L2/20-166

JTC1/SC2/WG2 N5134
2020-07-07

Universal Multiple-Octet Coded Character Set
International Organization for Standardization
Organisation Internationale de Normalisation
Международная организация по стандартизации

Doc Type: **Working Group Document**
Title: **Tangut Glyph Modifications and Corrections**
Source: **Andrew West and Viacheslav Zaytsev**
Status: **Individual Contribution**
Action: **For consideration by JTC1/SC2/WG2 and UTC**
Date: **2020-07-07**

1. Introduction

This document presents the second stage of glyph corrections for Tangut ideographs and components in response to the latest understanding of Tangut glyph shapes, based largely on the recent research by Profs. Jiǎ Chángyè 贾常业 and Jǐng Yǒngshí 景永时. The background investigation into the Tangut glyph issues raised by Jiǎ and Jǐng was carried out by West and Zaytsev, and presented in WG2 N5031 = L2/19-064. Subsequently, a joint proposal to disunify nine Tangut ideographs and six Tangut components was made in WG2 N5064 = L2/19-207, and these fifteen characters were encoded in Unicode 13.0.

The first stage corrected the original misunification of nine Tangut ideographs, and laid the foundations for further glyph corrections by encoding additional required components. However, as noted in N5031, and discussed in person at WG2 Meeting 68 at Redmond in June 2019, the issues of glyph shape (joined versus unjoined strokes) that underlie the Unicode 13.0 disunifications affect a very large number of other Tangut ideographs.

The second stage has been to identify the appropriate glyph forms (joined versus unjoined strokes) for all potentially affected Tangut ideographs, and apply the identified glyph corrections (joining adjacent strokes where appropriate) to the code chart font. In this document we propose glyph modifications for **72 Tangut components** listed in Table 1, and **1,493 Tangut ideographs** listed in Table 7 in the Appendix (just under a quarter of the encoded repertoire of Tangut ideographs). Although these glyph changes are visually minor (especially at low font sizes), they do reflect an important systematic distinction between components with joined strokes and components with unjoined strokes. However, it should be noted that none of these changes result in pairs of characters which differ only by one of the affected components, as was the case with the Stage 1 glyph changes.

We also propose miscellaneous glyph corrections for **2 Tangut components** listed in Table 4 and **32 Tangut ideographs** listed in Table 5.

Due to the very large number of proposed glyph changes, it is possible that we have wrongly identified some glyph forms or missed some glyph corrections, so we hope that experts from China and elsewhere will carefully review this document, and provide timely feedback to the UTC in order that these changes can be incorporated into Unicode version 14.0 (scheduled for September 2021).

2. Discussion

2.1 Caveats

The glyph modifications proposed in this document reflect what we believe is a systematic distinction between components with joined strokes and components with unjoined strokes, with the result that groups of semantically or phonetically related ideographs with the same component should use the same glyph form for that component (joined or unjoined as the case may be). For example, of the ideographs which before Unicode 13.0 contained Component 267 𘤊, all those which are related to birds or phonetically derived from ideographs related to birds share the same unjoined component (Component 267 𘤊); whereas those which are related to bones and the sun (among various other things) share the same joined component (Component 766 𘫽).

Fig. 1. Components 267 and 766

U+18D03 𘴃 (Component 267 𘤊) "kind of bird"	U+17F8A 𗾊 (Component 766 𘫽) "warehouse"

Homophones B5 04B36	*Homophones* B5 11A78

Nevertheless, the glyph form of components is not always consistent across different sources, and some native Tangut writers were evidently susceptible to confusion about which is the correct glyph form to use. The *Sea of Writing* generally has the most accurate glyph forms, with correctly joined or unjoined components, but the extant volumes only cover about half the Tangut character repertoire. Post-Western Xia sources, such as the mid-14th century Buddhist inscriptions at Juyong Pass in Beijing, tend not to be good models for glyph forms, sometimes showing unjoined forms where joined forms are expected. Tangut ideographs which show joined versus unjoined components in different sources may be candidates for treatment as Ideographic Variation Sequences (IVS).

For some components the evidence is more compelling than for other components, and we have a higher degree of certainty that the proposed glyph changes are correct. For example, the components 𘢏 [illegible] [illegible] etc. are almost invariably shown with clearly joined strokes in all sources (see Fig. 2), and there is no doubt that unjoined forms of ideographs with these components would be orthographically incorrect. NB Component 144 𘢏 may be written as Component 765 𘫼 (only found as a variant of Component 144) which is more easily confused with Component 141 𘢌 but should still be distinguishable when examined closely.

Fig. 2. Comparison between Components 144 (left) and 141 (right)

U+17481 𗒁

Homophones B6 29B77

On the other hand, the distinction between Component 068 𘡃 (unjoined) and Component 763 𘫺 (joined) is more blurred. When positioned above another component (e.g. [illegible]) we find that the joined form 𘫺 is used exclusively, but in other positions both joined and unjoined forms may occur, and it is not always clear whether an apparent 𘫺 is intrinsically joined or whether it represents 𘡃 which has simply been written with the two strokes meeting at the same point. Visually, the difference between an intrinsically joined stroke (𘫺) and two separate strokes meeting together (𘡃) is that in the former case the stroke shows a smooth and broad bend, whereas in the latter case the bend is less smooth, and the strokes tend to become narrower as they join together (see Fig. 3). In practice it can be hard to distinguish, especially if the component is squashed against another component or if the woodblock printing is not clear.

Fig. 3. Comparison of Joined and Unjoined Strokes

U+182EE 𘋮 (joined strokes)

Homophones B6 43B61

U+17539 𗔹 (unjoined strokes)

Homophones B6 43B53

Thus, it is necessary to examine a range of primary sources in order to determine the correct glyph shape of a Tangut ideograph. Even so, many ideographs are only attested in one or two sources, and often the printed glyph may not be clear, so it can be difficult to determine the correct glyph form based solely on glyph evidence. Therefore, we have also relied on the character construction analysis given in *Sea of Writing* to identify groups of related ideographs which share a common component (see WG2 N5031 §3.1 Methodology for details). This allows us to assign the correct component in many cases where the evidence is unclear or contradictory for individual ideographs.

2.2 Manuscript Evidence

An additional way of determining whether an ideograph has joined or unjoined strokes for a particular component would be to examine high quality manuscripts written in cursive or semi-cursive script, where the distinction between joined strokes and unjoined strokes is generally very clear. For example, Fig. 4 shows the Tangut ideograph U+1837E 𘠾 (red box) which clearly has a joined top right component (𗍁) and an unjoined bottom right component (𗍁), exactly as proposed in this document. Likewise, the Tangut ideograph U+17C17 𗰗 (blue box) clearly shows that the right side component is the double-joined component (𗍂) rather than the unjoined component (𗍂), also exactly as proposed in this document.

Fig. 4. Manuscript fragment with semi-cursive Tangut characters

Shānzuǐgōu Caves 山嘴沟石窟 K2:308

We believe that this would be a very fruitful area of study in the future, but we have not checked any of the proposed changes in this document with cursive or semi-cursive forms in manuscripts because it would be extremely time-consuming to search through hundreds of manuscript fragments looking for the required examples. It is quite possible that future investigations of semi-cursive manuscript forms will result in some glyph corrections to the code chart font.

2.3 Table of Xixia Characters

We have referred to the draft "Table of Xixia Characters" (2016) given to us by Profs. Jiă and Jǐng for guidance on Tangut glyph forms, and ideally we would have liked to check all our proposed glyph changes against the "Table of Xixia Characters". However, as we only have a hard copy of the document, which does not give Unicode code points for characters, it was not practical to do so for such a large number of characters. Therefore we cannot be certain that all the proposed glyph changes in this document agree with the "Table of Xixia Characters" — indeed there are some cases where we have deliberately diverged from the "Table of Xixia Characters" (see §3.2).

3. Unconditional Component Modifications

There are 72 Tangut components which need to be unconditionally modified so that two unjoined strokes at an angle to each other become a single joined stroke (with a few exceptions discussed after the table). This change affects 1,135 Tangut ideographs, as summarized in Table 1 below (41 ideographs are affected by two separate component changes).

The column labelled “No.” gives the Unicode Component Number (in the character name), with the component number used in the 2016 “Table of Xixia Characters” given in square brackets.

The column labelled “13.0” gives the Unicode 13.0 glyph with the Unicode stroke count in parentheses. The column labelled “New” gives the proposed new glyph with the stroke count from the “Table of Xixia Characters” in parentheses (NB Unicode counts ㇜ as one stroke, whereas “Table of Xixia Characters” counts it as two strokes).

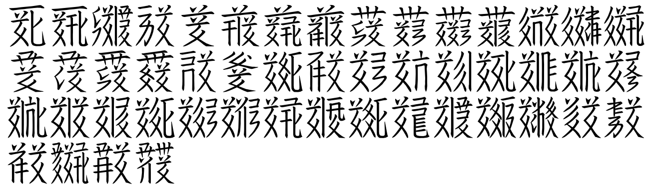
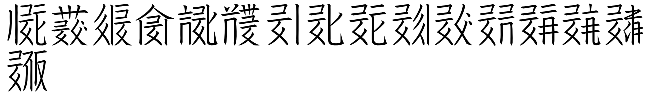
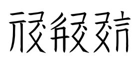
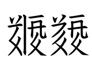
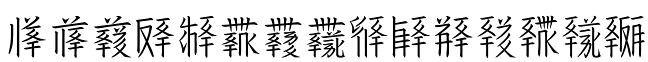
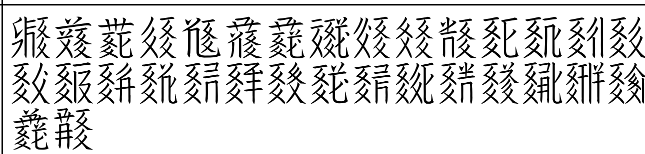
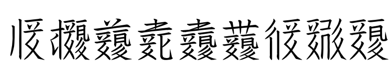
Table 1. Summary of Unconditional Component Modifications

Code Point	No.	13.0	New	Affected Ideographs (new glyph shown)	Count
18845	070 [15]	𘡅 (3)	𘡅 (2)	[illegible]	41
18870	113 [36]	𘡰 (4)	𘡰 (3)	[illegible]	53
1888E	143 [49]	𘢎 (4)	𘢎 (3)	[illegible]	6
1888F	144 [50]	𘢏 (4)	𘢏 (3)	[illegible]	33
18890	145 [47]	𘢐 (4)	𘢐 (3)	[illegible]	10

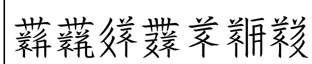
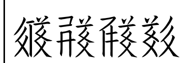
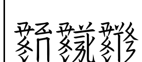
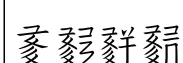
Code Point	No.	13.0	New	Affected Ideographs (new glyph shown)	Count
18892	147 [48]	 (4)	 (3)	[illegible]	97
18893	148	 (4)	 (3)	[illegible]	72
18894	149 [112]	 (4)	 (4)	[illegible]	52
188CB	204 [113]	 (4)	 (4)	[illegible]	17
188D1	210 [89]	 (5)	 (4)	[illegible]	58
188E4	229 [91]	 (5)	 (4)	[illegible]	21
188E6	231 [88]	 (5)	 (4)	[illegible]	24
188E7	232	 (5)	 (4)	[illegible]	17

Code Point	No.	13.0	New	Affected Ideographs (new glyph shown)	Count
188EF	240 [183]	(5)	(5)		2
18906	263 [109]	(5)	(4)		129
18907	264 [110]	(5)	(4)		14
18909	266	(5)	(4)		5
1890B	268 [106]	(5)	(4)		19
1890C	269 [111]	(5)	(4)		3
1893C	317 [138]	(5)	(4)		1
18956	343 [154]	(5)	(4)		32
18965	358 [174]	(6)	(5)		2

Code Point	No.	13.0	New	Affected Ideographs (new glyph shown)	Count
1896A	363 [93]	𘥪 (6)	𘥪 (4)	[illegible]	7
1897F	384 [204]	𘥿 (6)	𘥿 (5)	[illegible]	79
18980	385 [196]	𘦀 (6)	𘦀 (5)	[illegible]	1
18981	386	𘦁 (6)	𘦁 (5)	[illegible]	5
18982	387 [202]	𘦂 (6)	𘦂 (5)	[illegible]	46
18983	388 [116]	𘦃 (6)	𘦃 (4)	[illegible]	15
18984	389	𘦄 (6)	𘦄 (4)	[illegible]	3
18988	393 [212]	𘦈 (6)	𘦈 (5)	[illegible]	25
18992	403 [312]	𘦒 (6)	𘦒 (6)	[illegible]	1

Code Point	No.	13.0	New	Affected Ideographs (new glyph shown)	Count
1899B	412 [227]	 (6)	 (5)		49
189B9	442 [234]	 (6)	 (5)		16
189C5	454 [240]	 (6)	 (5)		2
189C6	455 [239]	 (6)	 (5)		3
189E2	483 [275]	 (7)	 (6)		1
189E3	484	 (7)	 (6)		2
189E8	489 [278]	 (7)	 (6)		15
189E9	490 [277]	 (7)	 (6)		32
189EA	491 [178]	 (7)	 (5)		11
189EB	492 [279]	 (7)	 (6)		9

Code Point	No.	13.0	New	Affected Ideographs (new glyph shown)	Count
189F2	499	 (7)	(6)		1
189F3	500 [296]	 (7)	(6)		24
189F4	501	(7)	(6)		2
189F6	503 [297]	(7)	(6)		4
189F7	504	 (7)	(6)		1
18A1A	539 [337]	 (7)	(6)		15
18A28	553 [341]	 (7)	(6)		1
18A2C	557 [362]	 (7)	(6)		10
18A42	579 [375]	(8)	(7)		5
18A44	581 [376]	(8)	(7)		2
18A54	597 [377]	(8)	(7)		5

Code Point	No.	13.0	New	Affected Ideographs (new glyph shown)	Count
18A5C	605	𘩜 (8)	𘩜 (7)	()	0
18A5D	606	𘩝 (8)	𘩝 (7)		2
18A63	612 [391]	𘩣 (8)	𘩣 (7)		7
18A70	625 [319]	𘩰 (8)	𘩰 (6)		4
18A76	631 [325]	𘩶 (8)	𘩶 (6)		1
18A78	633	𘩸 (8)	𘩸 (7)		3
18A8C	653 [433]	𘪌 (8)	𘪌 (7)		6
18A91	658 [499]	𘪑 (8)	𘪑 (8)		3
18A9A	667 [445]	𘪚 (9)	𘪚 (8)		1
18AAE	687	𘪮 (9)	𘪮 (8)		1
18AB9	698 [498]	𘪹 (9)	𘪹 (8)		4

Code Point	No.	13.0	New	Affected Ideographs (new glyph shown)	Count
18ABC	701 [496]	 (9)	(8)	爨	9
18AC1	706 [446]	 (10)	(8)	鱻	1
18AD2	723 [532]	 (10)	(9)	鑾	8
18AD7	728 [508]	 (11)	(9)	鱻	4
18ADE	735 [550]	 (11)	(10)	龘	2
18AE2	739	 (11)	(10)	靐	1
18AE3	740 [546]	 (12)	(10)	龗	2
18AE9	746 [575]	 (12)	(11)	鸞	16
18AED	750 [576]	 (13)	(12)	鬱	1

3.1 Exceptions

There are a few exceptions to the component modifications shown in Table 1. In two cases, a compound component has two separate and unrelated derivations according to the Tangut dictionary *Sea of Writing*. In the other two cases, the available evidence does not support changing the glyph form.

1. Component 579 is modified from 𘩂 (⿱卌𘡃) to 𘩂 (⿱卌𘫺), except in the single case of U+1798A 𗦊 (⿰𘡃⿱卌𘫺) where the right side of component actually derives separately from the upper right and lower right components of U+17A80 𗪀 (卌 and 𘫺):

Fig. 5. U+1798A

Sea of Writing 3:09.251

2. The right side of [illegible] etc. (⿱亠𘫺) [which is not an encoded component] is **not** modified to use Component 763 𘫺 instead of Component 068 𘡃. However, in the single case of U+17B04 𗬄 this component is modified to ⿱亠𘡃, because it derives separately from the upper middle component of U+1731C 𗌜 (亠) and the lower right component of U+171E4 𗇤 (𘡃):

Fig. 6. U+17B04

Sea of Writing 1:24.241

3. Component 113 𘡰 is modified to use Component 763 𘫺 underneath Component 001 𘠀, except in the case of the two related characters U+179FB 𗧻 'Tangut person' and U+17F07 𗼇 'Tangut' which have Component 068 𘡃 underneath Component 001 𘠀 in both editions of *Homophones* (see Fig. 7). Neither character occurs as a head character in *Sea of Writing*, so in the absence of conclusive evidence we recommend leaving these two characters unmodified. This accords with "Table of Xixia Characters" pp. 145 and where these two characters are given stroke counts of 13 and 9 respectively.

Fig. 7. U+179FB and U+17F07

U+179FB 𗧻		U+17F07 𗼇			
					
Homophones A 35B71	*Homophones* B2 36B28	*Homophones* A 04B33	*Homophones* B5 05B27	*Pearl in the Palm* 01A	*Proverbs* 02A

4. Component 412 𘦛 is modified to use Component 763 𘫺 underneath Component 075 𘡊, except in the case of U+1830C 𘌌. This character occurs as a head character in *Homophones* Ed. B only, and is not found anywhere else in either edition of *Homophones* or in *Sea of Writing*; and elsewhere it is only attested in *Synonyms* and *Parental Love and Filial Piety* (Nevsky 1960 vol. II p. 395 also gives an example from the first volume of [illegible] = *Huáng Shígōng Sānlüè* 黄石公三略 [IOM Tang. 9]). The three examples of U+1830C that we have been able to find all show an unjoined glyph form, and in the absence of better evidence we recommend leaving this character unmodified at the present time. This accords with "Table of Xixia Characters" p. 277 where it is given a stroke count of 12.

Fig. 8. U+1830C

		
Homophones B2 38B78	*Synonyms* 14B2	*Parental Love and Filial Piety* No. 15 38B78

3.2 Unmodified Components

The glyph forms of the 72 components listed in Table 1 all accord with the "Table of Xixia Characters" (2016), but this table also lists the following five components as having joined strokes. However, based on our examination of primary sources, we believe that the evidence does not indicate that they do have joined strokes, and so ideographs with these components should not be modified.

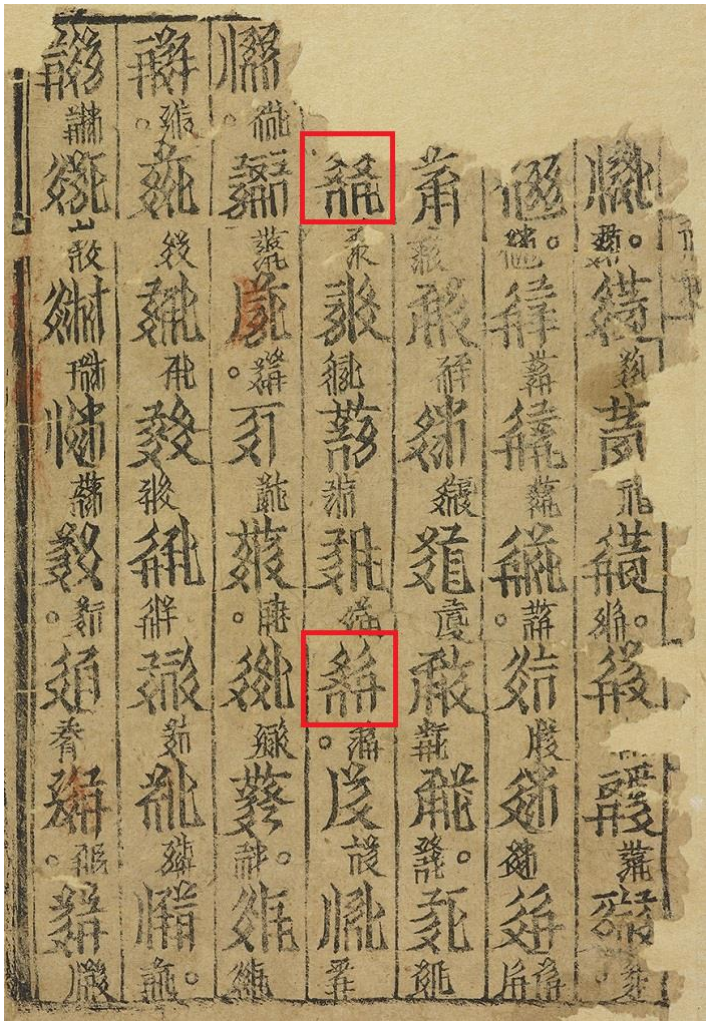
Table 2. Summary of Unmodified Components

Code Point	No.	Glyph	Affected Ideographs (no glyph change)	Count
189F5	502 [195]	𘧵	𘔾𘔿	2
18A4E	591 [370]	𘩎	[illegible]	9
18A4F	592	𘩏	[illegible]	9
18A51	594 [369]	𘩑	[illegible]	14
18A96	663 [443]	𘪖	[illegible]	3

3.2.1 Component 502

U+1853E 𘔾 and U+1853F 𘔿 do not occur in *Sea of Writing*, and their glyph shapes in *Homophones* Ed. A are not conclusive. However, the only surviving page of *Homophones* Ed. B that covers these two characters (see Fig. 9) clearly shows that they have unjoined strokes.

Fig. 9. *Homophones* Ed. B (British Library Or. 12380/3116)



Folio 53B

3.2.2 Components 591 and 592

In "Table of Xixia Characters" Components 591 𗔭 and 592 𗔮 have a stroke count of 7, and the bottom element of both components is Component 764 𗍫. However, examination of *Sea of Writing* and *Homophones* shows that three forms of the components are used, as shown in Fig. 10. Forms with Component 764 𗍫 are most common in both *Sea of Writing* and *Homophones* Eds. A and B (see Fig. 10: A and B); but forms with Component 113 𗍫 are used for U+18699 𘚙, U+1869A 𘚚, U+1869C 𘚜, and U+1869D 𘚝 in *Homophones* Ed. B (see Fig. 10: C); and forms with Component 087 𗍫 are found in both *Sea of Writing* (U+17AEF 𗫯, U+18105 𘄅, U+1864E 𘙎, U+18698 𘚘, U+1869B 𘚛) and *Homophones* Ed. B (U+17606 𗘆, U+17778 𗝸, U+17FFE 𗿾) (see Fig. 10: D and E). It is not clear from this evidence which is the correct form of Components 591 and 592, but in other Tangut sources it seems that the unjoined form with Component 087 𗍫 is most common (see Fig. 11).

Fig. 10. Examples with Components 591 and 592

A	B	C	D	E
U+18537 𘔷	U+18699 𘚃	U+18699 𘚃	U+18105 𘄩	U+17606 𗘦
				
Sea of Writing 1:48.122	*Homophones* A 06B36	*Homophones* B5 07B14	*Sea of Writing* 3:20.231	*Homophones* B1 27B47

Fig. 11. Additional Examples with Components 591 and 592

A	B	C	D	D
U+17A37 𗨷 U+18665 𘙥	U+17A37 𗨷 U+18665 𘙥	U+17A37 𗨷 U+18665 𘙥	U+1869D 𘚝 U+18105 𘄩	U+1864E 𘙎
				
Proverbs 05B	*Proverbs* 09A	*Forest of Categories* 06:05B	*Mixed Characters* 15B	*Repentance Dharma* B11:038 1:09

Overall, the evidence does not show a consistent use of the joined component (𗙔), and in some cases where a joined form is seen it can be assumed to be due the disjoined form having been written carelessly as a joined form (compare U+18665 𘙥 in Example 5.B where the bottom part of 𘝕 appears to be joined, but is clearly disjoined in Examples 5.A and 5.C).

Furthermore, Component 764 𗙔 is a special form of Component 087 𗙔 used only in U+18D01 𘴁, and is not used systematically elsewhere, so Component 087 𗙔 would be the expected form for bottom part of Components 591 and 592. As the evidence is not conclusive, it would seem safest to leave Components 591 and 592 unmodified at present, pending better evidence for the correct glyph form. It may be appropriate to use Ideographic Variation Sequences to distinguish the different forms of these characters.

3.2.3 Component 594

In "Table of Xixia Characters" Component 594 𗾦 has a stroke count of 7, and the upper part of the internal element is shown with a joined stroke. However, the evidence from *Sea of Writing* and *Homophones* does not seem to support this analysis, as shown by the examples given in Fig. 12, where the internal element is Component 267 𗍫 (with unjoined strokes).

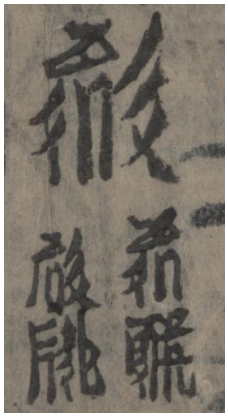
Fig. 12. Examples with Component 594

A	B	C	D	E
U+17653 𗝓	U+186A2 𘚢	U+18418 𘠘	U+1799D 𗦝	U+174A0 𗭠
				
Sea of Writing 1:21.252	*Sea of Writing* 3:19.232	*Homophones* A 28A27	*Homophones* A 37A36	*Homophones* B1 22B35

3.2.4 Component 663

In "Table of Xixia Characters" Component 663 𗏁 has a stroke count of 7, and the three ideographs with Component 663, as well as the related ideograph U+1762B 𗘫, are shown with Component 763 (𗍫). However, this analysis is not supported by the evidence of *Sea of Writing* and *Homophones*, where Component 068 (𗍫) can be seen in almost all cases, as shown in Fig. 13.

Fig. 13. Examples with Component 663

A	B	C	D	E
U+1762B 𗘫	U+1871F 𗜟	U+17062 𗁂	U+1871E 𗜞	U+1871F 𗜟
				
Sea of Writing 1:12.132	*Sea of Writing* 1:37.261	*Sea of Writing* 3:22.141	*Homophones* A 31B65	*Homophones* B5 06A45

4. Conditional Component Modifications

There are 4 Tangut components which were disunified in Unicode 13.0 into forms with unjoined strokes (𘡃 𘤊 𘤕 𘤻) and forms with joined strokes (𘫺 𘫽 𘫾 𘫿). All ideographs that under Unicode 13.0 include any of Components 068 (𘡃), 267 (𘤊), 278 (𘤕), or 316 (𘤻) have been examined, and based primarily on the glyph forms shown in *Sea of Writing* and *Homophones* Editions A and B, each ideograph glyph has either been left unmodified or Components 068, 267, 278, or 316 have been modified to Components 763 (𘫺), 766 (𘫽), 767 (𘫾), or 768 (𘫿) respectively. Additionally, eight ideographs with Component 267 under Unicode 13.0 have been modified to use a glyph form that is a hybrid between Components 267 and 766, as discussed in Note 1 to Table 3.

We have tried to determine the orthographically correct glyph forms for ideographs that in Unicode 13.0 incorporate Components 068, 267, 278, or 316, based on the available evidence of glyph forms shown in *Sea of Writing* and *Homophones*, as well as the analysis of character construction given in *Sea of Writing*, but in many cases the glyph choices only reflect the balance of probability, and the glyph form (i.e. whether having joined or unjoined strokes) may well differ for individual characters in individual sources.

575 ideographs with Components 068, 267, 278 or 316 are unchanged (6 ideographs have two unchanged components); and 407 ideographs with Components 068, 267, 278 or 316 are modified to use Components 763, 766, 767, or 768 instead (7 ideographs have two different modified components). The five ideographs with Component 766 which were already modified in Unicode 13.0 and the two ideographs with Component 768 which were added in Unicode 13.0 do not require any further glyph changes, and are highlighted in yellow in Table 3.

Note that in order to more clearly distinguish between the two sets of graphically similar components, many of the ideographs with Components 068, 267, 278 or 316 have been cosmetically tweaked to accentuate the disjoined strokes.

Table 3. Summary of Conditional Component Modifications

Code Point	No.	Glyph	Affected Ideographs (new glyph shown)	Count
18843	068	𘡃	[illegible]	197

Code Point	No.	Glyph	Affected Ideographs (new glyph shown)	Count
18AFA	763	𘫺	[illegible]	89
1890A	267	𘤊	[illegible]	151
18AFD	766	𘫽	[illegible]	136
–	–	[illegible]	[illegible]	8
18915	278	𘤕	[illegible]	94
18AFE	767	𘫾	[illegible]	48

Code Point	No.	Glyph	Affected Ideographs (new glyph shown)	Count
1893B	316	𘤻	[illegible]	139
18AFF	768	𘫿	[illegible]	133

Note 1

In N5031 (p. 17) we noted that in some cases the top strokes of Component 267 (𘤊) were joined like the top strokes of Component 766 (𘫽), resulting in a form which is a hybrid between Components 267 and 766, i.e. [illegible]. At that time we concluded that there was not a consistent or meaningful distinction between this hybrid form and Component 267. We have since re-examined the evidence, and reached a new understanding. Some ideographs which should have Component 267 may be inconsistently written with the hybrid form in some sources, as shown in the example for U+17F95 𗾕 on p. 17 of N5031, and in such cases the use of the hybrid form is not significant. However, there are two groups of related ideographs where the hybrid form is used consistently across all sources, and appears not to be a mistake for either Component 267 or Component 766:

A. Ideographs with Component 557 𘨬 (see Groups 10 and 11 in N5031 pp. 54–56). This component (U+18A2C) and the ten ideographs that include it are already covered in Table 1. There is also one ideograph, U+17C7A 𗱺, which derives its bottom right component from the bottom right of U+181BD 𘆽, and this as expected uses the hybrid form (this accords with "Table of Xixia Characters" where it has a stroke count of 12).

B. A group of seven interrelated ideographs (see Group 9 in N5031 p. 54; excluding U+1731C 𗌜 which should not have been included in this group as it actually derives from U+18736 𘜶).

The "Table of Xixia Characters" also shows Component 594 𘩑 (see Group 13 in N5031 pp. 56–57) as having the 7-stroke hybrid form, but as already discussed above (§2.2.3) we think that the evidence suggests that the internal element is Component 267.

5. Miscellaneous Glyph Corrections

The following is a summary of proposed miscellaneous glyph corrections. It is intended to document these in more detail in UTN 42 at a future date. Changes to radical and/or stroke count are highlighted in yellow in Table 5 (see Section 7 for discussion of stroke counts).

Table 4. Summary of Glyph Corrections for 2 Tangut Components

Code Point	Component	13.0	New	Stroke Count	
				13.0	New
188B4	181	𗃴	𗃴	4	4
18AF1	754	𗬱	𗬱	13	13

Table 5. Summary of Glyph Corrections for 32 Tangut Ideographs

Code Point	13.0	New	Sample	Radical/Strokes		Notes
				13.0	New	
1706B	𗚗	𗚗		2.10	2.10	Derived from U+17B10 𗬐
171BD	𗜽	𗜽		17.16	17.16	Derived from U+17176 𗜶
171BF	𗜿	𗜿		17.16	17.15	Derived from U+1700D 𗀍
1732E	𗼮	𗼮		37.10	37.10	Derived from U+17D26 𗼦
17403	𘐃	𘐃		68.20	68.20	See Note 1 below
174F4	𗽲	𗽲		75.14	75.14	See Note 2 below

Code Point	13.0	New	Sample	Radical/Strokes		Notes
				13.0	New	
174F6	𱍐	𱍐		75.14	75.13	See Note 2 below
176CA	𱛊	𱛊		106.12	106.12	See Note 3 below
17729	𱜩	𱜩		106.14	106.13	See Note 2 below
17760	𱝂	𱝂		106.15	106.15	See “Table of Xixia Characters” p. 101
177D6	𱟖	𱟖		106.21	106.21	Derived from U+170CE 𗳎
17869	𱡩	𱡩		113.13	230.13	Derived from U+18081 𠂁
178DF	𱣯	𱣯		141.9	141.9	See “Table of Xixia Characters” p. 130
179CC	𱧌	𱧌		141.12	141.11	See “Table of Xixia Characters” p. 138
17A8F	𱪏	𱪏		141.15	141.15	See “Table of Xixia Characters” p. 149

Code Point	13.0	New	Sample	Radical/Strokes		Notes
				13.0	New	
17AE5	纞	纞		141.17	141.17	See Note 1 below
17AF0	纞	纞		141.21	141.20	Derived from U+171BF 𱯿
17C2D	鬞	鬞		181.13	181.13	See Note 1 below
17CAB	龘	龘		185.16	185.16	See Note 3 below
17CC2	龞	龞		188.14	188.13	See “Table of Xixia Characters” p. 195
17D25	叕	叕		204.9	204.8	See “Table of Xixia Characters” p. 163
17DC0	爨	爨		217.14	217.13	See Note 2 below
17E26	麤	麤		229.9	229.9	Derived from U+186F8 𦫸
17EA8	龗	龗		260.10	260.11	See Note 2 below

Code Point	13.0	New	Sample	Radical/Strokes		Notes
				13.0	New	
17F03	彑	彑		262.5	262.5	See “Table of Xixia Characters” p. 224
18064	𣪊	𣪊		285.11	285.10	See Note 2 below
18179	𤣩	𤣩		316.13	316.13	See “Table of Xixia Characters” p. 181
1819A	𣪘	𣪘		327.11	327.10	See Note 2 below
183FC	𣫺	𣫺		436.12	436.11	See Note 2 below
1846F	𣬻	𣬻		449.12	449.11	See Note 2 below
184B3	𣭳	𣭳		462.12	462.11	See Note 2 below
18557	𣪊	𣪊		516.13	516.12	See Note 2 below

Note 1 (Component 754)

There are two changes to Component 754 龕 and the ideographs U+17C2D 龕, U+17403 龕, U+17AE5 龕. The first change is to extend the central vertical stroke up to the 龴 component, as shown in all sources. The second change is to make the realization of the 龴 component consistent with U+17C2E 龕. Currently, U+17C2D 龕 etc. show the top part as

彐 (two identical stacked elements) whereas U+17C2E 𗰮 shows the top part as 彐 (bottom element has an extended horizontal stroke). However, examination of the sources shows that the realization of the top of U+17C2D 𗰭 and the top of U+17C2E 𗰮 is generally consistent for each source, and that in most sources the component is written with an extended lower horizontal stroke.

Fig. 14. Comparison of U+17C2D and U+17C2E

U+17C2D 𗰭						
A	**B**	**C**	**D**	**E**	**F**	**G**
						
Sea of Writing 1:27.113	*Homophones* A 35B21	*Homophones* B2 36A58	*Homonyms* 12A5.04	*Three Generations* 21B	*Proverbs* 17A	*Repentance Dharma* B11:040 4:42
U+17C2E 𗰮						
A	**B**	**C**	**D**	**E**		
						
Sea of Writing 1:87.221	*Homophones* A 11A62	*Homophones* B2 12A41	*Homonyms* 09B7.04	*Parental Love and Filial Piety* No. 30		

Note 2 (Component 343)

As of Unicode version 13.0, there are 23 Tangut ideographs with Component 343 𗍫, and 12 ideographs with the very similar component 𗍬 [not an encoded component]. The difference between these two components is that in the former component the diagonal stroke of the lower element extends into the upper element, whereas in the latter component the upper and lower elements are separate (𗍬), and there is an extra dot in the upper component.

Analysis of the glyph forms of these ideographs demonstrates that ten of the twelve ideographs with component 𗍬 (𗍬) are in fact written with Component 343, and are related to other ideographs with Component 343 (e.g. U+174F6 𗓶 derives from U+181F9 𘇹; and U+17729 𗜩 derives from U+178F6 𗚶). The other two ideographs, U+1775B 𗝛 [nẹ] 'plum' and U+17B3F 𗬿 [nẹ] 'tough silk', are correctly written with component 𗍫 (𗍬). Additionally, there is one ideograph with Component 343, U+17EA8 𗫨 [nẹ] 'to fade', which is actually written with component 𗍬 (𗍬) and is phonetically related to U+1775B and U+17B3F. In summary, we think that ten ideographs with 𗍬 (𗍬) should be corrected to use Component 343 𗍫, and one ideograph with Component 343 𗍫 needs to be corrected to use 𗍬 (𗍬).

However, it should be noted that in a few cases characters with Component 343 𗍫 may sometimes be written with a dot instead of an extended diagonal stroke (i.e. 𗍬, which is different from 𗍬 in U+1775B, U+17B3F and U+17EA8).

Fig. 15. Forms of Component 343 with and without a dot

U+181FA 𘇺		U+184B3 𘒳	
dot	no dot	dot	no dot
			
Sea of Writing 3:19.251	*Homophones* B2 38B51	*Homophones* A 12B71	*Homophones* B5 13B56

These examples of glyph variation may be candidates for representation using Ideographic Variation Sequences.

Note 3 (U+17CAB)

Homophones Edition B2 has the current form of U+17CAB (𗫫), whereas *Homophones* Editions A and B5 show the proposed new form of the character (𗫫) (there is no head entry for U+17CAB in *Sea of Writing*). As U+17CAB has a compositional relationship with U+1818B 𘆋 (as indicated in the entry for U+1818B in *Sea of Writing*), the glyph form shown in *Homophones* A and B5 must be correct.

6. Additional Font Improvements

There are many additional cosmetic changes that could be made to the code chart font to improve its appearance, and make it a better model for font designers to follow. However, most such changes are not essential, and it would take considerable time and effort to redesign the font. Moreover, it is possible that China will provide a new code chart font at some point.

Nevertheless, there is one cosmetic change that we have made to the font. In the current version of the code chart font, Components 069 (𘡄), 142 (𘢍), and 453 (𘧄) extend most of the way across to the right side of an ideograph, whereas primary sources all show that the last stroke of these components should only extend part of the way under the rest of the ideograph. We have tweaked 78 Tangut ideographs shown below to reduce the extent of the under-stroke.

Table 6. Minor Glyph Modifications

Code Point	13.0	New
U+17055	𗁕	𗁕
U+17056	𗁖	𗁖
U+1707F	𗁿	𗁿
U+17104	𗄄	𗄄
U+1714A	𗅊	𗅊
U+1715E	𗅞	𗅞
U+1715F	𗅟	𗅟
U+171CF	𗇏	𗇏
U+171D0	𗇐	𗇐
U+171E4	𗇤	𗇤
U+171EA	𗇪	𗇪
U+171EB	𗇫	𗇫

Code Point	13.0	New
U+171F5		
U+171F7		
U+17224		
U+17379		
U+17404		
U+17405		
U+17406		
U+17407		
U+17408		
U+17409		
U+1740A		
U+17464		
U+17484		
U+174E4		
U+17549		
U+17556		
U+175FA		

Code Point	13.0	New
U+176C9	𱛉	𱛉
U+176CB	𱛋	𱛋
U+1773E	𱜾	𱜾
U+177FD	𱟽	𱟽
U+17869	𲡩	𲡩
U+17AF1	𲫱	𲫱
U+17AF2	𲫲	𲫲
U+17AF3	𲫳	𲫳
U+17AF4	𲫴	𲫴
U+17AF5	𲫵	𲫵
U+17AF6	𲫶	𲫶
U+17AF7	𲫷	𲫷
U+17AF8	𲫸	𲫸
U+17AF9	𲫹	𲫹
U+17AFA	𲫺	𲫺
U+17AFB	𲫻	𲫻
U+17AFC	𲫼	𲫼

Code Point	13.0	New
U+17AFD		
U+17AFE		
U+17AFF		
U+17B00		
U+17B01		
U+17B02		
U+17B03		
U+17B04		
U+17B05		
U+17B06		
U+17B07		
U+17B08		
U+17B09		
U+17B0A		
U+17B0B		
U+17B0D		
U+17B75		

Code Point	13.0	New
U+17C6F		
U+17ED7		
U+17F5C		
U+18037		
U+180A5		
U+18150		
U+1817E		
U+18346		
U+1834E		
U+1847E		
U+1847F		
U+18480		
U+18481		
U+184AA		
U+185B9		

7. Radical Stroke Data

We recommend that the kRSTUnicode key in the data files TangutSrc.txt (ISO/IEC 10646) and TangutSources.txt (UCD) be updated to reflect the new radical assignments for ideographs listed in Table 3. However, we do not recommend that the stroke counts given under kRSTUnicode should be changed for those ideographs where unjoined strokes have been modified to joined strokes. In the "Table of Xixia Characters" joined strokes are counted as a single stroke, so for example Component 144 𗍫, which has a stroke count of '4' in the Unicode data, is counted as having a stroke count of '3' in the "Table of Xixia Characters". We would prefer to keep the existing stroke counts for the 72 components listed in Table 1 (and by extension the stroke counts for all ideographs with these components), as explained below.

The kRSTUnicode key reflects the principles for assigning radicals and stroke counts that are defined in the original Tangut encoding proposal (WG2 N4522; L2/14-023), and for some purposes it is useful to continue using the sorting algorithm that kRSTUnicode currently produces, especially as this sort order more closely accords with the character ordering in Lǐ Fànwén's *Tangut-Chinese Dictionary* (2008) and other modern works of Tangut reference. In particular, maintaining the current stroke counts for kRSTUnicode would allow radicals such as U+1890A 𘢊 and U+18AFD 𘫽 to sort adjacent to each other, and individual characters such as U+184F1 𘓱 and U+18D07 𘔇 to sort together, which may be helpful for some users.

Furthermore, changing the stroke counts of the 72 components listed in Table 1 would only partially align kRSTUnicode with the "Table of Xixia Characters", as the latter source has stroke counts that differ from kRSTUnicode for a number of other components (e.g. Component 009 𗍏 is 1 stroke in kRSTUnicode but 2 strokes in "Table of Xixia Characters"). Therefore, we think that the best solution would be to add a new Radical/Stroke key which represents the radical assignments and stroke counts used by Profs. Jiǎ and Jǐng in a published source (such as a final published version of the "Table of Xixia Characters").

In summary, we propose making the following changes to kRSTUnicode:

- 19 changes to radicals and stroke counts documented in WG2 N5126 = L2/19-403 (18 changes listed on p. 7);
- 8 radical corrections (Radical 316 to Radical 454 for U+1814A; Radical 542 to Radical 543 for U+185A5, U+185A6, U+185A8, U+185AB, U+185AD, U+185C0; Radical 719 to Radical 691 for U+187B0);
- 16 changes to radial and/or stroke count as listed in Table 5 above;
- 27 changes from Radical 068 to Radical 763;
- 50 changes from Radical 267 to Radical 766 (including U+17F8A and U+17FA5 which were modified in Unicode 13.0);
- 16 changes from Radical 278 to Radical 767;
- 64 changes from Radical 316 to Radical 768 (including U+18D05 and U+18D06 which were added in Unicode 13.0).

These changes are provided in an appended text file.

8. References

N5031. Andrew West and Viacheslav Zaytsev. *Investigation of Tangut unification issues*. ISO/IEC JTC1/SC2/WG2 N5031 (L2/19-064). 2019-02-10. http://www.unicode.org/L2/L2019/19064-tangut-n5031.pdf

N5064. Andrew West, Viacheslav Zaytsev (Institute of Oriental Manuscripts, Russian Academy of Sciences), Jia Changye (Ningxia Academy of Social Sciences), Jing Yongshi (Beifang University of Nationalities), Sun Bojun (Institute of Ethnology and Anthropology, Chinese Academy of Social Sciences). *Proposal to encode nine Tangut ideographs and six Tangut components*. ISO/IEC JTC1/SC2/WG2 N5064 (L2/19-207). 2019-05-27. http://www.unicode.org/L2/L2019/19207-n5064-tangut.pdf

N5126. Andrew West and Viacheslav Zaytsev. *Additional Tangut Glyph Corrections*. ISO/IEC JTC1/SC2/WG2 N5126 (L2/19-403). 2019-12-21. https://www.unicode.org/L2/L2019/19403-n5126-tangut.pdf

Table of Xixia Characters. Zhōnghuá zìkù gōngchéng Xīxià wénzì de sōují zhěnglǐ kètí zǔ 中华字库工程西夏文字的搜集整理课题组 (comp.). *Xīxià zìfú jí shǔxìng biāozhù biǎo (cǎogǎo)* 西夏字符及属性标注表(草稿) [Table of Xixia Characters with Annotated Properties (Draft)]. [s. l.]: Zhōnghuá zìkù gōngchéng Xīxià wénzì de sōují zhěnglǐ kètí zǔ 中华字库工程西夏文字的搜集整理课题组, 2016 年 8 月.

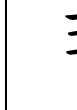
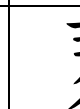
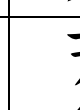
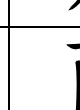
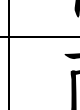
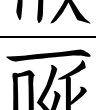
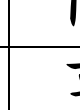
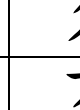
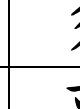
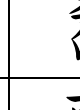
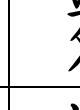
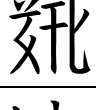
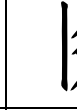
UTN 42. Andrew West and Viacheslav Zaytsev. Unicode Technical Note No. 42: *Tangut Character Additions and Glyph Corrections*. Version 2. 2019-12-21. https://www.unicode.org/notes/tn42/

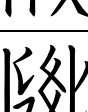
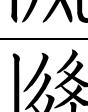
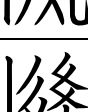
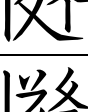
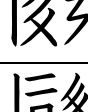
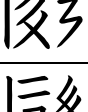
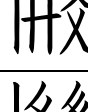
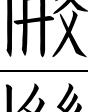
See UTN 42 §6 for bibliographic details of the Tangut sources cited in this document.

9. Appendix: List of Modified Ideographs

The table below lists the 1,493 Tangut ideographs that are proposed for modification in Sections 3 and 4 above.

Table 7. List of Modified Ideographs

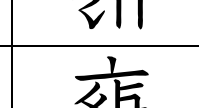
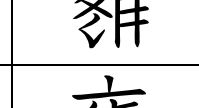
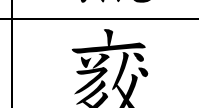
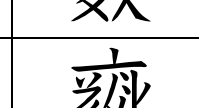
Code Point	13.0	New
17002		
17009		
1700C		
1700E		
1700F		
17011		
17016		
17017		
17025		
17041		
17056		
1705F		

Code Point	13.0	New
17068		
1706B		
1706D		
17075		
1707B		
1707E		
1707F		
17086		
1708E		
17096		
17097		
170A0		
170A4		
170A8		
170B3		

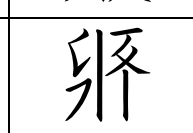
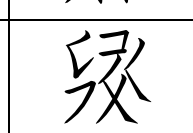
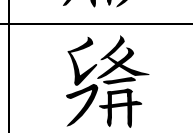
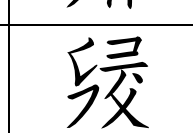
Code Point	13.0	New
170E2		
170E4		
170EA		
170F2		
170F3		
170F5		
170F6		
170FC		
17100		
17104		
17105		
17115		
17117		
1711A		
17123		

Code Point	13.0	New
17127		
17128		
1712B		
1713A		
17147		
1714B		
1714E		
17156		
17157		
1715E		
17163		
1716E		
1717C		
17183		
17184		

Code Point	13.0	New
17185		
1718D		
17191		
17193		
17199		
1719B		
1719E		
1719F		
171AC		
171B8		
171BE		
171C4		
171C9		
171CB		
171CE		

Code Point	13.0	New
171CF		
171D0		
171D1		
171D2		
171D3		
171D5		
171D7		
171D8		
171D9		
171DB		
171E4		
171E5		
171EB		
171F7		
171F8		

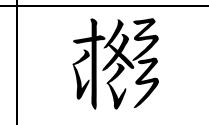
Code Point	13.0	New
171FD		
17201		
17202		
1720A		
1720F		
17212		
17215		
1721A		
17220		
17223		
1722C		
17232		
17238		
17239		
17243		

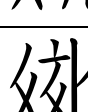
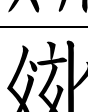
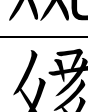
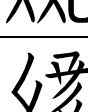
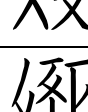
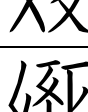
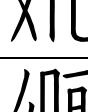
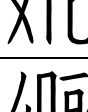
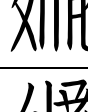
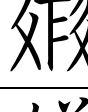
Code Point	13.0	New
17245		
17246		
17249		
17254		
17255		
17283		
17286		
1728F		
17296		
17297		
172A4		
172AC		
172B2		
172B6		
172B9		

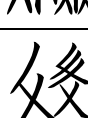
Code Point	13.0	New
172C4		
172CB		
172D8		
172EE		
172F5		
172F7		
172FF		
17305		
17308		
1730F		
17312		
17313		
17319		
1731B		
1731C		

Code Point	13.0	New
1731E		
17320		
17322		
17323		
17324		
17327		
1732B		
1732C		
1732D		
1732E		
17332		
1733D		
17347		
1734A		
1734F		

Code Point	13.0	New
17352		
17353		
17359		
1735B		
1735C		
1735F		
17361		
17365		
1736A		
1736C		
17378		
1737A		
1737C		
1737E		
17380		

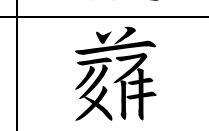
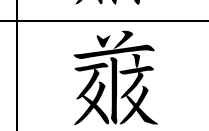
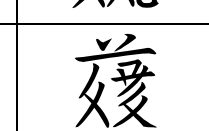
Code Point	13.0	New
17381		
17384		
1738A		
1738B		
1738E		
17392		
17397		
1739A		
1739C		
1739D		
173A6		
173A7		
173B2		
173C4		
173C9		

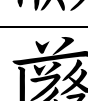
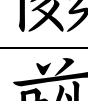
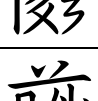
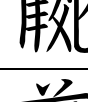
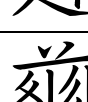
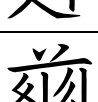
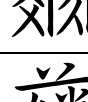
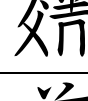
Code Point	13.0	New
173CE		
173D2		
173D3		
173D5		
173D8		
173DB		
173DC		
173E0		
173E1		
173E2		
173E5		
173E8		
173E9		
173EB		
173EC		

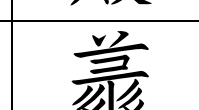
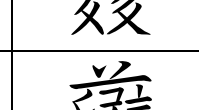
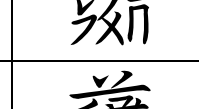
Code Point	13.0	New
173ED		
173F0		
173F2		
173F4		
173F5		
173F7		
173F8		
173FB		
173FD		
173FE		
173FF		
17401		
17402		
17403		
17405		

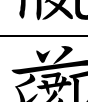
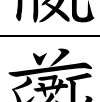
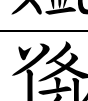
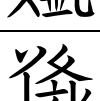
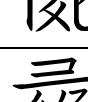
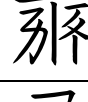
Code Point	13.0	New
1740B		
1740C		
1740D		
1740E		
1740F		
17410		
17411		
17412		
17413		
17414		
17415		
17416		
17417		
17418		
17419		

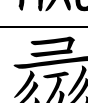
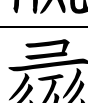
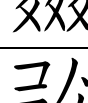
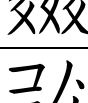
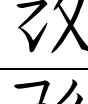
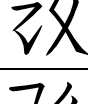
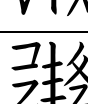
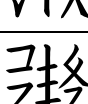
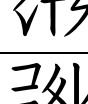
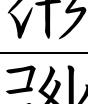
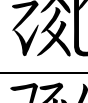
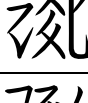
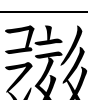
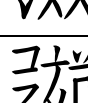
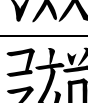
Code Point	13.0	New
1741A		
1741B		
1741C		
1741F		
17423		
1743B		
17441		
17442		
17451		
1745C		
1746C		
1746E		
17472		
17473		
17476		

Code Point	13.0	New
17478		
17481		
17483		
17484		
1748C		
17498		
1749C		
174A4		
174A5		
174A6		
174B7		
174B8		
174C3		
174D0		
174D1		

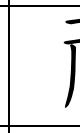
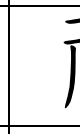
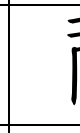
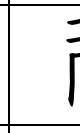
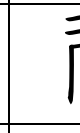
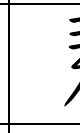
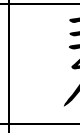
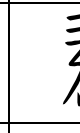
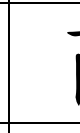
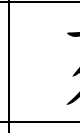
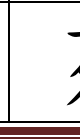
Code Point	13.0	New
174D2		
174D3		
174D9		
174DA		
174E2		
174E3		
174E4		
174E5		
174E6		
174E7		
174E9		
174EB		
174F1		
174F4		
174F6		

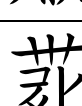
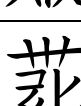
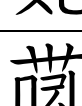
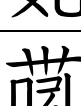
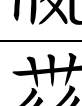
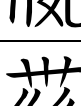
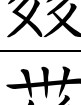
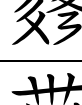
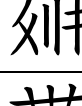
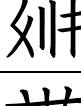
Code Point	13.0	New
174FA		
17501		
17503		
17509		
1750B		
1750C		
17510		
17511		
17512		
17513		
17517		
1751B		
17526		
17527		
1752C		

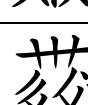
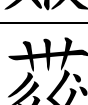
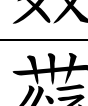
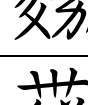
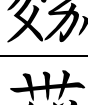
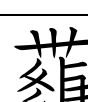
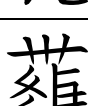
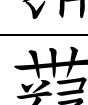
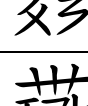
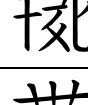
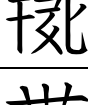
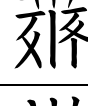
Code Point	13.0	New
17530		
17532		
17533		
17534		
17535		
17536		
17537		
1753A		
1753B		
17542		
17556		
17558		
1755C		
17561		
17564		

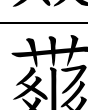
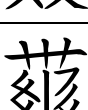
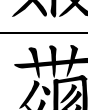
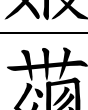
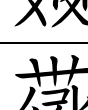
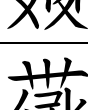
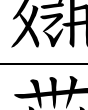
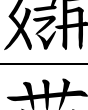
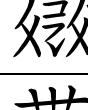
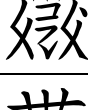
Code Point	13.0	New
1756B		
1756D		
17571		
1757C		
17585		
1758E		
175A6		
175A8		
175AB		
175B3		
175B4		
175B7		
175B8		
175C1		
175C4		

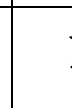
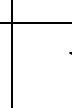
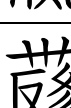
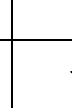
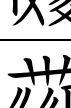
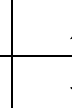
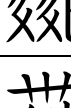
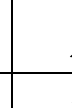
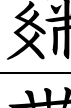
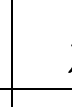
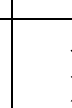
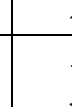
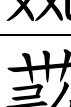
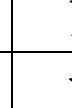
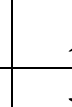
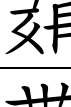
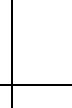
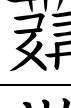
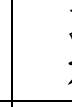
Code Point	13.0	New
175C9		
175CD		
175CE		
175CF		
175D0		
175D1		
175D2		
175EA		
175EE		
175F9		
17604		
17610		
17613		
17618		
17619		

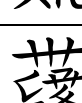
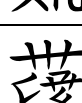
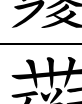
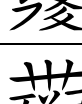
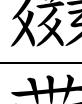
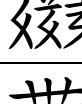
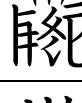
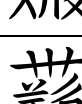
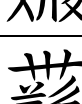
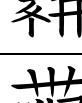
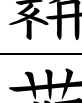
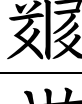
Code Point	13.0	New
1761F		
1762D		
17646		
17662		
1766B		
1766E		
17670		
17673		
17679		
1767A		
1767E		
17694		
17695		
17696		
17697		

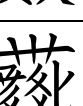
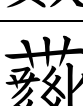
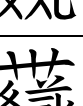
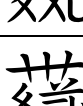
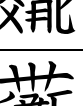
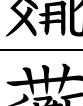
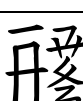
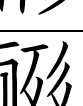
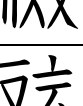
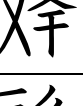
Code Point	13.0	New
1769D		
176A1		
176A9		
176B3		
176C6		
176CA		
176CC		
176CD		
176D4		
176D9		
176DE		
176E2		
176E4		
176E7		
176E8		

Code Point	13.0	New
176EE		
176F0		
176F2		
176F4		
176F9		
176FA		
176FB		
176FC		
176FD		
176FF		
17715		
1771B		
1771C		
1771D		
17725		

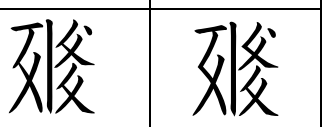
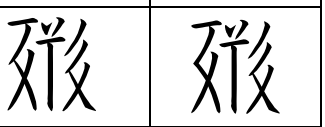
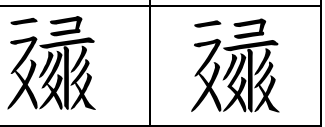
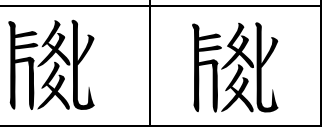
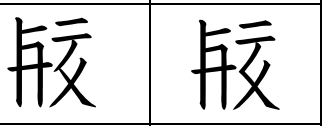
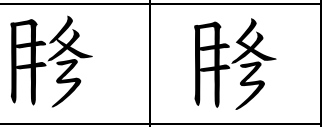
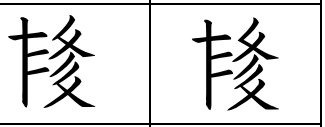
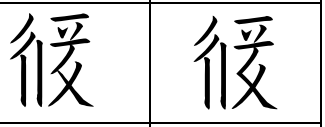
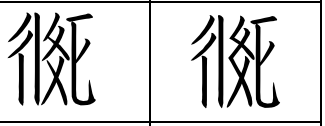
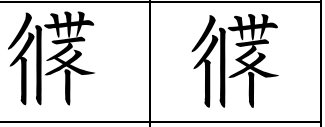
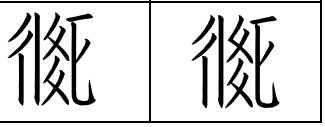
Code Point	13.0	New
17726		
17727		
17729		
1772A		
1772B		
1772C		
1772D		
1772E		
1772F		
17730		
17734		
1773D		
17741		
17745		
1774A		

Code Point	13.0	New
17752		
17753		
17755		
17760		
17762		
17763		
17764		
17765		
17766		
17772		
17774		
17775		
1777A		
17789		
1778B		

Code Point	13.0	New
1778F		
17799		
1779C		
1779F		
177A0		
177A3		
177A4		
177A7		
177A8		
177A9		
177B4		
177B5		
177B6		
177B7		
177BA		

Code Point	13.0	New
177BB		
177C1		
177C2		
177C7		
177CD		
177CE		
177D0		
177DB		
177E4		
177ED		
17800		
1781F		
17829		
1782E		
17839		

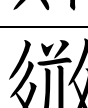
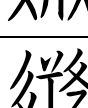
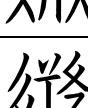
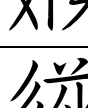
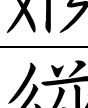
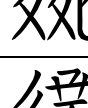
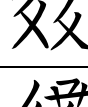
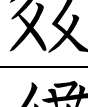
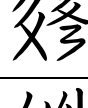
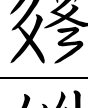
Code Point	13.0	New
1783E		
17841		
1784F		
17853		
17855		
17859		
1785E		
1785F		
17860		
17861		
17862		
17863		
17864		
17865		
17866		

Code Point	13.0	New
17867		
17868		
1786A		
17879		
1787C		
1787D		
1787E		
1787F		
17884		
1788B		
17893		
17898		
178A0		
178A2		
178A3		

Code Point	13.0	New
178A4		
178BB		
178BC		
178BD		
178CF		
178D5		
178D6		
178D7		
178E3		
178E4		
178F6		
17901		
17902		
17903		
17907		

Code Point	13.0	New
1790E		
17917		
17918		
17919		
1791A		
17942		
1794C		
1794F		
17952		
17959		
1795A		
1795B		
1795E		
17967		
17976		

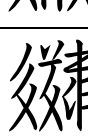
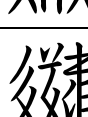
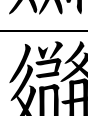
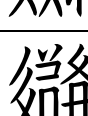
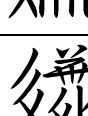
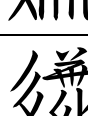
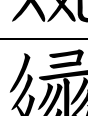
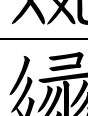
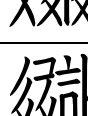
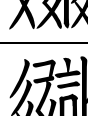
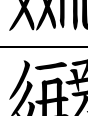
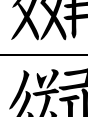
Code Point	13.0	New
1797E		
17980		
17982		
1798B		
1798C		
1798F		
17990		
17996		
17998		
1799E		
179A0		
179A1		
179A2		
179A6		
179AB		

Code Point	13.0	New
179B3		
179B4		
179B5		
179BD		
179C0		
179C1		
179C5		
179D5		
179D8		
179DC		
179E2		
179E9		
179F3		
179FC		
179FD		

Code Point	13.0	New
179FE		
179FF		
17A04		
17A05		
17A0F		
17A14		
17A1C		
17A1F		
17A20		
17A2F		
17A30		
17A38		
17A3C		
17A3F		
17A45		

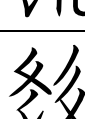
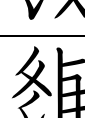
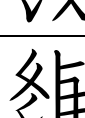
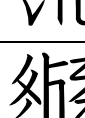
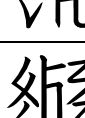
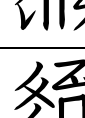
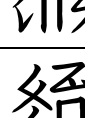
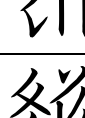
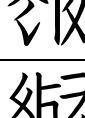
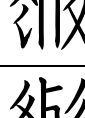
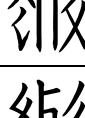
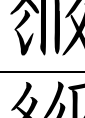
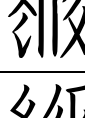
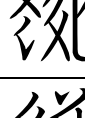
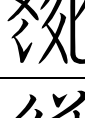
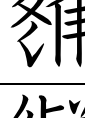
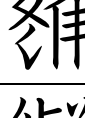
Code Point	13.0	New
17A49		
17A4A		
17A4C		
17A4D		
17A4E		
17A4F		
17A54		
17A56		
17A57		
17A59		
17A5A		
17A5B		
17A5E		
17A60		
17A73		

Code Point	13.0	New
17A74		
17A77		
17A78		
17A7D		
17A82		
17A86		
17A88		
17A89		
17A8F		
17A90		
17A94		
17A97		
17A99		
17A9A		
17AA0		

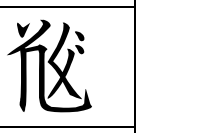
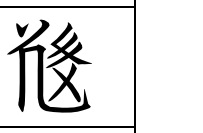
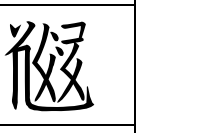
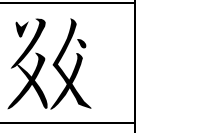
Code Point	13.0	New
17AA1		
17AB1		
17AB2		
17AB5		
17AB7		
17ABB		
17ABE		
17AC3		
17AC8		
17ACA		
17AD0		
17AD1		
17AD9		
17ADC		
17ADF		

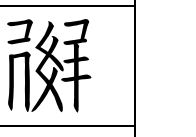
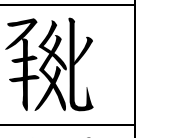
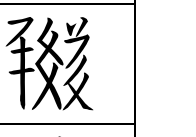
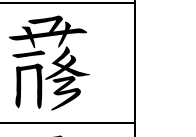
Code Point	13.0	New
17AE2		
17AE4		
17AE6		
17AEE		
17AF5		
17AF6		
17AF7		
17AF8		
17B01		
17B04		
17B0C		
17B0D		
17B0E		
17B0F		
17B10		

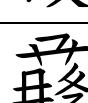
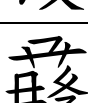
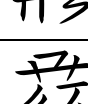
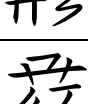
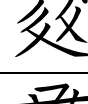
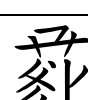
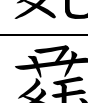
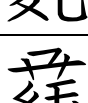
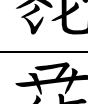
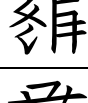
Code Point	13.0	New
17B11		
17B12		
17B13		
17B14		
17B15		
17B16		
17B17		
17B18		
17B19		
17B1A		
17B1B		
17B1C		
17B1D		
17B1E		
17B1F		

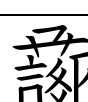
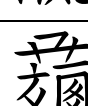
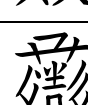
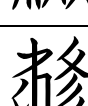
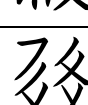
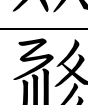
Code Point	13.0	New
17B20		
17B21		
17B22		
17B23		
17B24		
17B25		
17B26		
17B27		
17B28		
17B29		
17B2A		
17B2B		
17B2C		
17B2D		
17B2E		

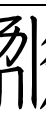
Code Point	13.0	New
17B2F		
17B30		
17B31		
17B32		
17B33		
17B34		
17B35		
17B3C		
17B3E		
17B53		
17B5E		
17B6C		
17B7F		
17B93		
17B98		

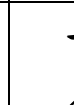
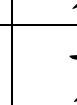
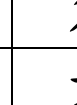
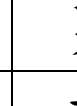
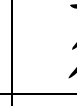
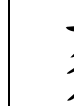
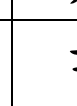
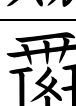
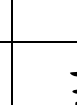
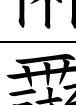
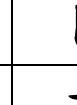
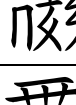
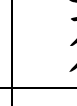
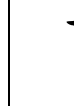
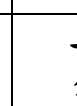
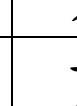
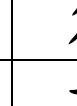
Code Point	13.0	New
17BA5		
17BAC		
17BB3		
17BB6		
17BBE		
17BC6		
17BC8		
17BC9		
17BCB		
17BCE		
17BCF		
17BDF		
17C09		
17C14		
17C17		

Code Point	13.0	New
17C1A		
17C1D		
17C23		
17C27		
17C2B		
17C2C		
17C41		
17C46		
17C4C		
17C56		
17C5A		
17C5B		
17C5E		
17C5F		
17C61		

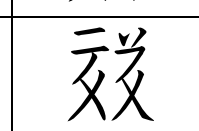
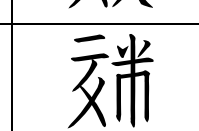
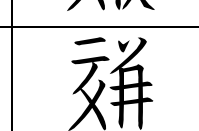
Code Point	13.0	New
17C62		
17C64		
17C6B		
17C6E		
17C6F		
17C70		
17C7A		
17C7B		
17C83		
17C84		
17C85		
17C86		
17C8A		
17C90		
17C95		

Code Point	13.0	New
17C9A		
17C9B		
17C9D		
17C9F		
17CA2		
17CA3		
17CB0		
17CB1		
17CB2		
17CB3		
17CBA		
17CC8		
17CD5		
17CE5		
17D04		

Code Point	13.0	New
17D08		
17D09		
17D18		
17D1B		
17D1F		
17D24		
17D25		
17D26		
17D27		
17D28		
17D29		
17D2A		
17D2B		
17D2C		
17D2D		

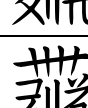
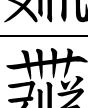
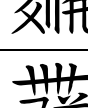
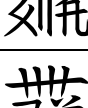
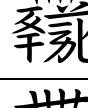
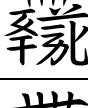
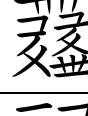
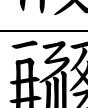
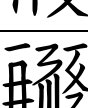
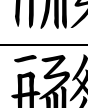
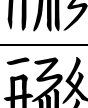
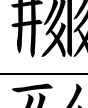
Code Point	13.0	New
17D2E		
17D32		
17D35		
17D36		
17D39		
17D3B		
17D45		
17D47		
17D4A		
17D4B		
17D4D		
17D4E		
17D52		
17D58		
17D59		

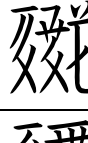
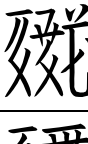
Code Point	13.0	New
17D5C		
17D5D		
17D5E		
17D66		
17D67		
17D68		
17D69		
17D6A		
17D6E		
17D73		
17D75		
17D77		
17D78		
17D79		
17D7B		

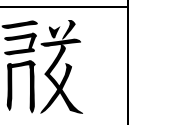
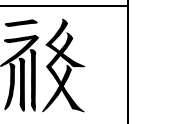
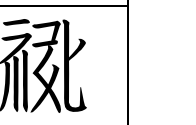
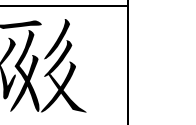
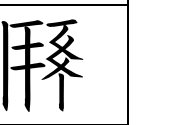
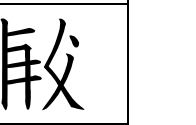
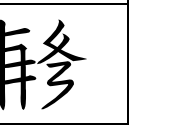
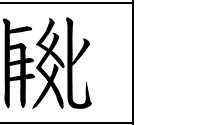
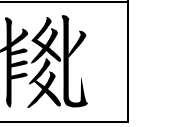
Code Point	13.0	New
17D7C		
17D7D		
17D7E		
17D7F		
17D80		
17D81		
17D82		
17D83		
17D84		
17D85		
17D86		
17D87		
17D88		
17D89		
17D8A		

Code Point	13.0	New
17D8B		
17D8C		
17D8D		
17D8E		
17D8F		
17D90		
17D91		
17D92		
17D93		
17D94		
17D95		
17D96		
17D98		
17D9A		
17DA3		

Code Point	13.0	New
17DA8		
17DA9		
17DAC		
17DAE		
17DB2		
17DB6		
17DB7		
17DBC		
17DBD		
17DC0		
17DC1		
17DC3		
17DC8		
17DCA		
17DCB		

Code Point	13.0	New
17DCC		
17DCD		
17DD2		
17DD3		
17DD4		
17DD6		
17DD7		
17DF9		
17DFE		
17E05		
17E0D		
17E10		
17E12		
17E26		
17E27		

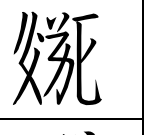
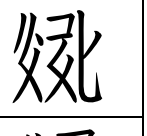
Code Point	13.0	New
17E28		
17E29		
17E2A		
17E2B		
17E2C		
17E2D		
17E2E		
17E2F		
17E30		
17E31		
17E32		
17E33		
17E34		
17E35		
17E3C		

Code Point	13.0	New
17E41		
17E44		
17E50		
17E54		
17E5A		
17E5B		
17E5D		
17E5E		
17E70		
17E71		
17E75		
17E7C		
17E80		
17E81		
17E8C		

Code Point	13.0	New
17E8D		
17E8F		
17EB1		
17EB2		
17EB3		
17EBB		
17EC5		
17ED3		
17EE4		
17EED		
17EF2		
17F12		
17F17		
17F1D		
17F20		

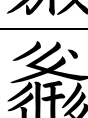
Code Point	13.0	New
17F26		
17F28		
17F29		
17F2F		
17F30		
17F31		
17F32		
17F33		
17F34		
17F35		
17F36		
17F37		
17F38		
17F39		
17F3A		

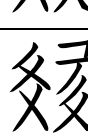
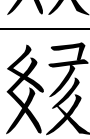
Code Point	13.0	New
17F3B		
17F3C		
17F3D		
17F3E		
17F3F		
17F40		
17F41		
17F42		
17F43		
17F44		
17F45		
17F46		
17F47		
17F48		
17F49		

Code Point	13.0	New
17F4A		
17F4B		
17F4C		
17F4D		
17F4E		
17F4F		
17F50		
17F51		
17F52		
17F53		
17F54		
17F55		
17F56		
17F57		
17F58		

Code Point	13.0	New
17F59		
17F5A		
17F5B		
17F5C		
17F5D		
17F5E		
17F5F		
17F60		
17F61		
17F62		
17F63		
17F64		
17F65		
17F66		
17F67		

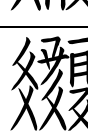
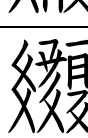
Code Point	13.0	New
17F68		
17F69		
17F6A		
17F6B		
17F6C		
17F6D		
17F6E		
17F6F		
17F70		
17F71		
17F72		
17F73		
17F74		
17F75		
17F76		

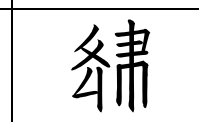
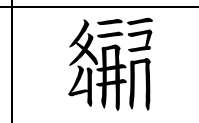
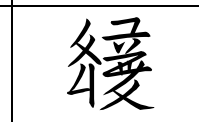
Code Point	13.0	New
17F77		
17F78		
17F79		
17F7A		
17F7B		
17F7C		
17F7D		
17F7E		
17F7F		
17F80		
17F81		
17F82		
17F83		
17F84		
17F85		

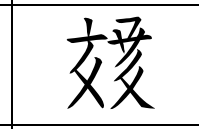
Code Point	13.0	New
17F88		
17F89		
17F8D		
17F90		
17F91		
17F93		
17F94		
17F96		
17F98		
17F9A		
17F9C		
17F9E		
17F9F		
17FA1		
17FA7		

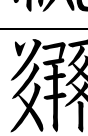
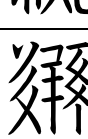
Code Point	13.0	New
17FAA		
17FAB		
17FAD		
17FAE		
17FAF		
17FB0		
17FB1		
17FB9		
17FBA		
17FBB		
17FBE		
17FBF		
17FC0		
17FC2		
17FC5		

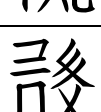
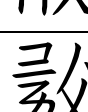
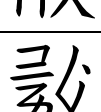
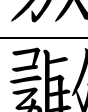
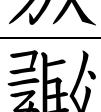
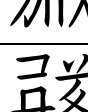
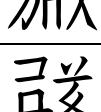
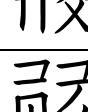
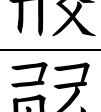
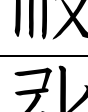
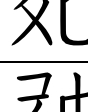
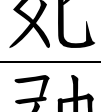
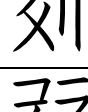
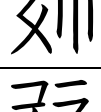
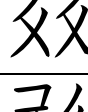
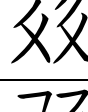
Code Point	13.0	New
17FC6		
17FCA		
17FCC		
17FCF		
17FD0		
17FD2		
17FD4		
17FD5		
17FDC		
17FDD		
17FDE		
17FDF		
17FE0		
17FE2		
17FE3		

Code Point	13.0	New
17FE4		
17FE7		
17FEA		
17FEE		
17FEF		
17FF0		
17FF1		
17FF3		
17FF4		
17FF5		
17FF7		
17FF8		
17FF9		
17FFE		
17FFF		

Code Point	13.0	New
18000		
18001		
18002		
18008		
1800A		
1800C		
1800E		
18012		
18014		
18015		
18016		
18017		
18019		
1801A		
1801B		

Code Point	13.0	New
1801C		
1802C		
1802D		
1802F		
18030		
18031		
18032		
18033		
18034		
18035		
18037		
18038		
18039		
1803A		
1803B		

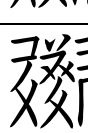
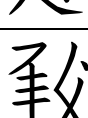
Code Point	13.0	New
1803C		
1803D		
1803F		
18051		
18053		
18064		
1806C		
18074		
18077		
1807F		
18094		
18098		
1809C		
180A6		
180C8		

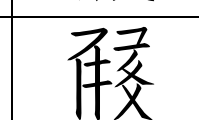
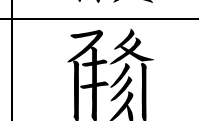
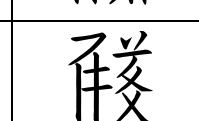
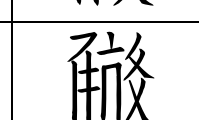
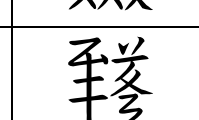
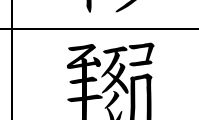
Code Point	13.0	New
180D6		
180D7		
180E1		
180E7		
180F7		
18101		
18116		
1811A		
18126		
1812B		
1812F		
18130		
18132		
18133		
18134		

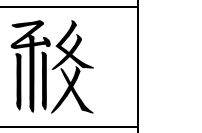
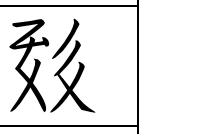
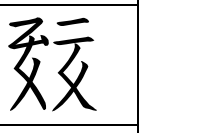
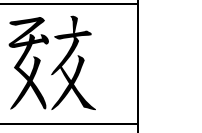
Code Point	13.0	New
18135		
18136		
18137		
18138		
1813A		
1813B		
1813C		
1813D		
1813F		
18140		
18141		
18142		
18143		
18144		
18145		

Code Point	13.0	New
18149		
1814A		
1814B		
1814C		
1814D		
1814E		
1814F		
18150		
18151		
18152		
18154		
18156		
18157		
18158		
18159		

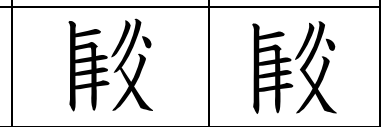
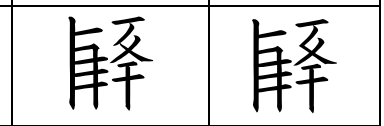
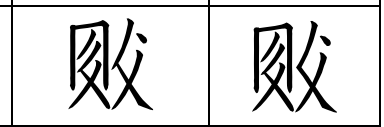
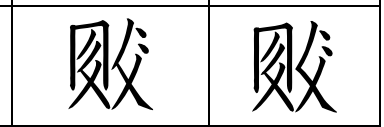
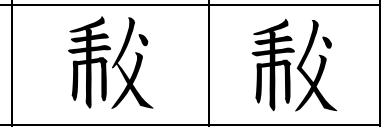
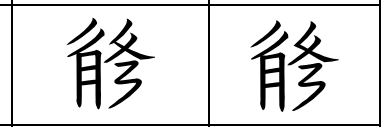
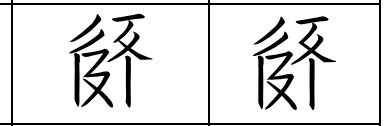
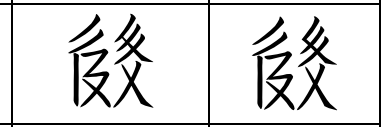
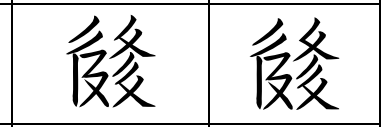
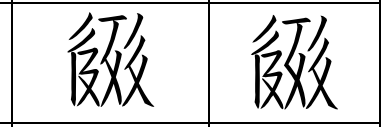
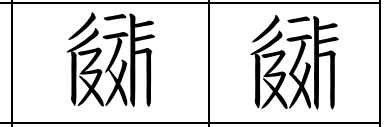
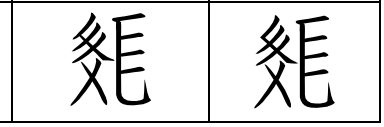
Code Point	13.0	New
1815A		
1815B		
1815C		
1815D		
1815E		
1815F		
18161		
18162		
18163		
18164		
18165		
18167		
18168		
18169		
1816B		

Code Point	13.0	New
1816E		
18170		
18171		
18172		
18173		
18174		
18175		
18177		
18178		
18179		
1817A		
1817B		
1817D		
1817E		
18181		

Code Point	13.0	New
18183		
18187		
18193		
1819A		
181A4		
181B5		
181B7		
181BD		
181C3		
181C6		
181C7		
181D0		
181D4		
181E8		
181E9		

Code Point	13.0	New
181EC		
181ED		
181EE		
181F4		
181F9		
181FA		
181FB		
181FC		
181FD		
181FE		
181FF		
18200		
18201		
18202		
18203		

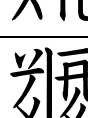
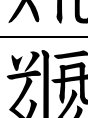
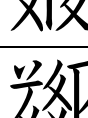
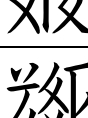
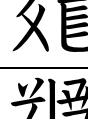
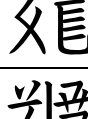
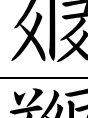
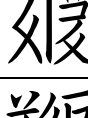
Code Point	13.0	New
18204		
18205		
18206		
18208		
18213		
18215		
18216		
18217		
18226		
18227		
1822B		
1822C		
1822D		
1822F		
18232		

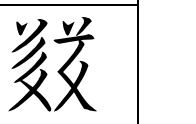
Code Point	13.0	New
18237		
1823F		
18241		
1824D		
18251		
18261		
18266		
18275		
1827A		
18283		
18286		
1828A		
1828F		
18290		
18291		

Code Point	13.0	New
18292		
18293		
18294		
18295		
18296		
18297		
18298		
18299		
1829A		
1829B		
1829C		
1829D		
1829E		
1829F		
182A0		

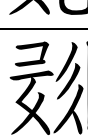
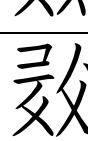
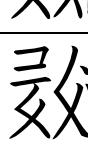
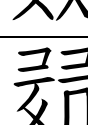
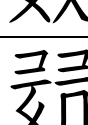
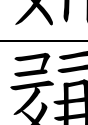
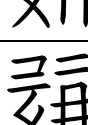
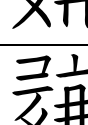
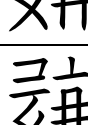
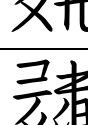
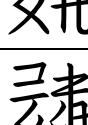
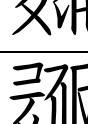
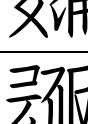
Code Point	13.0	New
182A1		
182A2		
182A4		
182A5		
182A6		
182A7		
182A8		
182A9		
182AA		
182BB		
182C1		
182C3		
182C8		
182C9		
182CC		

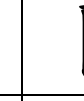
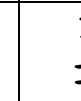
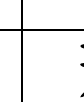
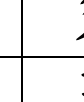
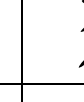
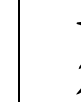
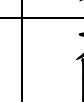
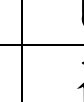
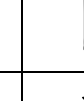
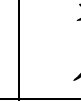
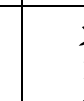
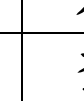
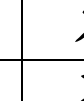
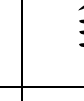
Code Point	13.0	New
182CE		
182D2		
182D4		
182D7		
182E0		
182E5		
182E7		
182E8		
182E9		
182EA		
182EB		
182EC		
182ED		
182EE		
182EF		

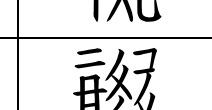
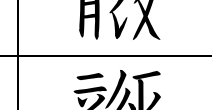
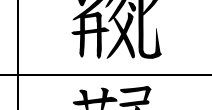
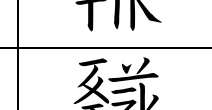
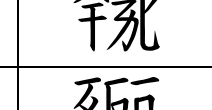
Code Point	13.0	New
182F0		
182F1		
182F2		
182F3		
182F4		
182F5		
182F6		
182F7		
182F8		
182F9		
182FE		
18301		
1830A		
18311		
18314		

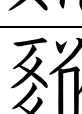
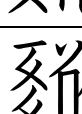
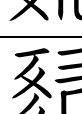
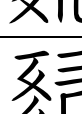
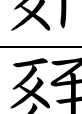
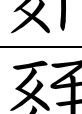
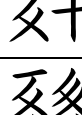
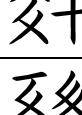
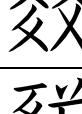
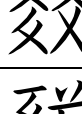
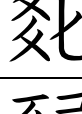
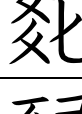
Code Point	13.0	New
18324		
18333		
18337		
18365		
1836D		
1836E		
1837A		
1837E		
18393		
18395		
18398		
1839B		
183A1		
183B5		
183CA		

Code Point	13.0	New
183D1		
183D2		
183E8		
183EF		
183FC		
18400		
18405		
18419		
1841E		
1841F		
18421		
18422		
18427		
1842C		
18431		

Code Point	13.0	New
18437		
18442		
18444		
18446		
18448		
1845B		
1845C		
1845D		
1845E		
1845F		
18460		
18461		
18462		
18463		
18464		

Code Point	13.0	New
18466		
1846F		
18479		
18482		
18491		
184A8		
184AA		
184B0		
184B3		
184B4		
184B6		
184C4		
184CB		
184CE		
184D3		

Code Point	13.0	New
184DA		
184DB		
184E0		
184E7		
184E9		
184EA		
184EB		
1850B		
1850C		
1850D		
1850E		
1850F		
18510		
18511		
18512		

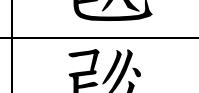
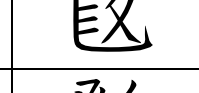
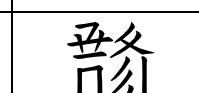
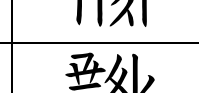
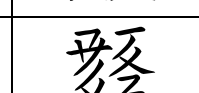
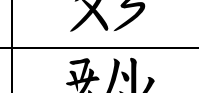
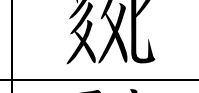
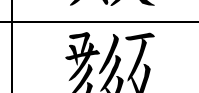
Code Point	13.0	New
18513		
18514		
18515		
18516		
18517		
18518		
18519		
1851A		
1851B		
1851C		
1851D		
1851E		
1851F		
18520		
18521		

Code Point	13.0	New
18522		
18523		
18524		
18525		
18530		
18531		
18532		
18533		
18534		
18535		
18536		
18537		
18538		
18539		
1853A		

Code Point	13.0	New
1853B		
1853C		
1853D		
18540		
18544		
1854E		
18550		
18552		
18557		
1856B		
1856C		
18581		
1858A		
1858B		
1858C		

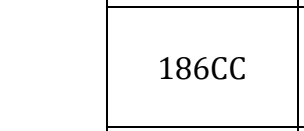
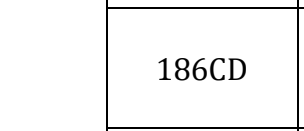
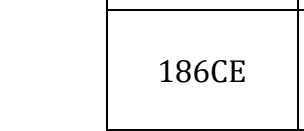
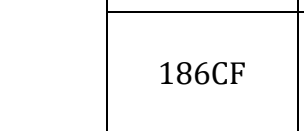
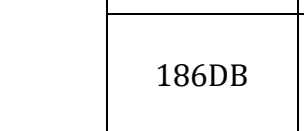
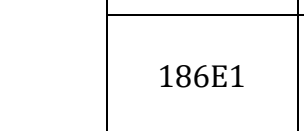
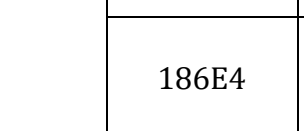
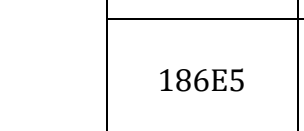
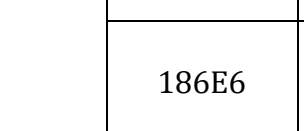
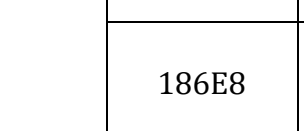
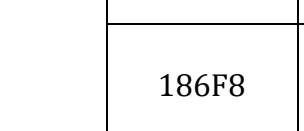
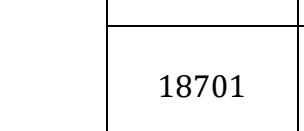
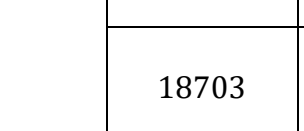
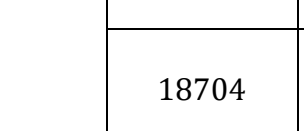
Code Point	13.0	New
1858D		
1858E		
1858F		
18590		
18591		
18592		
18593		
18594		
18595		
18596		
18597		
18598		
1859A		
185AB		
185B3		

Code Point	13.0	New
185B9		
185BD		
185BE		
185CA		
185CF		
185D8		
185DA		
185DB		
185E3		
185F2		
185F4		
185F5		
185F6		
185F7		
185F9		

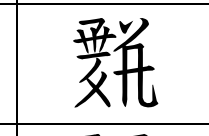
Code Point	13.0	New
185FE		
1860B		
1860D		
1861D		
18620		
18621		
1862C		
18630		
1863F		
18640		
18650		
18651		
18652		
18653		
18657		

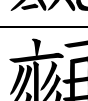
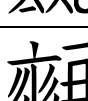
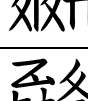
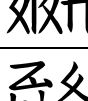
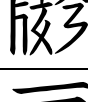
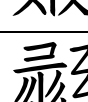
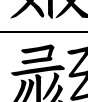
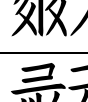
Code Point	13.0	New
18658		
1865A		
1865F		
18660		
18663		
18664		
18667		
1866F		
18671		
18675		
1867C		
1867D		
18681		
18682		
18686		

Code Point	13.0	New
18687		
18688		
18689		
1868A		
1868B		
18695		
18697		
1869B		
1869D		
1869E		
186A1		
186A8		
186AE		
186B0		
186B4		

Code Point	13.0	New
186B7		
186CC		
186CD		
186CE		
186CF		
186DB		
186E1		
186E4		
186E5		
186E6		
186E8		
186F8		
18701		
18703		
18704		

Code Point	13.0	New
18705		
18706		
1870A		
1870B		
1870C		
1870E		
1870F		
18710		
1871A		
1871C		
18729		
18743		
1874B		
1875B		
1875C		

Code Point	13.0	New
18760		
18772		
1877D		
1877E		
1877F		
18780		
18781		
18782		
18783		
18784		
18785		
1878F		
187A6		
187B7		
187C3		

Code Point	13.0	New
187C4		
187C9		
187CF		
187D6		
187D7		
187D8		
187E0		
187E1		
187E2		
187E5		
187E6