictable.

   - Before ﻉ *kaph*: A common Arameogram particle <ZK> *ān* is written as ﻚﺱ using a descending form of *zayin*.

3. The regular, stroked, looped forms of *lamedh* have regular ⟩, ⟩, ⟩ and descending ⟩, ⟩, ⟩ forms.

On the other hand, 'complex' letters exhibit several features that lead to potential ambigious representations and interpretations, if the reader is unfamiliar with the orthography and morphology.

1. Their independent forms may resemble sequences of other letters:

ﻼ	*aleph-heth*	ﺭ + ﺭ	*daleth-gimel-yodh* + *daleth-gimel-yodh*
ᛒ	*he*	ι + ᛒ	*mem-qoph* + height-adjusted *waw-nun-ayin-resh*
ﺱ	*samekh*	ﺭ + ﺭ	curled *daleth-gimel-yodh* + curled *daleth-gimel-yodh*
ﺱﻭ	Indian *samekh*	ﺭ + ﻭ	hooked curled *daleth-gimel-yodh* + *daleth-gimel-yodh*
ﻼﻭ	curled *shin*	ﻼ + ﻭ	hooked curled *daleth-gimel-yodh* + *aleph-heth*

2. Some letters have distinctive independent forms, but share the same final form. This is true for ﻭ *pe* and ﻉ *sadhe*, which may both be written as ﻉ when final, in additional to their regular shapes.

3. They have contextual forms that obscure their identities, especially when adjacent to other complex letters. Some example words containing adjacent complex letters:

ᴨ <'y> *ay* 'O!'; could be read as:
<ᴨ *aleph-heth*, � *daleth-gimel-yodh*>
<ᴵ *daleth-gimel-yodh*, ᴨ *aleph-heth*>

ᴨᴷᴳᴺ <'sm'n> *āsmān* 'sky'; the sequence ᴨᴗ could be read as
<ᴨ *aleph-heth*, ᴗ alternate *samekh*>
<ᴨ*aleph-heth*, ᴵ curled *daleth-gimel-yodh*, ᴵ *daleth-gimel-yodh*>

ᴨᴗᴼᴗᴨ <'pyckyh> *abēzagīh* 'purity'; the sequence ᴼᴗᴨ could be read as
<ᴨ *aleph-heth*, ᴼ *pe*, ᴵ curled *daleth-gimel-yodh*, ᴼ *pe*>
<ᴨ *aleph-heth*, ᴗ *sadhe*, ᴵ curled *daleth-gimel-yodh*, ᴗ *sadhe*>
<ᴨ *aleph-heth*, ᴼ *pe*, ᴵ curled *daleth-gimel-yodh*, ᴗ *sadhe*
<ᴨ *aleph-heth*, ᴗ *sadhe*, ᴵ curled *daleth-gimel-yodh*, ᴼ *pe*>

ᴨᴼᴗᴵᴾ <drwyst> *drust* 'healthy'; the sequence ᴨᴗ could be interpreted as
<ᴵ curled *daleth-gimel-yodh*, ᴨ *samekh*>
<ᴨ *samekh*, ᴵ curled *daleth-gimel-yodh*>
<ᴵ curled *daleth-gimel-yodh*, ᴵ curled *daleth-gimel-yodh*, ᴵ curled *daleth-gimel-yodh*>

ᴨᴗᴗᴗ <g'h'n> *gāhān* 'the Gathas'; the sequence ᴨᴗᴗᴗ could be read as
<ᴗ alternate *samekh*, ᴗ *shin*, ᴨ *aleph-heth*>
<ᴵ curled *daleth-gimel-yodh*, ᴵ *daleth-gimel-yodh*, ᴗ *shin*, ᴨ *aleph-heth*>
<ᴵ curled *daleth-gimel-yodh*, ᴨ *aleph-heth*, ᴵ *daleth-gimel-yodh*, ᴗ *shin*>

4. While there are typical joining patterns for complex letters, there are several irregular patterns:

- The sequence ᴨ *aleph-heth* + ᴵ *daleth-gimel-yodh* typically takes the form ᴗ, eg. ᴼᴵᴗ <'dwk> *ēk* 'one'. But, in several words the letters connect without contextual forms, eg. ᴨ, as in ᴨ <'YK> *kū* 'where?, thus'. When this sequence is followed by *kaph*, the form ᴨ may change to ᴗ, where the *daleth-gimel-yodh* descends before connecting, as in ᴼᴗᴗ <p'dk> *pādak* (see below for more information on the shaping of *daleth-gimel-yodh* before *kaph*.

- The sequence *gimel-daleth-yodh* + *aleph-heth* ᴗ may be represented as a ligature ᴗ at the end of words.

- The sequence ᴵ *daleth-gimel-yodh* + ᴵ *daleth-gimel-yodh* is used for representing *zd* in preserved spellings. In such cases, the sequence is written as ᴨ, which resembles *aleph-heth*. One important word is ᴨᴳᴨᴾ <'whrmzd> *ohurmazd* 'Ahura Mazda', where final *zd* is written ᴨ, which is the independent or final form of *aleph-heth*. The sequence ᴨ is represented as ᴗ using the ᴵ descending form of *daleth-gimel-yodh*, when connecting before letters at the baseline, eg. ᴨᴗᴷ <zyd'n> *ziyān*.

- The sequence ᴵ *daleth-gimel-yodh* + ᴼ *kaph* has unpredictable representations. The *daleth-gimel-yodh* may be written using both ᴵ regular and ᴵ tall forms. The tall form connects at the baseline to *kaph*, as in ᴼᴗᴗᴗᴗ <'p'dšnyk> *abāyišnīg* 'pleasing, attractive'; ᴗᴗ١ <n'ylyk> *nāyrīg* 'adult woman'; ᴼᴗ <kdk> *kayak*. But, also with its regular shape ᴵ: ᴼᴵᴵᴾᴼᴼ <YKTYBWN-tn> *nipistan*;

ﺍﺳﻮﺳﺍ <wsyk'l> *vasīkār*; ﯡﯙ <kdkw't> *kai-kavar*. The usage of the ◡ regular and ﺝ tall forms is not entirely contextual, that is, it is not based on letters that precede *daleth-gimel-yodh*, but a preservation of spelling conventions. Moreover, this variation attested in words, such as <nzdyk> *nazdīk* 'near', which has the contrastive forms ﺍﻛﺮﻭ and ﺍﻛﺴﻮ in the sources.

- The letter ﻉ *pe* occurs in medial and final positions using both its ﻉ regular and ﻉ half forms, of which the latter is also used for medial and final ﻕ *sadhe*. The medial forms of *pe* are not predictable:

  – After ﺏ *aleph-heth*: regular: ﺱﻉﻣﻭﻟﻭﺪ <'pylwcglyh> *a-peroz-gareh*; half: ﻉﺵ <'p'c> *apac*

  – After ◡curled *daleth-gimel-yodh*: regular: ﻉﺵ <dpl> *davr*, ﯡﺳﺍ <dyp'hl> *depahr*; half: ﺍﻉﺵ <dpywr> *dipivar*

  – After ﺝ *lamedh*: regular: ﺱﻉﻣ <hylpt> *herpat*; half: ﻉﻟﻉ <gndlp> *Gandarv*

  – After ﺵ *samekh*: regular: ﯡﺵﻉ <sp's> *spas*; half: ﯡﺵﻉﺵ <spyn'y> *spenai*

4   Approach to the Encoding Model

Despite the fact that Book Pahlavi has rules that govern the joining behavior of its letters, it has several irregularities, as shown in the previous section, which present complications for defining a practical character-encoding model in Unicode. For this reason, a typical palaeographic or purely graphemic approach is not ideal. Instead, a hybrid model is needed. The goal of the proposed encoding model is to enable a user to represent Book Pahlavi in digital plain text as it appears in written and printed sources, using a repertoire that is graphically congruent with Book Pahlavi shapes. I propose a model based upon the following principles in order to achieve this:

- Book Pahlavi is a right-to-left (RTL) cursive joining script, and requires a an encoding model that supports this feature, along with a repertoire that provides the characters needed for such a model.

- A letter of the script that is clearly distinctive and cannot be confused with another letter or a sequence of other letters is to be encoded as an atomic character. This applies to:

ﺟ	*beth*	ﻝ	*lamedh*	ﻉ	hooked *mem-qoph*
ﺟ	old *daleth*	ﻱ	stroked *lamedh*	ﺏ	old *nun*
ﺍ	*waw-nun-ayin-resh*	ﻱ	looped *lamedh*	ﻕ	*sadhe*
ﺱ	*zayin*	ﻝ	hooked *lamedh*	ﻣ	*taw*
ﻭ	*kaph*	ﺩ	old *lamedh*		
ﺏ	old *kaph*	ﻉ	*mem-qoph*		

• A letter whose shape resembles the rendered sequence of multiple letters is not to be encoded as an atomic character. Instead it is to be represented using a sequence of letter-like elements, or 'primitives'. These letters are:

  �承 *aleph-heth*   ℧ Indian *samekh*   ℧ curled *shin*

  ᚼ *he*   ꙫ *pe*

  ᴣ *samekh*   ℧ *shin*

• The above seven letters, as well as their contextual forms, are to be constructed using the following set of 'primitives':

  � tooth   ᴣ curled tooth   ℧ belly

  ᴣ descending tooth   ᴣ descending curled tooth   ℧ curled belly

As well as the half-form:

  ℯ final *pe-sadhe*

The 'descending' tooth characters ᴣ and ᴣ are differentiated from the belly characters ℧ and ℧ on account of their shape. For example, if a user needed to represent ꙫ, they would select <ᴣ, ℯ>. It would not be appropriate to treat ᴣ as a contextual form of ℧, and to represent ꙫ using <℧, ℯ>. Similarly, for representing the form ᴣᴣ, which might represent a descending *samekh* or a sequence of two *gimel-daleth-yodh* at word-final position, a user would expect to type <ᴣ, ᴣ> and not <℧, ℧>. Burdening the belly with different forms in different contexts would prevent users from representing in plain text the written text. It would also require substitutions and additional rules for shaping in the font.

The descriptor 'descending' for ᴣ and ᴣ has been selected based on the interpretation that they are forms of ᴙ and ᴣ with descending baselines. From an alternate interpretation, the 'descending tooth' and 'descending curled tooth' could be considered 'half' belly and 'half curled' belly, being truncated forms of ℧ belly and ℧ curled belly.

• Descending or 'belly' forms of a letter that are used for enabling connections with different letters are included as separate characters. These may be scribal preferences, and usage may vary across the sources, but defining distinctive characters to account for the variations permits simple representation of text. This applies to the letters *zayin*, *lamedh*, stroked *lamedh*, looped *lamedh*:

  ʂ descending *zayin*   ʏ descending stroked *lamedh*

  ʂ *zayin* belly   ʏ stroked *lamedh* belly

  ʅ descending *lamedh*   ʏ descending looped *lamedh*

  ʅ *lamedh* belly   ʏ looped *lamedh* belly

- Additional contextual forms are provided for *waw-nun-ayin-resh*:

    ı short *waw-nun-ayin-resh*   ↳ curved *waw-nun-ayin-resh*

- Atomic ligatures are encoded as independent characters. This applies to the following:

    ꭕ X_1 ∿ *yodh-heth*   ⴹᴙ turned *ahriman*

    ꭎ X_1

Applying the above encoding model to the Book Pahlavi provides a repertoire that is not heavily reliant on a complex shaping engine. Instead, it provides characters that enable a user to represent text as it appears in Book Pahlavi materials, from manuscripts to printed books.

Accordingly, in order to represent the phrase shown at the beginning of this document:

<div align="center">

١٥٠ܠ ܡܡܡ ܢܢ ١ܢ\ܠ ١ ܡܡܡ ܢܢ ١ܡܡܡܡܡ ١ܘܘܡܠܡܠ

wištāsp šāhān šāh ud ērān šāh būd

</div>

The following sequence of characters would be used, where ⸢SP⸣ is the common U+0020 SPACE:

<div align="center">

⸢SP⸣ ١ ⸢SP⸣ ┘ ┘ ∪ ┘ ∪ ┘ ∪ ⸢SP⸣ ١١ ┘ ┘ ∪ ┘ ∪ ┘ ∪ ┘ ∪ ⸢SP⸣ ١ ℮ ﺝ ﻭ ﻭ ┘ ┘ ﺭ ∪ ┘ ∪١

١٥١ ┘ ⸢SP⸣ ┘ ┘ ∪ ┘ ∪ ┘ ∪ ⸢SP⸣ ١١ ┘ ┘) ┘ ┘ ┘

</div>

As is evident in the above, the proposed encoding model enables a user to represent Book Pahlavi text simply by inspecting any given text and selecting the distinctive characters that correspond to the visual interpretation.

5 Proposed Repertoire

A practical Unicode repertoire for Book Pahlavi consists of the 45 characters shown in the table below, with column names providing the following information:

- J: the joining behavior of a letter: dual-joining (D), right-joining (R), non-joining (N):
- X_n: the independent form of the letter
- X_f: the form a letter takes in final position
- X_m: the form a letter takes in medial position
- X_i: the form a letter takes in initial position

The table also provides the proposed names for the Unicode characters. Character, line-breaking, and bi-directional properties are specified in § 7, and a code chart follows p. 18 here.

Primitives (6)	J	X$_n$	X$_f$	X$_m$	X$_i$
BOOK PAHLAVI TOOTH	D	ـ	ـﹲ	ﹲ	ـ
BOOK PAHLAVI DESCENDING TOOTH	D	ﺭ	ﺭ, ﻝ	ﺭ, ﻝ	ﺭ
BOOK PAHLAVI CURLED TOOTH	D	ﺩ	ﺩ	ﺩ	ﺩ
BOOK PAHLAVI DESCENDING CURLED TOOTH	D	ﺭ	ﺭ, ﻝ	ﺭ, ﻝ	ﺭ
BOOK PAHLAVI BELLY	D	ﻭ	ﻭ	ﻭ,	ﻭ,
BOOK PAHLAVI CURLED BELLY	D	ﻭ	ﻭ	ﻭ	ﻭ

Letters (26)	J	X$_n$	X$_f$	X$_m$	X$_i$
BOOK PAHLAVI LETTER BETH	R	ﻝ	ﻝ	—	—
BOOK PAHLAVI LETTER OLD DALETH	R	ﻭ	ﻭ	—	—
BOOK PAHLAVI LETTER WAW-NUN-AYIN-RESH	R	١	ﺡ	—	—
BOOK PAHLAVI LETTER SHORT WAW-NUN-AYIN-RESH	R	١	ﺡ	—	—
BOOK PAHLAVI LETTER CURVED WAW-NUN-AYIN-RESH	R	ﻝ	ﺡ	—	—
BOOK PAHLAVI LETTER ZAYIN	D	ﺱ	ﺱ	ﺱ	ﺱ
BOOK PAHLAVI LETTER DESCENDING ZAYIN	D	ﺱ	ﺱ	ﺱ	ﺱ
BOOK PAHLAVI LETTER ZAYIN WITH BELLY	D	ﺱ	ﺱ	ﺱ	ﺱ
BOOK PAHLAVI LETTER KAPH	R	ﻭ	ﻭ, ﻭ	—	—
BOOK PAHLAVI LETTER OLD KAPH	R	ﻉ	ﻉ	—	—
BOOK PAHLAVI LETTER LAMEDH	D	ﻝ	ﻝ	ﻝ	ﻝ
BOOK PAHLAVI LETTER DESCENDING LAMEDH	D	ﻝ	ﻝ	ﻝ	ﻝ
BOOK PAHLAVI LETTER LAMEDH BELLY	D	ﻝ	ﻝ	ﻝ	ﻝ
BOOK PAHLAVI LETTER STROKED LAMEDH	D	ﻝ	ﻝ	ﻝ	ﻝ
BOOK PAHLAVI LETTER DESCENDING STROKED LAMEDH	D	ﻝ	ﻝ	ﻝ	ﻝ
BOOK PAHLAVI LETTER STROKED LAMEDH BELLY	D	ﻝ	ﻝ	ﻝ	ﻝ
BOOK PAHLAVI LETTER LOOPED LAMEDH	D	ﻝ	ﻝ	ﻝ	ﻝ
BOOK PAHLAVI LETTER DESCENDING LOOPED LAMEDH	D	ﻝ	ﻝ	ﻝ	ﻝ
BOOK PAHLAVI LETTER LOOPED LAMEDH BELLY	D	ﻝ	ﻝ	ﻝ	ﻝ
BOOK PAHLAVI LETTER HOOKED LAMEDH	R	ﻝ	ﻝ	ﻝ	ﻝ

BOOK PAHLAVI LETTER OLD LAMEDH	R	⟩	⟩	—	—
BOOK PAHLAVI LETTER MEM-QOPH	D	𝟼	ϭ , ϭ	ϭ , ϭ , ϭ	ϭ , ϭ
BOOK PAHLAVI LETTER HOOKED MEM-QOPH	D	ϭ	—	—	—
BOOK PAHLAVI LETTER OLD NUN	N	ר	—	—	—
BOOK PAHLAVI FINAL PE-SADHE	R	ℓ	ℓ	—	—
BOOK PAHLAVI LETTER SADHE	R	ℓ	—	—	—
BOOK PAHLAVI LETTER TAW	R	℮	℮	—	—

Atomic Ligatures (4)	J	X_n	X_f	X_m	X_i
BOOK PAHLAVI LIGATURE X1	R	𝕏	𝕏	—	—
BOOK PAHLAVI LIGATURE X2	R	𝕩	𝕩	—	—
BOOK PAHLAVI LIGATURE YODH-HETH	R	∿	∿	—	—
BOOK PAHLAVI TURNED AHRIMAN	N	ﻤﮬﺍ	—	—	—

Combining Signs (7)	
BOOK PAHLAVI COMBINING DOT ABOVE	◌̇
BOOK PAHLAVI COMBINING DOT BELOW	◌̣
BOOK PAHLAVI COMBINING TWO DOTS ABOVE	◌̈
BOOK PAHLAVI COMBINING TWO DOTS BELOW	◌̤
BOOK PAHLAVI COMBINING THREE DOTS ABOVE	◌̈̇
BOOK PAHLAVI COMBINING THREE DOTS BELOW	◌̣̈
BOOK PAHLAVI COMBINING HAT ABOVE	◌̂

Number (1)	J	X_n	X_f	X_m	X_i
BOOK PAHLAVI NUMBER ONE	R	ﺭ	ﺭ	—	—

Punctuation (2)	
BOOK PAHLAVI PUNCTUATION THREE DOTS	∵
BOOK PAHLAVI PUNCTUATION THREE CIRCLES	⁙

6 Encoded Representations

6.1 Palaeographical letters

Notably absent from the proposed Unicode repertoire are the following letters of Book Pahlavi. Given the fact that they resemble sequences of contextual forms of letters, they are not independently encoded. They are to be represented as sequences using the characters specified:

palaeographical letter	shape	character sequence
aleph-heth	ـﯨ	<ﺑ TOOTH, ﺑ TOOTH>
daleth-gimel-yodh	ﺑ	<ﺑ TOOTH>
curled *daleth-gimel-yodh*	ﺩ	<ﺩ CURLED TOOTH>
he	ﻟﻮ	<ﻟ MEM-QOPH, ι SHORT WAW-NUN-AYIN-RESH>
samekh	ﺩﺩ	<ﺩ CURLED TOOTH, ﺩ CURLED TOOTH>
Indian *samekh*	ﻟﻮ	<ﻟ CURLED BELLY, ﺑ TOOTH>
shin	ﻟﻮ	<ﻟ BELLY, ﺑ TOOTH, ﺑ TOOTH>
curled *shin*	ﻟﻮ	<ﻟ CURLED BELLY, ﺑ TOOTH, ﺑ TOOTH>
pe	ﻟﻮ	<ﻟ DESCENDING TOOTH, ﻉ FINAL PE-SADHE>

Contextual forms for complex letters are to be composed in a similar manner:

contextual form	shape	character sequence
descending *aleph-heth*	ﺑﺮ	<ﺑ TOOTH, ﺟ DESCENDING TOOTH>
aleph-heth belly	ﻟﻮ	<ﺑ TOOTH, ﻟ BELLY>
descending *gimel-daleth-yodh*	ﺟ	<ﺟ DESCENDING TOOTH>
descending curled *gimel-daleth-yodh*	ﺩ	<ﺩ DESCENDING CURLED TOOTH>
descending *samekh*	ﺩﺩ	<ﺩ DESCENDING CURLED TOOTH, ﺩ DESCENDING CURLED TOOTH>
descending *shin*	ﻟﻮ	<ﻟ BELLY, ﺑ TOOTH, ﺟ DESCENDING TOOTH>
shin belly	ﻟﻮ	<ﻟ BELLY, ﺑ TOOTH, ﻟ BELLY>
curled *shin* belly	ﻟﻮ	<ﻟ CURLED BELLY, ﺑ TOOTH, ﻟ BELLY>

6.2 Numbers

Book Pahlavi numbers may be represented using characters in the proposed repertoire. If there is a require-ment to preserve the numeric values of numbers, then these would need to be encoded as atomic characters.

The primary units are to be represented as follows:

1   ر   <ر ONE>

2   بر   <ب TOOTH, ر ONE>

3   سر   <ب TOOTH, ب TOOTH, ر ONE>

4   سر   <ب TOOTH, ب TOOTH, ب TOOTH, ر ONE>

5   سربر   <ب TOOTH, ب TOOTH, ر ONE, ب TOOTH, ر ONE>

6   سربر   <ب TOOTH, ب TOOTH, ر ONE, ب TOOTH, ب TOOTH, ر ONE>

7   سربر   <ب TOOTH, ب TOOTH, ب TOOTH, ر ONE, ب TOOTH, ب TOOTH, ر ONE>

8   سربسر   <ب TOOTH, ب TOOTH, ب TOOTH, ر ONE, ب TOOTH, ب TOOTH, ب TOOTH, ر ONE>

9   سربسر   <ب TOOTH, ب TOOTH, ر ONE, ب TOOTH, ب TOOTH, ر ONE, ب TOOTH, ب TOOTH, ر ONE>

Ten through nineteen are represented as follows:

10   و   <و OLD DALETH>

11   ونر   <ن CURLED BELLY, ر ONE>

12   ونر   <ن CURLED BELLY, ب TOOTH, ر ONE>

13   ونسر   <ن CURLED BELLY, ب TOOTH, ب TOOTH, ر ONE>

14   ونسر   <ن CURLED BELLY, ب TOOTH, ب TOOTH, ب TOOTH, ر ONE>

15   ونسربر   <ن CURLED BELLY, ب TOOTH, ب TOOTH, ر ONE, ب TOOTH, ر ONE>

16   ونسربر   <ن CURLED BELLY, ب TOOTH, ب TOOTH, ر ONE, ب TOOTH, ب TOOTH, ر ONE>

17   ونسربسر   <ن CURLED BELLY, ب TOOTH, ب TOOTH, ب TOOTH, ر ONE, ب TOOTH, ب TOOTH, ر ONE>

18   ونسربسر   <ن CURLED BELLY, ب TOOTH, ب TOOTH, ب TOOTH, ر ONE,
                ب TOOTH, ب TOOTH, ب TOOTH, ر ONE>

19   ونسربسر   <ن CURLED BELLY, ب TOOTH, ب TOOTH, ر ONE, ب TOOTH, ب TOOTH, ر ONE,
                ب TOOTH, ب TOOTH, ر ONE>

Twenty through ninety are expressed as follows:

20   ل   <ل LAMEDH>

30   لو   <ل LAMEDH, و DESCENDING CURLED TOOTH>

40   ں   <ں CURLED BELLY, ٮ TOOTH>

50   ںو   <ں CURLED BELLY, ٮ TOOTH, و DESCENDING CURLED TOOTH>

60   وں   <و DESCENDING CURLED TOOTH, ں CURLED BELLY, ٮ TOOTH>

70   وںو   <و DESCENDING CURLED TOOTH, ں CURLED BELLY, ٮ TOOTH,
و DESCENDING CURLED TOOTH>

80   ووں   <و DESCENDING CURLED TOOTH, و DESCENDING CURLED TOOTH,
ں CURLED BELLY, ٮ TOOTH>

90   ووںو   <و DESCENDING CURLED TOOTH, و DESCENDING CURLED TOOTH, ں CURLED BELLY,
ٮ TOOTH, و DESCENDING CURLED TOOTH>

The hundreds are represented as follows:

100   لى   <ل LAMEDH, ى ZAYIN BELLY>

100   ىلى   <ٮ TOOTH, ل LAMEDH, ى ZAYIN BELLY>

200   سلى   <ٮ TOOTH, ٮ TOOTH, ل LAMEDH, ى ZAYIN BELLY>

300   سلى   <ٮ TOOTH, ٮ TOOTH, ٮ TOOTH, ل LAMEDH, ى ZAYIN BELLY>

800   سرسلى   <ٮ TOOTH, ٮ TOOTH, ٮ TOOTH, ر ONE,
ٮ TOOTH, ٮ TOOTH, ٮ TOOTH, ٮ TOOTH, ل LAMEDH, ى ZAYIN BELLY>

900   سرسرسلى   <ٮ TOOTH, ٮ TOOTH, ر ONE,
ٮ TOOTH, ٮ TOOTH, ر ONE,
ٮ TOOTH, ٮ TOOTH, ٮ TOOTH, ل LAMEDH, ى ZAYIN BELLY>

Thousands are expressed as:

1000   لو   <ل LAMEDH, و FINAL OLD KAPH>

1000   ىلو   <ٮ TOOTH, ل LAMEDH, و FINAL OLD KAPH>

2000   سلو   <ٮ TOOTH, ٮ TOOTH, ل LAMEDH, و FINAL OLD KAPH>

7 Character Data

Character Properties: UnicodeData.txt

```
10BB0;BOOK PAHLAVI LETTER TOOTH;Lo;0;R;;;;;N;;;;;
10BB1;BOOK PAHLAVI LETTER DESCENDING TOOTH;Lo;0;R;;;;;N;;;;;
10BB2;BOOK PAHLAVI LETTER CURLED TOOTH;Lo;0;R;;;;;N;;;;;
10BB3;BOOK PAHLAVI LETTER DESCENDING CURLED TOOTH;Lo;0;R;;;;;N;;;;;
10BB4;BOOK PAHLAVI LETTER BELLY;Lo;0;R;;;;;N;;;;;
10BB5;BOOK PAHLAVI LETTER CURLED BELLY;Lo;0;R;;;;;N;;;;;
10BB6;BOOK PAHLAVI LETTER BETH;Lo;0;R;;;;;N;;;;;
10BB7;BOOK PAHLAVI LETTER OLD DALETH;Lo;0;R;;;;;N;;;;;
10BB8;BOOK PAHLAVI LETTER WAW-NUN-AYIN-RESH;Lo;0;R;;;;;N;;;;;
10BB9;BOOK PAHLAVI LETTER SHORT WAW-NUN-AYIN-RESH;Lo;0;R;;;;;N;;;;;
10BBA;BOOK PAHLAVI LETTER CURVED WAW-NUN-AYIN-RESH;Lo;0;R;;;;;N;;;;;
10BBB;BOOK PAHLAVI LETTER ZAYIN;Lo;0;R;;;;;N;;;;;
10BBC;BOOK PAHLAVI LETTER DESCENDING ZAYIN;Lo;0;R;;;;;N;;;;;
10BBD;BOOK PAHLAVI LETTER ZAYIN BELLY;Lo;0;R;;;;;N;;;;;
10BBE;BOOK PAHLAVI LETTER KAPH;Lo;0;R;;;;;N;;;;;
10BBF;BOOK PAHLAVI LETTER OLD KAPH;Lo;0;R;;;;;N;;;;;
10BC0;BOOK PAHLAVI LETTER LAMEDH;Lo;0;R;;;;;N;;;;;
10BC1;BOOK PAHLAVI LETTER DESCENDING LAMEDH;Lo;0;R;;;;;N;;;;;
10BC2;BOOK PAHLAVI LETTER LAMEDH BELLY;Lo;0;R;;;;;N;;;;;
10BC3;BOOK PAHLAVI LETTER STROKED LAMEDH;Lo;0;R;;;;;N;;;;;
10BC4;BOOK PAHLAVI LETTER DESCENDING STROKED LAMEDH;Lo;0;R;;;;;N;;;;;
10BC5;BOOK PAHLAVI LETTER STROKED LAMEDH BELLY;Lo;0;R;;;;;N;;;;;
10BC6;BOOK PAHLAVI LETTER LOOPED LAMEDH;Lo;0;R;;;;;N;;;;;
10BC7;BOOK PAHLAVI LETTER DESCENDING LOOPED LAMEDH;Lo;0;R;;;;;N;;;;;
10BC8;BOOK PAHLAVI LETTER LOOPED LAMEDH BELLY;Lo;0;R;;;;;N;;;;;
10BC9;BOOK PAHLAVI LETTER HOOKED LAMEDH;Lo;0;R;;;;;N;;;;;
10BCA;BOOK PAHLAVI LETTER OLD LAMEDH;Lo;0;R;;;;;N;;;;;
10BCB;BOOK PAHLAVI LETTER MEM-QOPH;Lo;0;R;;;;;N;;;;;
10BCC;BOOK PAHLAVI LETTER HOOKED MEM-QOPH;Lo;0;R;;;;;N;;;;;
10BCD;BOOK PAHLAVI LETTER OLD NUN;Lo;0;R;;;;;N;;;;;
10BCE;BOOK PAHLAVI LETTER FINAL PE-SADHE;Lo;0;R;;;;;N;;;;;
10BCF;BOOK PAHLAVI LETTER SADHE;Lo;0;R;;;;;N;;;;;
10BD0;BOOK PAHLAVI LETTER TAW;Lo;0;R;;;;;N;;;;;
10BD1;BOOK PAHLAVI LETTER LIGATURE X1;Lo;0;R;;;;;N;;;;;
10BD2;BOOK PAHLAVI LETTER LIGATURE X2;Lo;0;R;;;;;N;;;;;
10BD3;BOOK PAHLAVI LETTER LIGATURE YODH-HETH;Lo;0;R;;;;;N;;;;;
10BD4;BOOK PAHLAVI LETTER LIGATURE TURNED AHRIMAN;Lo;0;R;;;;;N;;;;;
10BD5;BOOK PAHLAVI COMBINING DOT ABOVE;Mn;230;NSM;;;;;N;;;;;
10BD6;BOOK PAHLAVI COMBINING DOT BELOW;Mn;220;NSM;;;;;N;;;;;
10BD7;BOOK PAHLAVI COMBINING TWO DOTS ABOVE;Mn;230;NSM;;;;;N;;;;;
10BD8;BOOK PAHLAVI COMBINING TWO DOTS BELOW;Mn;220;NSM;;;;;N;;;;;
10BD9;BOOK PAHLAVI COMBINING THREE DOTS ABOVE;Mn;230;NSM;;;;;N;;;;;
10BDA;BOOK PAHLAVI COMBINING THREE DOTS BELOW;Mn;220;NSM;;;;;N;;;;;
10BDB;BOOK PAHLAVI COMBINING HAT ABOVE;Mn;230;NSM;;;;;N;;;;;
10BDC;BOOK PAHLAVI NUMBER ONE;No;0;R;;;;;N;;;;;
10BDD;BOOK PAHLAVI PUNCTUATION THREE DOTS;Po;0;AL;;;;;N;;;;;
10BDE;BOOK PAHLAVI PUNCTUATION THREE CIRCLES;Po;0;AL;;;;;N;;;;;
```

Linebreaking Properties: LineBreak.txt

```
10BB0..10BD4;AL   # Lo  [37] BOOK PAHLAVI TOOTH..BOOK PAHLAVI LIGATURE TURNED AHRIMAN
10BD5..10BDB;AL   # Cm  [7]  BOOK PAHLAVI COMBINING DOT ABOVE..BOOK PAHLAVI COMBINING HAT ABOVE
10BDC;AL          # No       BOOK PAHLAVI NUMBER ONE
10BDD..10BDE;AL   # Po  [3]  BOOK PAHLAVI PUNCTUATION THREE DOTS..BOOK PAHLAVI PUNCTUATION THREE CIRCLES
```

Arabic Shaping Properties: `ArabicShaping.txt`

```
10BB0; BOOK PAHLAVI TOOTH; D; No_Joining_Group
10BB1; BOOK PAHLAVI DESCENDING TOOTH; D; No_Joining_Group
10BB2; BOOK PAHLAVI CURLED TOOTH; D; No_Joining_Group
10BB3; BOOK PAHLAVI DESCENDING CURLED TOOTH; D; No_Joining_Group
10BB4; BOOK PAHLAVI BELLY; D; No_Joining_Group
10BB5; BOOK PAHLAVI CURLED BELLY; D; No_Joining_Group
10BB6; BOOK PAHLAVI BETH; R; No_Joining_Group
10BB7; BOOK PAHLAVI OLD DALETH; R; No_Joining_Group
10BB8; BOOK PAHLAVI WAW-NUN-AYIN-RESH; R; No_Joining_Group
10BB9; BOOK PAHLAVI SHORT WAW-NUN-AYIN-RESH; R; No_Joining_Group
10BBA; BOOK PAHLAVI CURVED WAW-NUN-AYIN-RESH; R; No_Joining_Group
10BBB; BOOK PAHLAVI ZAYIN; D; No_Joining_Group
10BBC; BOOK PAHLAVI DESCENDING ZAYIN; D; No_Joining_Group
10BBD; BOOK PAHLAVI ZAYIN BELLY; D; No_Joining_Group
10BBE; BOOK PAHLAVI KAPH; R; No_Joining_Group
10BBF; BOOK PAHLAVI OLD KAPH; R; No_Joining_Group
10BC0; BOOK PAHLAVI LAMEDH; D; No_Joining_Group
10BC1; BOOK PAHLAVI DESCENDING LAMEDH; D; No_Joining_Group
10BC2; BOOK PAHLAVI LAMEDH BELLY; D; No_Joining_Group
10BC3; BOOK PAHLAVI STROKED LAMEDH; D; No_Joining_Group
10BC4; BOOK PAHLAVI DESCENDING STROKED LAMEDH; D; No_Joining_Group
10BC5; BOOK PAHLAVI STROKED LAMEDH BELLY; D; No_Joining_Group
10BC6; BOOK PAHLAVI LOOPED LAMEDH; D; No_Joining_Group
10BC7; BOOK PAHLAVI DESCENDING LOOPED LAMEDH; D; No_Joining_Group
10BC8; BOOK PAHLAVI LOOPED LAMEDH BELLY; D; No_Joining_Group
10BC9; BOOK PAHLAVI HOOKED LAMEDH; R; No_Joining_Group
10BCA; BOOK PAHLAVI OLD LAMEDH; R; No_Joining_Group
10BCB; BOOK PAHLAVI MEM-QOPH; D; No_Joining_Group
10BCC; BOOK PAHLAVI HOOKED MEM-QOPH; D; No_Joining_Group
10BCD; BOOK PAHLAVI OLD NUN; U; No_Joining_Group
10BCE; BOOK PAHLAVI FINAL PE-SADHE; R; No_Joining_Group
10BCF; BOOK PAHLAVI SADHE; R; No_Joining_Group
10BD0; BOOK PAHLAVI TAW; R; No_Joining_Group
10BD1; BOOK PAHLAVI X1; R; No_Joining_Group
10BD2; BOOK PAHLAVI X2; R; No_Joining_Group
10BD3; BOOK PAHLAVI YODH-HETH; R; No_Joining_Group
10BD4; BOOK PAHLAVI TURNED AHRIMAN; U; No_Joining_Group
```

8　Acknowledgments

	10BB	10BC	10BD
0	┘ 10BB0	‌) 10BC0	‍ 10BD0
1	‌ 10BB1	) 10BC1	‍ 10BD1
2	‌ 10BB2	‌) 10BC2	‍ 10BD2
3	‌ 10BB3	‌ 10BC3	‍ 10BD3
4	‌ 10BB4	‌ 10BC4	‍ 10BD4
5	‌ 10BB5	‌ 10BC5	◌̇ 10BD5
6	‌ 10BB6	‌ 10BC6	◌ 10BD6
7	‌ 10BB7	‌ 10BC7	◌ 10BD7
8	I 10BB8	‌ 10BC8	◌ 10BD8
9	I 10BB9	‌ 10BC9	◌ 10BD9
A	‌ 10BBA	‌ 10BCA	◌ 10BDA
B	‌ 10BBB	‌ 10BCB	◌̂ 10BDB
C	‌ 10BBC	‌ 10BCC	‌ 10BDC
D	‌ 10BBD	‌ 10BCD	◌ 10BDD
E	‌ 10BBE	‌ 10BCE	◌ 10BDE
F	‌ 10BBF	‌ 10BCF	▨

Primitives

10BB0	ﺣ	BOOK PAHLAVI TOOTH
10BB1	ﺟ	BOOK PAHLAVI DESCENDING TOOTH
10BB2	ﻭ	BOOK PAHLAVI CURLED TOOTH
10BB3	ﻭ	BOOK PAHLAVI DESCENDING CURLED TOOTH
10BB4	ﺟ	BOOK PAHLAVI BELLY
10BB5	ﻭ	BOOK PAHLAVI CURLED BELLY

Letters

10BB6	ﺟ	BOOK PAHLAVI BETH
10BB7	ﻭ	BOOK PAHLAVI LETTER OLD DALETH
10BB8	١	BOOK PAHLAVI LETTER WAW-NUN-AYIN-RESH
		= also used for the otiose sign or end-of-word marker
10BB9	١	BOOK PAHLAVI LETTER SHORT WAW-NUN-AYIN-RESH
10BBA	ﻝ	BOOK PAHLAVI LETTER CURVED WAW-NUN-AYIN-RESH
10BBB	ﺱ	BOOK PAHLAVI LETTER ZAYIN
10BBC	ﺱ	BOOK PAHLAVI LETTER DESCENDING ZAYIN
10BBD	ﺵ	BOOK PAHLAVI LETTER ZAYIN BELLY
10BBE	ﻭ	BOOK PAHLAVI LETTER KAPH
10BBF	ﻭ	BOOK PAHLAVI LETTER OLD KAPH
10BC0	ﺱ	BOOK PAHLAVI LETTER LAMEDH
10BC1	ﺱ	BOOK PAHLAVI LETTER DESCENDING LAMEDH
10BC2	ﺱ	BOOK PAHLAVI LETTER LAMEDH BELLY
10BC3	ﺯ	BOOK PAHLAVI LETTER STROKED LAMEDH
10BC4	ﺯ	BOOK PAHLAVI LETTER DESCENDING STROKED LAMEDH
10BC5	ﺯ	BOOK PAHLAVI LETTER STROKED LAMEDH BELLY
10BC6	ﺯ	BOOK PAHLAVI LETTER LOOPED LAMEDH
10BC7	ﺯ	BOOK PAHLAVI LETTER DESCENDING LOOPED LAMEDH
10BC8	ﺯ	BOOK PAHLAVI LETTER LOOPED LAMEDH BELLY
10BC9	ﺯ	BOOK PAHLAVI LETTER HOOKED LAMEDH
10BCA	ﺯ	BOOK PAHLAVI LETTER OLD LAMEDH
10BCB	ﻭ	BOOK PAHLAVI LETTER MEM-QOPH
10BCC	ﻭ	BOOK PAHLAVI LETTER HOOKED MEM-QOPH
10BCD	ﻝ	BOOK PAHLAVI LETTER OLD NUN
10BCE	ﻉ	BOOK PAHLAVI LETTER FINAL PE-SADHE
10BCF	ﻉ	BOOK PAHLAVI LETTER SADHE
10BD0	ﻁ	BOOK PAHLAVI LETTER TAW

Ligatures

10BD1	ﷻ	BOOK PAHLAVI LIGATURE X1
10BD2	ﷻ	BOOK PAHLAVI LIGATURE X2
10BD3	ﻥ	BOOK PAHLAVI LIGATURE YODH-HETH
10BD4	ﻥ	BOOK PAHLAVI LIGATURE TURNED AHRIMAN

Combining signs

10BD5	◌̇	BOOK PAHLAVI COMBINING DOT ABOVE
10BD6	◌̣	BOOK PAHLAVI COMBINING DOT BELOW
10BD7	◌̈	BOOK PAHLAVI COMBINING TWO DOTS ABOVE
10BD8	◌̤	BOOK PAHLAVI COMBINING TWO DOTS BELOW
10BD9	◌̈	BOOK PAHLAVI COMBINING THREE DOTS ABOVE
10BDA	◌̣	BOOK PAHLAVI COMBINING THREE DOTS BELOW
10BDB	◌̂	BOOK PAHLAVI COMBINING HAT ABOVE

Number

10BDC	ﺟ	BOOK PAHLAVI NUMBER ONE

Punctuation

10BDD	⁖	BOOK PAHLAVI PUNCTUATION THREE DOTS
10BDE	⁘	BOOK PAHLAVI PUNCTUATION THREE CIRCLES