

Universal Multiple-Octet Coded Character Set
 International Organization for Standardization
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 Международная организация по стандартизации

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Title: Proposal for encoding the Chakma script in the UCS

Source: UC Berkeley Script Encoding Initiative (Universal Scripts Project)

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1. Introduction. The Chakma people were in origin Tibeto-Burman, related to the Burmese. The language which they now speak is Indo-European, part of the Southeastern Bengali branch of Eastern Indo-Aryan. Its better-known closest relatives are Bengali, Assamese, Chittagonian, Bishnupriya, and Sylheti. It is spoken by 312,000 people in southeast Bangladesh near Chittagong City, and another 176,000 in India in Mizoram, Assam, Tripura, and Arunachal Pradesh. Literacy in Chakma script is low. The script itself is also called ᱠᱟᱨ ᱯᱟᱨ *Ajhā pāth*, sometimes romanized *Ojhopath*.

There is a certain amount of glyph variation between the script as used in India and Bangladesh. Some fonts are rounder, similar to the style used in Myanmar; compare a similar variation in the Tai Tham script as used in Khün Tai. The glyphs used in this proposal are based on the Chadigang font, with some alterations toward more “generic” shapes for some characters.

The Chakma script is currently being adapted for use in Tanchangya, a language which is closely related to Chakma. An effort to develop the orthography is currently underway, and it appears that there may be additional letters, vowel signs, and tone marks added to cover this script. These extensions are a subject for future standardization, as the orthography for Tanchangya is still under development and testing.

2. Structure. Chakma is of the Brahmic type: the consonant letters contain an inherent vowel. Consonant clusters are written with conjunct characters, and a visible vowel killer shows the deletion of the inherent vowel when there is no conjunct.

3. Independent vowels. Four independent vowels exist: ᱠ *a*, ᱡ *i*, ᱣ *u*, and ᱤ *e*. Other vowels in initial position are formed by adding the vowel sign to ᱠ *a*, as in ᱠᱟ *ī*, ᱠᱡ *ū*, ᱠᱣ *ai*, ᱠᱤ *oi*. Some modern writers are generalizing this spelling in ᱠᱟ *i*, ᱠᱡ *u*, and ᱠᱤ *e*.

4. Dependent vowels. Independent vowel signs have been encoded according to their phonetic value, as in Balinese or Telugu. However, because some of the independent vowels appear to be made out of smaller units, decomposition of the vowels has been taken into consideration. In order to avoid any ambiguous encoding, canonical equivalences have been given in order to resolve the issue of multiple representations. Two glyph fragments (CHAKMA O MARK and CHAKMA AU MARK) have been encoded in order to account for this, and to allow for any users who desire to create texts using the lower glyph fragments on their own. The Chakma vowel signs are given with the letter ᱠ *ka* below.

ᳵ	kā	=	ᳶ	kā
ᳶ	ka	=	ᳶ	kā + ᳶ -a (11127)
᳷	ki	=	ᳶ	kā + ᳷ i (11128)
᳸	kī	=	ᳶ	kā + ᳸ -ī (11129)
᳹	ku	=	ᳶ	kā + ᳹ -u (1112A)
ᳺ	kū	=	ᳶ	kā + ᳺ -ū (1112B)
᳻	ke	=	ᳶ	kā + ᳻ -e (1112C)
᳼	kāi	=	ᳶ	kā + ᳼ -āi (1112D)
᳽	ko	=	ᳶ	kā + ᳽ -o (1112E – or – 11131 + 11127)
᳾	kau	=	ᳶ	kā + ᳾ -au (1112F – or – 11132 + 11127)
᳿	koi	=	ᳶ	kā + ᳿ -oi (11130)
᳠	kaṁ	=	ᳶ	kā + ᳠ -ṁ (11100)
᳡	kaṃ	=	ᳶ	kā + ᳡ -ṃ (11101)
᳢	kaḥ	=	ᳶ	kā + ᳢ -ḥ (11102)
᳣	k	=	ᳶ	kā + ᳣ MAAYYAA

One of the interesting features of Chakma writing is that CANDRABINDU (*cānaphupudā*) can be used together with ANUSVARA (*ekaphudā*) and VISARGA (*dviphudā*):

ᳶ᳣	aḥṁ	=	ᳶ	ā + ᳶ ḥ + ᳶ ṁ
ᳶ᳡	aṃṁ	=	ᳶ	ā + ᳶ ṃ + ᳶ ṁ
ᳶ᳢	uṃṁ	=	ᳶ	u + ᳶ ṃ + ᳶ ṁ
ᳶ᳣	muṁ	=	ᳶ	mā + ᳶ u + ᳶ ṁ

Glyph rendering of CANDRABINDU with other vowel signs (like ᳶ *a* or ᳷ *i*) is as yet unattested; nevertheless the encoding is clear.

5. Consonants with killed vowels and conjunct consonants. Like other Brahmic scripts, Chakma makes use of the MAAYYAA (*killer*) to invoke conjoined consonants. In the past, practice was much more common than it is today. Like the Myanmar script, Chakma is encoded with two vowel-killing characters in order to conform to modern user expectations. As shown above, most letters have their vowels killed with the use of the explicit MAAYYAA character:

᳣	k	=	ᳶ	kā + ᳣ MAAYYAA
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In 2001 an orthographic reform was recommended in the book *Cānmā pattham pāt* which would limit the standard repertoire of conjuncts to those composed with the five letters ᳶ *yā*, ᳷ *rā*, ᳸ *lā*, ᳹ *wā*, and ᳺ *nā*. The four here are the most widely-accepted repertoire of conjuncts.

ya: X + ◻ VIRAMA + 𑄣 yā:

𑄣𑄣𑄣 𑄣𑄣𑄣 - 𑄣𑄣𑄣 𑄣𑄣𑄣 - 𑄣𑄣𑄣 𑄣𑄣𑄣
𑄣𑄣𑄣 𑄣𑄣𑄣 - 𑄣𑄣𑄣 𑄣𑄣𑄣 - 𑄣𑄣𑄣 𑄣𑄣𑄣

ra: X + ◻ VIRAMA + 𑄤 rā:

𑄤𑄤𑄤 𑄤𑄤𑄤 - 𑄤𑄤𑄤 𑄤𑄤𑄤 - 𑄤𑄤𑄤 𑄤𑄤𑄤
𑄤𑄤𑄤 𑄤𑄤𑄤 - 𑄤𑄤𑄤 𑄤𑄤𑄤 - 𑄤𑄤𑄤 𑄤𑄤𑄤

la: X + ◻ VIRAMA + 𑄥 lā:

𑄥𑄥𑄥 𑄥𑄥𑄥 - 𑄥𑄥𑄥 𑄥𑄥𑄥 - 𑄥𑄥𑄥 𑄥𑄥𑄥
𑄥𑄥𑄥 𑄥𑄥𑄥 - 𑄥𑄥𑄥 𑄥𑄥𑄥 - 𑄥𑄥𑄥 𑄥𑄥𑄥

wa: X + ◻ VIRAMA + 𑄦 wā:

𑄦𑄦𑄦 𑄦𑄦𑄦 - 𑄦𑄦𑄦 𑄦𑄦𑄦 - 𑄦𑄦𑄦 𑄦𑄦𑄦
𑄦𑄦𑄦 𑄦𑄦𑄦 - 𑄦𑄦𑄦 𑄦𑄦𑄦 - 𑄦𑄦𑄦 𑄦𑄦𑄦

No separate conjunct forms of subjoined full-form *-yā* or *-rā* appear to exist. The fifth of these conjuncts, the *-na* conjunct, is exemplary of the orthographic shift which has taken place in Chakma.

na: X + ◻ VIRAMA + 𑄧 nā:

𑄧𑄧𑄧 𑄧𑄧𑄧 - 𑄧𑄧𑄧 𑄧𑄧𑄧 - 𑄧𑄧𑄧 𑄧𑄧𑄧
𑄧𑄧𑄧 𑄧𑄧𑄧 - 𑄧𑄧𑄧 𑄧𑄧𑄧 - 𑄧𑄧𑄧 𑄧𑄧𑄧

While some writers would indeed write *kakna* (in ligating style) as 𑄣𑄣𑄣 or (in subjoining style) as 𑄣𑄣𑄣, most now would probably expect it to be written as 𑄣𑄣𑄣. The ligating style of glyphs is now considered old-fashioned. Thus, taking the letter 𑄣 *mā* as the second element, while the glyph shapes 𑄣𑄣 *kmā*, 𑄣𑄣 *tmā*, 𑄣𑄣 *nmā*, 𑄣𑄣 *bbā*, 𑄣𑄣 *mmā*, 𑄣𑄣 *llā*, 𑄣𑄣 *smā*, and 𑄣𑄣 *hmā* are attested, most users now prefer the glyph shapes 𑄣𑄣 *kmā*, 𑄣𑄣 *tmā*, 𑄣𑄣 *nmā*, 𑄣𑄣 *bbā*, 𑄣𑄣 *mmā*, 𑄣𑄣 *llā*, 𑄣𑄣 *smā*, and 𑄣𑄣 *hmā*. Again, this distinction is stylistic and not orthographic.

As with Myanmar and Meetei Mayek, encoding a visible killer for modern users alongside an explicit conjoin-former permits the user to make specific choices about spelling more easily. Both the Myanmar encoding model and the Devanagari encoding model have been explained to the user community and feedback is that the Myanmar model fits the script better. (This is little surprise considering the close relationship between the Myanmar and Chakma scripts.)

In principle, nothing prevents the visible killer from appearing together with a stack. Thus while 𑄣 *kā* + ◻ VIRAMA + 𑄣 *sā* gives 𑄣𑄣 *ksā*, the sequence 𑄣 *kā* + ◻ VIRAMA + 𑄣 *sā* + ◻ MAAYYAA could give 𑄣𑄣 *ks*. Neither the string ◻ VIRAMA + ◻ MAAYYAA nor the string ◻ MAAYYAA + ◻ VIRAMA following a consonant would be meaningful, however, as both kill the inherent vowel, and “double-killing” a vowel makes no sense; either sequence should generate an error presentation.

The 2004 book *Phadagan* shows examples of the five conjuncts above together alongside conjuncts formed with 𑄣 *bā*, 𑄣 *mā*, and 𑄣 *hā*. These are all formed by simple subjoining.

ba: X + VIRAMA + ூ bā:

ூ ௃ ௄ ௅ ெ - ே ை ௉ ொ ோ - ௌ ் ௎ ௐ ௑
௒ ௓ ௔ ௕ ௖ - ே ை ௉ ொ ோ ௌ - ் ௎ ௐ ௑ ௒ ௓

ma: X + VIRAMA + ் mā:

ூ ௃ ௄ ௅ ெ - ே ை ௉ ொ ோ - ௌ ் ௎ ௐ ௑
௒ ௓ ௔ ௕ ௖ - ே ை ௉ ொ ோ ௌ - ் ௎ ௐ ௑ ௒ ௓

ha: X + VIRAMA + ே hā:

ூ ௃ ௄ ௅ ெ - ே ை ௉ ொ ோ - ௌ ் ௎ ௐ ௑
௒ ௓ ௔ ௕ ௖ - ே ை ௉ ொ ோ ௌ - ் ௎ ௐ ௑ ௒ ௓

In the 1982 book *Cāṅmār āg pudhi* a much wider range of conjunct pairs is shown, some of them with fairly complicated glyphs.

- ூூ kkā = ூ kā + VIRAMA + ூ kā
- ூ௃ kṭā = ூ kā + VIRAMA + ூ௃ ṭā
- ூ௄ ktā = ூ kā + VIRAMA + ூ௄ tā
- ூ௅ kmā = ூ kā + VIRAMA + ூ௅ mā
- ூெ kcā = ூ kā + VIRAMA + ூெ cā (*conjunct shows old-style glyph*)
- ூே ṅkā = ூே ṅā + VIRAMA + ூ kā
- ூை ṅgā = ூை ṅā + VIRAMA + ூை gā
- ூ௉ ccā = ூ௉ cā + VIRAMA + ூ௉ cā (*conjunct shows old-style glyph*)
- ூொ cchā = ூொ cā + VIRAMA + ூொ chā (*conjunct shows old-style glyph*)
- ூோ ṅcā = ூோ ṅā + VIRAMA + ூ௉ cā (*conjunct shows old-style glyph*)
- ூௌ ṅjā = ூௌ ṅā + VIRAMA + ூௌ jā
- ூ் ṅjhā = ூ் ṅā + VIRAMA + ூ் jhā
- ூ௎ ṭṭā = ூ௎ ṭā + VIRAMA + ூ௎ ṭā
- ூௐ ttā = ூௐ tā + VIRAMA + ூௐ tā
- ூ௑ tmā = ூ௑ tā + VIRAMA + ூ௑ mā
- ூ௒ tthā = ூ௒ tā + VIRAMA + ூ௒ thā
- ூ௓ ddā = ூ௓ dā + VIRAMA + ூ௓ dā
- ூ௔ ddhā = ூ௔ dā + VIRAMA + ூ௔ dhā

𑄎𑄏	ntā	=	𑄎	nā	+	𑄏	VIRAMA	+	𑄏	tā
𑄎𑄏𑄏	nthā	=	𑄎	nā	+	𑄏	VIRAMA	+	𑄏𑄏	thā
𑄎𑄏𑄐	nmā	=	𑄎	nā	+	𑄏	VIRAMA	+	𑄏𑄐	mā
𑄏𑄏	ppā	=	𑄏	pā	+	𑄏	VIRAMA	+	𑄏	pā
𑄏𑄏𑄐	bbā	=	𑄏	bā	+	𑄏	VIRAMA	+	𑄏	bā
𑄏𑄏𑄐	mmā	=	𑄏	mā	+	𑄏	VIRAMA	+	𑄏	mā
𑄏𑄏𑄐	jjā	=	𑄏	jā	+	𑄏	VIRAMA	+	𑄏	jā
𑄏𑄏𑄐	lkā	=	𑄏	lā	+	𑄏	VIRAMA	+	𑄏	kā
𑄏𑄏𑄐	lgā	=	𑄏	lā	+	𑄏	VIRAMA	+	𑄏	gā
𑄏𑄏𑄐	llā	=	𑄏	lā	+	𑄏	VIRAMA	+	𑄏	lā
𑄏𑄏𑄐	ltā	=	𑄏	lā	+	𑄏	VIRAMA	+	𑄏	tā
𑄏𑄏𑄐	lpā	=	𑄏	lā	+	𑄏	VIRAMA	+	𑄏	pā
𑄏𑄏𑄐	schā	=	𑄏	sā	+	𑄏	VIRAMA	+	𑄏	chā (<i>conjunct shows old-style glyph</i>)
𑄏𑄏𑄐	stā	=	𑄏	sā	+	𑄏	VIRAMA	+	𑄏	tā
𑄏𑄏𑄐	skā	=	𑄏	sā	+	𑄏	VIRAMA	+	𑄏	kā
𑄏𑄏𑄐	spā	=	𑄏	sā	+	𑄏	VIRAMA	+	𑄏	pā
𑄏𑄏𑄐	smā	=	𑄏	sā	+	𑄏	VIRAMA	+	𑄏	mā
𑄏𑄏𑄐	hmā	=	𑄏	hā	+	𑄏	VIRAMA	+	𑄏	mā

5.1 Specific recommendation for Chakma fonts. In Chakma, the encoding model supports conjunct behaviour and Chakma fonts *by default* should display the subjoined form of letters when following virama, to ensure legibility. Whether a conjunct is required or not is part of the spelling of a word; it is not a stylistic issue. (We have seen no examples of conjuncts with more than one consonant, and while the encoding handles (in principle) any length of stacking examples of such would probably be spelling errors.)

6. Collating order. As an Indo-European language, the standard Brahmic sorting order applies to Chakma.

7. Character names. Consonant letter names use the typical Brahmic transliteration used in the UCS. Chakma letters have a descriptive name followed by a traditional Brahmic consonant. These latter are given in annotations to the character names.

8. Punctuation and digits. Alongside a | DANDA and || DOUBLE DANDA punctuation, Chakma has a unique 𑄏 QUESTION MARK, and a 𑄏 SECTION MARK. There is some variation in the glyphs for the SECTION MARK, some looking like flowers or leaves. A set of digits exists and is encoded, although Bengali digits are also used. The Tanchangya use Myanmar digits.

9. Linebreaking. Letters and digits behave as in Bengali. Both CHAKMA DANDA and CHAKMA DOUBLE DANDA behave as in Devanagari. The CHAKMA QUESTION MARK behaves like U+003F QUESTION MARK. The CHAKMA SECTION MARK behaves like U+2055 FLOWER PUNCTUATION MARK.

10. Unicode Character Properties.

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11100;CHAKMA SIGN CANDRABINDU;Mn;0;NSM;;;;;N;;;;;
11101;CHAKMA SIGN ANUSVARA;Mn;0;NSM;;;;;N;;;;;
11102;CHAKMA SIGN VISARGA;Mc;0;L;;;;;N;;;;;
11103;CHAKMA LETTER AA;Lo;0;L;;;;;N;;;;;
11104;CHAKMA LETTER I;Lo;0;L;;;;;N;;;;;
11105;CHAKMA LETTER U;Lo;0;L;;;;;N;;;;;
11106;CHAKMA LETTER E;Lo;0;L;;;;;N;;;;;
11107;CHAKMA LETTER KAA;Lo;0;L;;;;;N;;;;;
11108;CHAKMA LETTER KHAA;Lo;0;L;;;;;N;;;;;
11109;CHAKMA LETTER GAA;Lo;0;L;;;;;N;;;;;
1110A;CHAKMA LETTER GHAA;Lo;0;L;;;;;N;;;;;
1110B;CHAKMA LETTER NGAA;Lo;0;L;;;;;N;;;;;
1110C;CHAKMA LETTER CAA;Lo;0;L;;;;;N;;;;;
1110D;CHAKMA LETTER CHAA;Lo;0;L;;;;;N;;;;;
1110E;CHAKMA LETTER JAA;Lo;0;L;;;;;N;;;;;
1110F;CHAKMA LETTER JHAA;Lo;0;L;;;;;N;;;;;
11110;CHAKMA LETTER NYAA;Lo;0;L;;;;;N;;;;;
11111;CHAKMA LETTER TTAA;Lo;0;L;;;;;N;;;;;
11112;CHAKMA LETTER TTHAA;Lo;0;L;;;;;N;;;;;
11113;CHAKMA LETTER DDAA;Lo;0;L;;;;;N;;;;;
11114;CHAKMA LETTER DDHAA;Lo;0;L;;;;;N;;;;;
11115;CHAKMA LETTER NNAA;Lo;0;L;;;;;N;;;;;
11116;CHAKMA LETTER TAA;Lo;0;L;;;;;N;;;;;
11117;CHAKMA LETTER THAA;Lo;0;L;;;;;N;;;;;
11118;CHAKMA LETTER DAA;Lo;0;L;;;;;N;;;;;
11119;CHAKMA LETTER DHAA;Lo;0;L;;;;;N;;;;;
1111A;CHAKMA LETTER NAA;Lo;0;L;;;;;N;;;;;
1111B;CHAKMA LETTER PAA;Lo;0;L;;;;;N;;;;;
1111C;CHAKMA LETTER PHAA;Lo;0;L;;;;;N;;;;;
1111D;CHAKMA LETTER BAA;Lo;0;L;;;;;N;;;;;
1111E;CHAKMA LETTER BHAA;Lo;0;L;;;;;N;;;;;
1111F;CHAKMA LETTER MAA;Lo;0;L;;;;;N;;;;;
11120;CHAKMA LETTER YYAA;Lo;0;L;;;;;N;;;;;
11121;CHAKMA LETTER YAA;Lo;0;L;;;;;N;;;;;
11122;CHAKMA LETTER RAA;Lo;0;L;;;;;N;;;;;
11123;CHAKMA LETTER LAA;Lo;0;L;;;;;N;;;;;
11124;CHAKMA LETTER WAA;Lo;0;L;;;;;N;;;;;
11125;CHAKMA LETTER SAA;Lo;0;L;;;;;N;;;;;
11126;CHAKMA LETTER HAA;Lo;0;L;;;;;N;;;;;
11127;CHAKMA VOWEL SIGN A;Mn;0;NSM;;;;;N;;;;;
11128;CHAKMA VOWEL SIGN I;Mn;0;NSM;;;;;N;;;;;
11129;CHAKMA VOWEL SIGN II;Mn;0;NSM;;;;;N;;;;;
1112A;CHAKMA VOWEL SIGN U;Mn;0;NSM;;;;;N;;;;;
1112B;CHAKMA VOWEL SIGN UU;Mn;0;NSM;;;;;N;;;;;
1112C;CHAKMA VOWEL SIGN E;Mc;0;L;;;;;N;;;;;
1112D;CHAKMA VOWEL SIGN AI;Mn;0;NSM;;;;;N;;;;;
1112E;CHAKMA VOWEL SIGN O;Mn;0;NSM;11131 11127;;;;;N;;;;;
1112F;CHAKMA VOWEL SIGN AU;Mn;0;NSM;11132 11127;;;;;N;;;;;
11130;CHAKMA VOWEL SIGN OI;Mn;0;NSM;;;;;N;;;;;
11131;CHAKMA O MARK;Mn;0;NSM;;;;;N;;;;;
11132;CHAKMA AU MARK;Mn;0;NSM;;;;;N;;;;;
11133;CHAKMA VIRAMA;Mn;9;NSM;;;;;N;;;;;
11134;CHAKMA MAAYYAA;Mn;9;NSM;;;;;N;;;;;
11136;CHAKMA DIGIT ZERO;Nd;0;L;0;0;0;N;;;;;
11137;CHAKMA DIGIT ONE;Nd;0;L;1;1;1;N;;;;;
11138;CHAKMA DIGIT TWO;Nd;0;L;2;2;2;N;;;;;
11139;CHAKMA DIGIT THREE;Nd;0;L;3;3;3;N;;;;;
1113A;CHAKMA DIGIT FOUR;Nd;0;L;4;4;4;N;;;;;
1113B;CHAKMA DIGIT FIVE;Nd;0;L;5;5;5;N;;;;;
1113C;CHAKMA DIGIT SIX;Nd;0;L;6;6;6;N;;;;;
1113D;CHAKMA DIGIT SEVEN;Nd;0;L;7;7;7;N;;;;;
1113E;CHAKMA DIGIT EIGHT;Nd;0;L;8;8;8;N;;;;;
1113F;CHAKMA DIGIT NINE;Nd;0;L;9;9;9;N;;;;;
11140;CHAKMA SECTION MARK;Po;0;L;;;;;N;;;;;
11141;CHAKMA DANDA;Po;0;L;;;;;N;;;;;
11142;CHAKMA DOUBLE DANDA;Po;0;L;;;;;N;;;;;
11143;CHAKMA QUESTION MARK;Po;0;L;;;;;N;;;;;

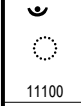
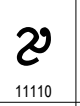
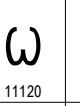
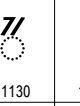
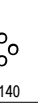
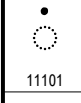
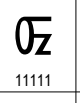
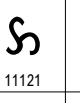
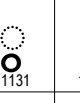

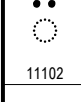
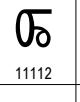
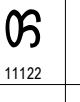
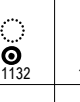
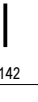
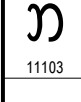
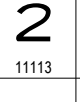
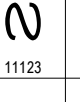
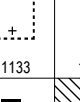

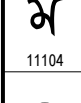
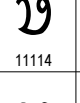
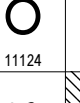


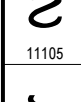
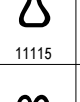
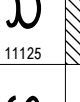


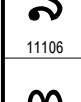
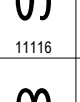
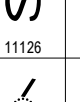
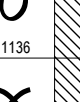

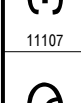
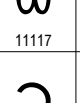
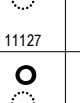
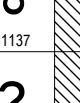

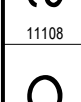
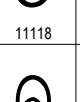
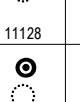
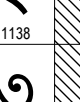

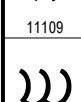
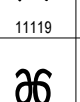
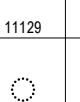


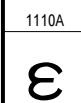
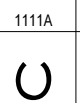
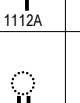


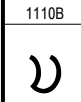
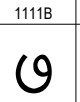
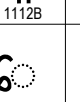
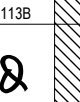

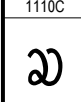

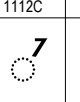
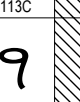


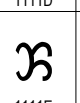
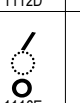
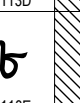

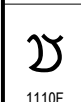
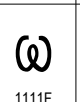
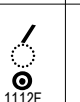





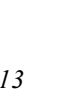

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11. Bibliography.

Cānmā, Cirajyoti and Maṅgal Cāngmā. 1982. *Cānmār āg pudhi (Chakma primer)*. Rānamāṭi: Cānmābhāṣā Prakāśanā Pariṣad.

Khisa, Bhagadatta. 2001. *Cāṅmā pattham pāt = Chakma primer*. Rāṅmāṭi: Tribal Cultural Institute (TCI).
Singā. 2004. *Phagadāṅ*.

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	1110	1111	1112	1113	1114
0	 11100	 11110	 11120	 11130	 11140
1	 11101	 11111	 11121	 11131	 11141
2	 11102	 11112	 11122	 11132	 11142
3	 11103	 11113	 11123	 11133	 11143
4	 11104	 11114	 11124	 11134	
5	 11105	 11115	 11125		
6	 11106	 11116	 11126	 11136	
7	 11107	 11117	 11127	 11137	
8	 11108	 11118	 11128	 11138	
9	 11109	 11119	 11129	 11139	
A	 1110A	 1111A	 1112A	 1113A	
B	 1110B	 1111B	 1112B	 1113B	
C	 1110C	 1111C	 1112C	 1113C	
D	 1110D	 1111D	 1112D	 1113D	
E	 1110E	 1111E	 1112E	 1113E	
F	 1110F	 1111F	 1112F	 1113F	

Various signs

- 11100 ◌ CHAKMA SIGN CANDRABINDU
= caanaphupudaa
- 11101 ◌ CHAKMA SIGN ANUSVARA
= ekaphudaa
- 11102 ◌ CHAKMA SIGN VISARGA
= dviphudaa

Independent vowels

- 11103 𑄀 CHAKMA LETTER AA
= pichapujhaa aa
- 11104 𑄁 CHAKMA LETTER I
= delabhaangagaa i
- 11105 𑄂 CHAKMA LETTER U
= bacacu u
- 11106 𑄃 CHAKMA LETTER E
= lejaubaa e

Consonants

- 11107 𑄄 CHAKMA LETTER KAA
= cucyaangyaa kaa
- 11108 𑄅 CHAKMA LETTER KHAA
= grajaangyaa khaa
- 11109 𑄆 CHAKMA LETTER GAA
= caandyyaa gaa
- 1110A 𑄇 CHAKMA LETTER GHAA
= tinaddaalyaa ghaa
- 1110B 𑄈 CHAKMA LETTER NGAA
= cilaama ngaa
- 1110C 𑄉 CHAKMA LETTER CAA
= dvibhalyaa caa
- 1110D 𑄊 CHAKMA LETTER CHAA
= majaraa chaa
- 1110E 𑄋 CHAKMA LETTER JAA
= dvipadala haa
- 1110F 𑄌 CHAKMA LETTER JHAA
= uraauraa jhaa
- 11110 𑄍 CHAKMA LETTER NYAA
= silaacyaa nyaa
- 11111 𑄎 CHAKMA LETTER TTA
= dviyaadaat ttaa
- 11112 𑄏 CHAKMA LETTER TTHAA
= phudaadviaat thaa
- 11113 𑄐 CHAKMA LETTER DDAA
= aadudaangaat ddaa
- 11114 𑄑 CHAKMA LETTER DDHAA
= lejabharaat ddhaa
- 11115 𑄒 CHAKMA LETTER NNAA
= petttuyaa nnaa
- 11116 𑄓 CHAKMA LETTER TAA
= ghangadaat taa
- 11117 𑄔 CHAKMA LETTER THAA
= jagadaat thaa
- 11118 𑄕 CHAKMA LETTER DAA
= dolaniit daa
- 11119 𑄖 CHAKMA LETTER DHAA
= talamuyaat dhaa
- 1111A 𑄗 CHAKMA LETTER NAA
= phaarabaanyaa naa
- 1111B 𑄘 CHAKMA LETTER PAA
= paalyaa paa
- 1111C 𑄙 CHAKMA LETTER PHAA
= ubaraphudaa phaa

- 1111D 𑄚 CHAKMA LETTER BAA
= ubaramuyaa baa
- 1111E 𑄛 CHAKMA LETTER BHAA
= ciraddaalyaa bhaa
- 1111F 𑄜 CHAKMA LETTER MAA
= bugatpadalaa maa
- 11120 𑄝 CHAKMA LETTER YYAA
= cimayyaa yyaa
- 11121 𑄞 CHAKMA LETTER YAA
= jilyaa yaa
- 11122 𑄟 CHAKMA LETTER RAA
= dvidaayyaa raa
- 11123 𑄠 CHAKMA LETTER LAA
= talamuyaa laa
- 11124 𑄡 CHAKMA LETTER WAA
= bajhonyaa waa
- 11125 𑄢 CHAKMA LETTER SAA
= bhudibukyaa saa
- 11126 𑄣 CHAKMA LETTER HAA
= ubaramuyaa haa

Dependent vowel signs

- 11127 ◌ CHAKMA VOWEL SIGN A
= ubaratulyaa a
- 11128 ◌ CHAKMA VOWEL SIGN I
= bahryaa i
- 11129 ◌ CHAKMA VOWEL SIGN II
= baaniiphadaa ii
- 1112A ◌ CHAKMA VOWEL SIGN U
= ekattaana u
- 1112B ◌ CHAKMA VOWEL SIGN UU
= dviittaana uu
- 1112C ◌ CHAKMA VOWEL SIGN E
= ekaara e
- 1112D ◌ CHAKMA VOWEL SIGN AI
= delabhaanga ai
- 1112E ◌ CHAKMA VOWEL SIGN O
= okaara o
≡ 11131 ◌ 11127 ◌
- 1112F ◌ CHAKMA VOWEL SIGN AU
= aukaara au
≡ 11132 ◌ 11127 ◌
- 11130 𑄥 CHAKMA VOWEL SIGN OI
= oikaara oi
- 11131 ◌ CHAKMA O MARK
- 11132 ◌ CHAKMA AU MARK

Various signs

- 11133 ◌ CHAKMA VIRAMA
• used to form conjuncts
→ 1039 ◌ myanmar sign virama
- 11134 ◌ CHAKMA MAAYYAA
• killer
→ 103A ◌ myanmar sign asat

Digits

- 11136 0 CHAKMA DIGIT ZERO
- 11137 𑄦 CHAKMA DIGIT ONE
- 11138 𑄧 CHAKMA DIGIT TWO
- 11139 𑄨 CHAKMA DIGIT THREE
- 1113A 𑄩 CHAKMA DIGIT FOUR
- 1113B 𑄪 CHAKMA DIGIT FIVE

- 1113C 𑄆 CHAKMA DIGIT SIX
1113D 𑄇 CHAKMA DIGIT SEVEN
1113E 𑄈 CHAKMA DIGIT EIGHT
1113F 𑄉 CHAKMA DIGIT NINE

Punctuation

- 11140 𑄐 CHAKMA SECTION MARK
= phulacihna
11141 𑄑 CHAKMA DANDA
= ekacilyaa
11142 𑄒 CHAKMA DOUBLE DANDA
= dvicilyaa
11143 𑄓 CHAKMA QUESTION MARK
= pujhaar