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Proposal to add Pollard to Unicode/ISO-IEC 10646

Overview

This is a very preliminary proposal on encoding the Pollard script in Unicode and ISO/IEC 10646. The targeted location for encoding would be Plane 1, as Pollard is a recently invented script with limited current use.

Any suggestions on improvement would be greatly appreciated. Please send me mail at jenkins@apple.com.

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Background

General introduction

The Miao are a group of non-Han tribes living mostly in southwestern China. As population pressure from the Han has increased, some Miao groups moved further south, mostly into Vietnam and Laos. From there, many have been driven overseas by years of warfare into countries such as the United States.

"Miao" (苗) isn't the Miao name for themselves; it's the name the Chinese use for them. The character is a homophone for "cat" (貓), and, like "cat", was occasionally written with the "dog" radical often used when writing the names of non-Han minorities (犭). As a result, the word borders on the insulting. Unfortunately, the Miao have no word for all the Miao collectively, only

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words for individual Miao subgroups, and so there aren't any realistic alternatives.

Individual Miao tribes were traditionally known in Western literature by the characteristic color of their clothing—"Black" Miao, "Green" Miao, "Flowery" Miao, and so on. These names are dropping out of use and being replaced with the native Miao names. For example, the Miao tribes who emigrated to Vietnam/Laos and onwards are usually called by their own name for themselves, "Hmong."

The Miao are a loosely organized people without any true political organization above the level of the village. Their technology is also minimal, their incomes meager, and as a rule, they've been pushed to the side and ignored as much as possible by their Chinese rulers. This has changed over the course of the past century, as first the West and then modern China has taken notice of them and sought to improve their lives.

The Miao speak a number of mutually unintelligible languages. Miao languages are related to the Yao languages (also of south China) and may be a part of the Sino-Tibetan family. Certainly Miao languages share many of the characteristics of Sino-Tibetan languages: they tend to be monosyllabic and isolating, and syllables tend to be structured as *initial + final + tone*. Finals are usually vowels only, or occasionally vowels plus a nasal. The initial consonant cluster can be quite complex, as distinctions can be made between all of vocalization/non-vocalization, aspiration/non-aspiration, nasalization/non-nasalization for various consonants. Examples of this are below.

The Miao have no written language of their own. They have legends explaining that at one point the Miao had been a literate people but they lost their writing at some point in their ancient history, and that their illiteracy is one of the reasons for their downtrodden state. As a result, there tends to be a messianic quality to the introduction of writing to the Miao, as seen in the development of Pahawh Hmong in Vietnam/Laos and the introduction of Pollard in China.

Various writing systems have been developed for Miao during the course of the 20th century. Most of them—particularly the ones officially promulgated by the People's Republic of China—are written with the Latin alphabet, usually without diacritics. (Tones are generally indicated by postpending consonants.) There are, however, two exceptions in current use: the Pahawh Hmong developed from the late 1950's to the early 1970's to write various Hmong dialects, and the Pollard "syllabary" developed in the first third of the 20th century to write A-Hmao.

The A-Hmao

The A-Hmao are a division of the Hmong who live mostly in Guizhou and Yunnan provinces of China. There are approximately 200,000 A-Hmao as of the early 1980's. They are among the smallest of the Miao groups and among the poorest.

The A-Hmao language is particularly complex phonetically. Phonemically, it has sixty initials of its own (including a null-initial) and one more required to pronounce Chinese loan-words, and 14 finals (plus 17 more for Chinese loan-words). A-Hmao has approximately seven or eight tones (depending, as usual, on how you count them) and a particularly complex tone sandhi process by which tones interact with and alter the tones and other phonemes in other words.

One result of tone sandhi in A-Hmao is that some initials will be vocalized before some tones and unvocalized before others. There are enough exceptions to this rule, however, that there are suggestions that up to 110 phonetically distinct initials need to be represented in order to write A-Hmao.

Pollard

Christian missionaries began working with the A-Hmao around the turn of the 20th century. Among them was Samuel Pollard, who worked with the A-Hmao from 1904 until his death in 1915.

One of his initial frustrations in his teaching of the A-Hmao was their lack of a writing system. Inspired by the work of James Evans, who invented a syllabary for the Cree in Canada during the 1840's, he determined to create a syllabary for the writing of A-Hmao. A number books were published using this syllabary during his lifetime, but he was continually reworking and modifying the script. Indeed, it didn't reach a fully stable form until 1936, when an entire New Testament was published using it. By this point, Pollard's script was being enthusiastically adopted by the A-Hmao. They saw it as a restoration of their ancient, lost writing system and many further assumed that the books Pollard published using it (namely, parts of the Bible and other religious works) were the actual lost books of the ancient Miao.

By the time the PRC was able to assert control over Yunnan and other southern provinces, the use of Pollard was well-established among the A-Hmao, being used for general texts as well as religious ones. The new Chinese government, however, was less than enthusiastic about the use of a script developed by a foreign missionary and vacillated regarding the promotion of *any* writing system for any language other than Chinese. The PRC pinyin-like phonetic alphabet was developed for A-Hmao but found little acceptance: partly because Pollard was already well-established, partly because the Chinese themselves often pushed assimilation into the Han race over maintain individual nationalities, and partly because you need to write more letters for the same sounds.

On the other hand, one of the main criticisms against Pollard was its inability to reflect the full phonetic richness of A-Hmao, particularly its failure to be able to represent all the tones and write Chinese loan-words. Pollard's mechanism for writing tones, moreover, was cumbersome and ill-suited for the printing technologies available. As a result, various efforts were made to reform the syllabary, culminating in a semi-official "reformed" Pollard script finalized in 1988.

Currently, there are three writing systems in use in China to represent the A-Hmao language: the PRC's pinyin, the original 1936 Pollard script, and the reformed 1988 Pollard script.

The 1936 version of Pollard should be taken as the fundamental basis for encoding the script. It represents a relatively stable landmark in the history of this writing system, having been used continuously for the past sixty years. The 1988 recension represents the most recent version and the culmination of decades of work trying to "improve" Pollard but its stability is not guaranteed.

The Pollard script

Basic structure of Pollard

Strictly speaking, Pollard is *not* a syllabary. It gets that name from the fact that, rather like hangul, it writes individual syllables as independent blocks. Also like hangul, however, those syllables have a regular structure which can be broken down into smaller phonemic pieces.

And, like hangul, it would be most unfortunate if Pollard were to be encoded using all possible $110 \times 31 \times 8 = 27,280$ individual precomposed syllables, particularly if they were to be put in the BMP.

Pollard divides each individual syllable into an initial and a final. The initial is written with one "large" letter, and the final with a second, "small" letter. (The small letters are indeed, physically smaller, about one-third to one-quarter the size of the large letters.) Even here, however, "letter" is a misnomer, since many of them can be further broken down into smaller, phonetically meaningful pieces. (Occasionally these smaller pieces are ligated together.)

In Pollard's original system, the tone of a syllable is indicated by placing the final letter in one of five positions surrounding the initial letter. This is incredibly clumsy and makes it difficult to use Pollard with any technology between handwriting and a modern line layout-savvy computer. One of the changes made by the time of the 1988 revision was a new way to represent tones: the finals are all written left-to-right from the base of the initial and are followed by one of seven tone markers; a missing tone marker is used to represent an eighth tone.

Initials

Although there are sixty or so initials in A-Hmao (see Appendix 1), there are fewer characters required by Pollard to write them. This is because each initial is broken down as:

Base consonant +
optional aspiration mark +
optional voicing mark

In point of fact, many of the initials are simple ligatures of C and a following consonant. Ten code points could be saved by using ligation to represent these initials. There are two main reasons why this isn't done in this proposal:

First of all, there is a standard and uniform presentation of the 32 initials of the 1933 Pollard. Representing eight of these 32 initials as compounds would fail to reflect how people who actually use this writing system think about it.

Secondly, there is a temptation to treat the finals in the same way—using ligation to save on the number of code points required. Although it's possible to do so cleanly with the initials, it isn't possible to do so cleanly with the finals. To maintain consistency in the encoding of the initials and finals, then, we propose that the full set of each be encoded.

The initials are subdivided into two ranges. Positions 0001 $\text{xx}00$ through 0001 $\text{xx}1F$ are the standard thirty-two "big letters" of the 1933 Pollard. Positions 0001 $\text{xx}20$ through 0001 $\text{xx}28$ are the additional initials used by the 1988 Pollard.

0001 $\text{xx}00$	Y	POLLARD INITIAL GLOTTAL STOP
0001 $\text{xx}01$	L	POLLARD INITIAL L
0001 $\text{xx}02$	J	POLLARD INITIAL B
0001 $\text{xx}03$	T	POLLARD INITIAL D
0001 $\text{xx}04$	+	POLLARD INITIAL Z
0001 $\text{xx}05$	Г	POLLARD INITIAL F
0001 $\text{xx}06$	Г	POLLARD INITIAL H
0001 $\text{xx}07$	С	POLLARD INITIAL ZH
0001 $\text{xx}08$	Ж	POLLARD INITIAL G
0001 $\text{xx}09$	Т	POLLARD INITIAL DR
0001 $\text{xx}0A$	Т	POLLARD INITIAL GH

0001 xx0B	Ꞁ	POLLARD INITIAL N
0001 xx0C	ꞁ	POLLARD INITIAL M
0001 xx0D	Ꞃ	POLLARD INITIAL W
0001 xx0E	ꞃ	POLLARD INITIAL V
0001 xx0F	Ꞅ	POLLARD INITIAL Y
0001 xx10	ꞅ	POLLARD INITIAL S
0001 xx11	Ꞇ	POLLARD INITIAL R
0001 xx12	ꞇ	POLLARD INITIAL DL
0001 xx13	ꞈ	POLLARD INITIAL HL
0001 xx14	꞉	POLLARD INITIAL NG
0001 xx15	꞊	POLLARD INITIAL XG
0001 xx16	Ꞌ	POLLARD INITIAL SH
0001 xx17	ꞌ	POLLARD INITIAL RH
0001 xx18	Ɥ	POLLARD INITIAL NB
0001 xx19	ꞎ	POLLARD INITIAL NZ
0001 xx1A	ꞏ	POLLARD INITIAL NZH
0001 xx1B	Ꞑ	POLLARD INITIAL NG
0001 xx1C	ꞑ	POLLARD INITIAL ND
0001 xx1D	Ꞓ	POLLARD INITIAL NDR
0001 xx1E	ꞓ	POLLARD INITIAL NGH
0001 xx1F	ꞔ	POLLARD INITIAL NDL
0001 xx20	ꞕ	POLLARD INITIAL NR
0001 xx21	Ꞗ	POLLARD INITIAL NI
0001 xx22	ꞗ	POLLARD INITIAL PALATIZED Y
0001 xx23	Ꞙ	POLLARD INITIAL J
0001 xx24	ꞙ	POLLARD INITIAL PALATIZED DL
0001 xx25	Ꞛ	POLLARD INITIAL SHI
0001 xx26	ꞛ	POLLARD INITIAL GAMMA
0001 xx27	Ꞝ	POLLARD INITIAL N PALATIZED DL
0001 xx28	ꞝ	POLLARD INITIAL NJ

The names for the characters are derived as much as possible from the PRC's A-Hmao pinyin, since it gives a nice ASCII only way of writing A-Hmao. Where different recensions of pinyin give different spellings for the phonemes, the most recent is used.

The only names not derived from pinyin are: the glottal stop, the "gamma," and the three palatized initials, which aren't in pinyin. The glottal stop is in both recensions of Pollard, but the palatized initials are only found in the 1988 version. Enwall admits to not understanding how they're supposed to fit into A-Hmao's phonetic structure. The "gamma" is also found only in the 1988 recension.

Finals

As with initials, a full table derived from Enwall can be found in an Appendix illustrating the various finals of A-Hmao as represented by pinyin, the 1936 version of Pollard and the 1988 version of Pollard.

There are fewer finals in A-Hmao itself, but Pollard's handling of finals is complicated by the need to add additional finals for Chinese loan words.

All of the finals for A-Hmao itself are represented by unique glyphs and should be separately encoded.

Most of the finals for borrowings from Chinese, however, which do *not* end in an -n or -ng can be spelled by placing two A-Hmao finals together and possibly ligating them. The finals with nasals can be most efficiently accomodated by encoding separately just a final n and ng and allowing them to change shape as they're appended to different final strings, but this seems counter-intuitive. Probably the best thing to do is to just separately add all eight finals needed for Chinese loan-words ending in nasals.

Because some some of the compound finals can be spelled and others can't, and becuae those that can be spelled are scattered throughout the finals (rather than being isolated in one block), we've simply included all the thirty-seven finals from the 1936 version of Pollard. This is inconsistent with our policy regarding the initials.

Note also that this means that a second aspiration character is included. This should be unified away.

Appendix 2 also shows that some of the characters changed shape between 1936 and 1988; this, however, is just a font problem.

This gives us the encoding:

0001	xx29	-	POLLARD FINAL A
0001	xx2A	ᵀ	POLLARD FINAL AI
0001	xx2B	ᵁ	POLLARD FINAL EI
0001	xx2C	ᵂ	POLLARD FINAL H
0001	xx2D	ᵃ	POLLARD FINAL Y
0001	xx2E	ᵄ	POLLARD FINAL I
0001	xx2F	ᵅ	POLLARD FINAL U
0001	xx30	ᵆ	POLLARD FINAL ASPIRATION
0001	xx31	=	POLLARD FINAL IE
0001	xx32	ᵇ	POLLARD FINAL AU
0001	xx33	ᵈ	POLLARD FINAL O
0001	xx34	ᵉ	POLLARD FINAL YU
0001	xx35	ᶀ	POLLARD FINAL W
0001	xx36	ᶁ	POLLARD FINAL EU
0001	xx37	ᶂ	POLLARD FINAL E
0001	xx38	ᶃ	POLLARD FINAL AW
0001	xx39	ᶄ	POLLARD FINAL IA
0001	xx3A	ᶅ	POLLARD FINAL IE

0001 xx3B	no	POLLARD FINAL IO
0001 xx3C	~	POLLARD FINAL IU
0001 xx3D	ni	POLLARD FINAL IAI
0001 xx3E	nii	POLLARD FINAL IAO
0001 xx3F	nb	POLLARD FINAL IW
0001 xx40	ns	POLLARD FINAL IEU
0001 xx41	np	POLLARD FINAL IEH
0001 xx42	nb	POLLARD FINAL IANG
0001 xx43	nb	POLLARD FINAL IN
0001 xx44	τ	POLLARD FINAL AN
0001 xx45	ε	POLLARD FINAL EN
0001 xx46	ε	POLLARD FINAL ENG
0001 xx47	q	POLLARD FINAL OU
0001 xx48	u	POLLARD FINAL UA
0001 xx49	ub	POLLARD FINAL UAW
0001 xx4A	u	POLLARD FINAL UI
0001 xx4B	uc	POLLARD FINAL UN
0001 xx4C	uo	POLLARD FINAL UO
0001 xx4D	ob	POLLARD FINAL ONG
0001 xx4E	ne	POLLARD FINAL ING
0001 xx4F	tb	POLLARD FINAL ANG
0001 xx50	nc	POLLARD FINAL IAN
0001 xx51	uc	POLLARD FINAL UAN

Code positions 0001 xx29 through 0001 xx4D are the 37 "little letters" of the 1936 Pollard. The remainder are additions required for the 1988 recension.

The names for POLLARD FINAL Y and POLLARD FINAL H are less than satisfactory. These are A-Hmao finals without a pinyin equivalent in the current system. "Y" is used for the former because it isn't used for anything else, and "H" for the latter because the first version of the A-Hmao pinyin used an upside-down "h" to write it. Their actual sounds are found in Appendix 2.

Tones

Encoding the A-Hmao tones as represented by Pollard is easy. (How accurately they portray the tones as spoken is another matter.)

The 1936 version of Pollard indicates tones by placing the final letter(s) in one of four positions relative to the initial. The fifth position (bottom) wasn't used in the 1936 recension of the script but had been used earlier, so we include it.

0001	xx52	⊙	POLLARD FINAL POSITION TOP
0001	xx53	⊙ ^o	POLLARD FINAL POSITION TOP-RIGHT
0001	xx54	⊙⊙	POLLARD FINAL POSITION RIGHT
0001	xx55	⊙ _o	POLLARD FINAL POSITION BOTTOM-RIGHT
0001	xx56	⊙	POLLARD FINAL POSITION BOTTOM

The one tricky point is where they're to be positioned in the text stream. The most reasonable place, I think, from a processing point of view is between the initial(s) and the final(s). In the absence of people on hand to write with Pollard, one assumes this is also how people who *write* using the 1936 version think: Write the initial, figure out where to put the final, write the final. On the other hand, it seems a bit counter-intuitive in terms of how the syllable is thought of in the abstract and doesn't mesh well with the 1988 approach.

As for the 1988 tone marks, they are very straightforward and are the final element of any syllable block. The names are derived from the pinyin letters used for the tones.

0001	xx57	ɜ	POLLARD TONE B
0001	xx58	ɹ	POLLARD TONE X
0001	xx59	ɱ	POLLARD TONE L
0001	xx5A	ɽ	POLLARD TONE T
0001	xx5B	s	POLLARD TONE S
0001	xx5C	l	POLLARD TONE K
0001	xx5D	t	POLLARD TONE F

Other characters

The 1988 recension of Pollard requires one other character:

0001	xx5E	◌̣	POLLARD VOICED SOUND MARK
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This character is placed after an initial to indicate that it's voiced.

Summary of the encoding proposal

The code positions used (taking up a total of six columns) are:

	xx0	xx1	xx2	xx3	xx4	xx5
0	Y	S	Ɔ	'	ɱɣ	ɽɹ
1	L	ɜ	ɽ	=	ɱɹ	ɽɹ
2	J	Δ	A		ɽɹ	⊙ ⊙ ^o

3	ᠮ	ᠯ	ᠠ	ᠣ	ᠨᠪ	ᠮᠤᠨ
4	ᠮ	ᠮ	ᠠ	ᠣ	ᠮ	ᠮᠤᠨ
5	ᠮ	ᠮ	ᠠ	ᠣ	ᠮ	ᠮᠤᠨ
6	ᠮ	ᠮ	ᠠ	ᠣ	ᠮ	ᠮᠤᠨ
7	ᠮ	ᠮ	ᠠ	ᠣ	ᠮ	ᠮᠤᠨ
8	ᠮ	ᠮ	ᠠ	ᠣ	ᠮ	ᠮᠤᠨ
9	ᠮ	ᠮ	ᠠ	ᠣ	ᠮ	ᠮᠤᠨ
A	ᠮ	ᠮ	ᠠ	ᠣ	ᠮ	ᠮᠤᠨ
B	ᠮ	ᠮ	ᠠ	ᠣ	ᠮ	ᠮᠤᠨ
C	ᠮ	ᠮ	ᠠ	ᠣ	ᠮ	ᠮᠤᠨ
D	ᠮ	ᠮ	ᠠ	ᠣ	ᠮ	ᠮᠤᠨ
E	ᠮ	ᠮ	ᠠ	ᠣ	ᠮ	ᠮᠤᠨ
F	ᠮ	ᠮ	ᠠ	ᠣ	ᠮ	ᠮᠤᠨ

A Pollard syllable is generated:

(A) For the 1936 version of the script, by an initial, followed by an optional breathing mark, followed by a final, followed by a tone position indicator.

(B) For the 1988 version of the script, by one or more initials followed by one or more finals followed by at most one tone mark.

Issues and alternate encodings

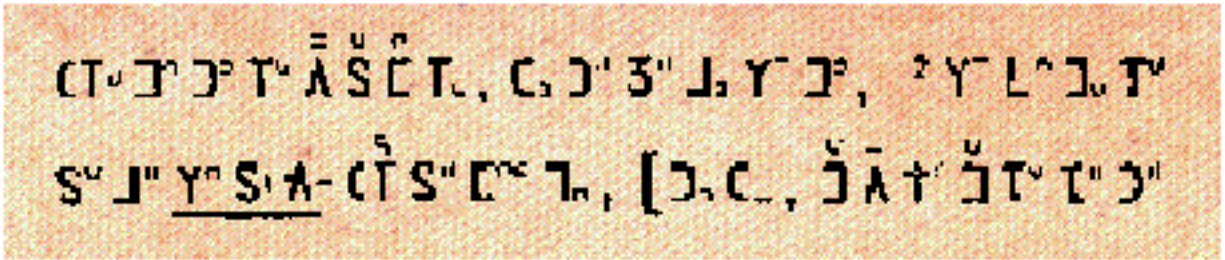
The main alternative in encoding Pollard is to simply skip the 1988 recension altogether pending further data.

The 1936 recension is stable, comparatively well-established and comparatively well-known and, according to Enwall, still in actual use. It's not unreasonable to proceed with encoding it at this point.

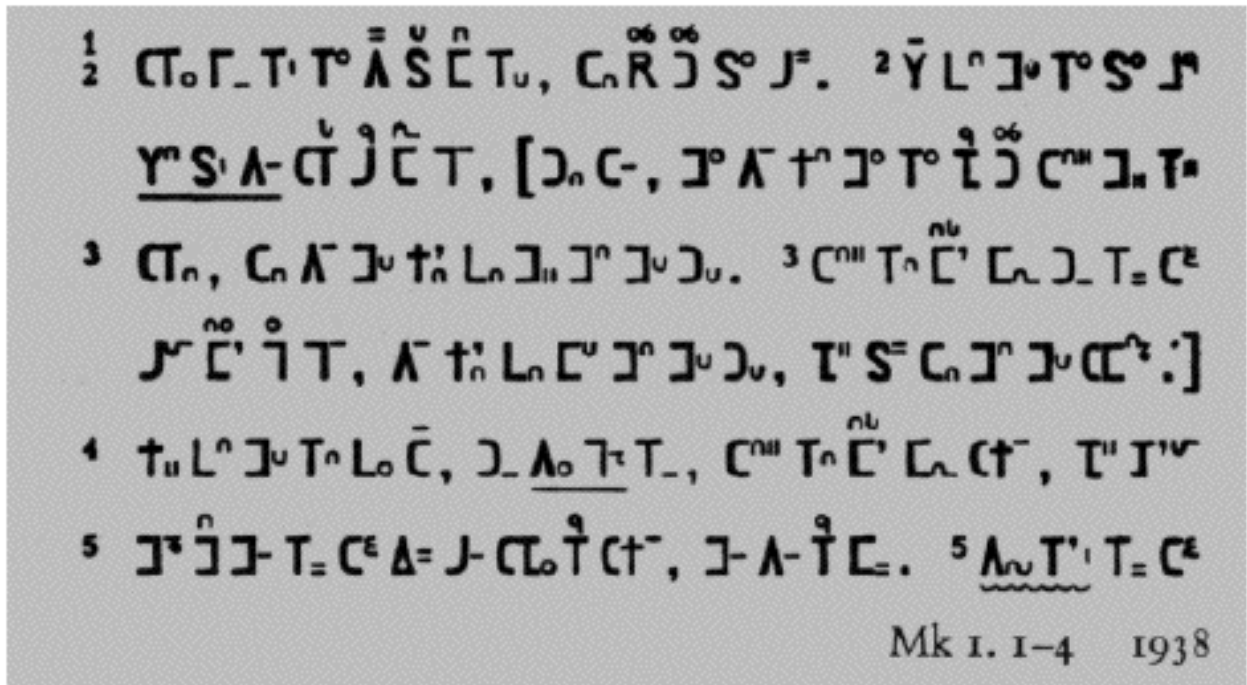
The 1988 recension, however, *may* be stable—and it may not. Information really should be obtained from people inside China before we can tell.

It might also be preferable to have the tone marker for the 1936 Pollard go *between* the initial and the final.

Samples



From <http://idris.com/scripts/Invented.html>.



From <http://idris.com/scripts/Pollard.html>.

Reference

Material on Pollard and A-Hmao is very difficult to come by, not surprising given the location of the A-Hmao deep within some of the least accessible and poorest parts of China.

The main reference is:

Enwall, Joakim. (1990). *A Myth Become Reality: History and Development of the Miao Written Language*. Stockholm East Asian Monographs nos. 5-6. Stockholm: Institute of Oriental Languages, Stockholm University.

Appendix 1: A-Hmao initials

The following table, which is copied from Enwall, compares the various initials of A-Hmao, using IPA, the 1990 pinyin, the 1936 recension of Pollard, and the 1988 recension of Pollard. Lines whose IPA entry is in square brackets are allophones of the preceding phoneme.

The single line whose IPA entry is in parentheses is a sound needed only for Chinese loan-words.

The characters in the chart are made deliberately large in order to be more easily seen and distinguished.

IPA	Pinyin	'36	'88	[G´]				
p	b	ㄅ	ㄅ	0 [ʔ]		ʏ	ʏ	
[b]			ㄅ◌◌	pH	p	ㄅ´	ㄅ´	
[bH]				tsH	c	ㄘ´	ㄘ´	
ts	z	ㄗ	ㄗ	tH	t	ㄊ´	ㄊ´	
[dz]			ㄗ◌◌	t-H	tl	ㄊ´	ㄊ´ ㄊ´	
[dz´]				˜H	tr	ㄊ´	ㄊ´	
t	d	ㄊ	ㄊ	tβH	ch	ㄔ´	ㄔ´	
[d]			ㄊ◌◌	t _c H	q	ㄑ´ _n	ㄑ´	
[d´]				kH	k	ㄎ´	ㄎ´	
t-	dl	ㄊ	ㄊ ㄊ	qH	kh	ㄎ´	ㄎ´	
[dL]			ㄊ◌◌ ㄊ◌◌	mp	nb	ㄋ	ㄋ	
[dL´]				[mb]			ㄋ◌◌	
tβ	zh	ㄗ	ㄗ	[mb´]				
[d]			ㄗ◌◌	nts	nz	ㄗ	ㄗ	
[d´]				[ndz]			ㄗ◌◌	
t _c	j	ㄐ _n	ㄐ	[ndz´]				
[d _s]			ㄐ◌◌	nt	nd	ㄋ	ㄋ	
[d _s ´]				[nd]			ㄋ◌◌	
k	g	ㄍ	ㄍ	[nd´]				
[g]			ㄍ◌◌	nt-	ndl	ㄎ	ㄎ ㄎ	
[g´]				[ndL]			ㄎ◌◌ ㄎ◌◌	
q	gh	ㄍ	ㄍ	[ndL´]				
[G]			ㄍ◌◌	˜˜	ndr	ㄋ	ㄋ	

[~Í]			CT _o	[N']			Co
[~Í']				m8	hm	'o	'o'
~tβ	nzh	CE	CE	n8	hn	'c	c'
[~d]			CE _o	n8	hn-i-	'C _n	ε'
[~d ']				N8	hng	'Co	Co'
nJt _o	nj	CE _n	C1	f	f	Γ	Γ
[nJd _o]			C1 _o	s	s	S	S
[nJd _o ']				ɾ	hl	↳	L'↳'
Nk	ng	C□	C□	β	sh	/	/
[Ng]			C□ _o	ɛ	x	/ _n	7
[Ng']				x	hx	7	lo
q	ngh	CΓ	CΓ	X		7	
[G]			CT _o	h	h	7	γ'
[G']				[']			
mpH	np	CJ'	CJ'	[h]			
ntsH	nc	C+	C+	[']			
ntH	nt	CT'	CT'	v	v	V	V
nt-H	ntl	CΔ'	CΔ' CΔ'	[v']			
~H	ntr	CT'	CT'	z	r	3	3
~tβH	nch	CE'	CE'	[z']			
nJt _o H	nq	CE' _n	C1'	l	l	L	L↳
~kJ	nk	CJ'	CJ'	[l']			
qH	nkh	CT'	CT'		r		
m	m	'o	'o	[']			
[m']			'o _o	ɹ	y	Λ	Λ A
n	n	C	C	[,']			
[n']			Co	f			
~	nr	C	c	[f']			lo
[~']			Co	w	w	U	U
nJ	n-i-	C _n	ε				
[nJ']			ε _o				
N	ngg	Co	Co				

Appendix 2: A-Hmao finals

The following table, which is copied from Enwall, compares the various initials of A-Hmao, using IPA, the 1990 pinyin, the 1936 recension of Pollard, and the 1988 recension of Pollard. Lines whose IPA entry is in square brackets are allophones of the preceding phoneme.

Lines whose IPA entry is in parentheses are sounds needed only for Chinese loan-words.

The characters in the chart are made deliberately large in order to be more easily seen and distinguished.

IPA	Pinyin	'36	'88	uai	uae	ㄨㄞ	ㄨㄟ
i	i	ㄨ	ㄨ	uaμ		ㄨㄟ	ㄨㄟ
[z̥, ʳ]		ㄐ	ㄐ	uo		ㄨㄛ	ㄨㄛ
e	(ye)			in		ㄨㄣ	ㄨㄣ
y	yu	ㄩ	ㄩ	[iN]			ㄨㄣ
[z̥, ʳ]		ㄐ		en		ㄜ	ㄜ
´	e	ㄝ	ㄝ	[eN]		ㄞ	ㄞ
a	a	ㄚ	ㄚ	an		ㄞ	ㄞ
μ	w	ㄨ	ㄨ	[aN]			ㄞ
u	u	ㄨ	ㄨ	oN[uN]		ㄨㄛ	ㄨㄛ
o	o	ㄛ	ㄛ	ian		ㄨㄣ	
ei		ㄟ	ㄟ	uan			ㄨㄣ
øy	eu	ㄝ	ㄝ				
ai	ai	ㄞ	ㄞ				
aμ	aw	ㄨ	ㄨ				
au	ao	ㄞ	ㄞ				
ie	ie	ㄟ	=				
ia	ia	ㄟ	ㄟ				
iaμ	iang	ㄟ	ㄟ				
iau	iao	ㄟ	ㄟ				
iu	iu	ㄟ	ㄟ				
ye\[io]	io	ㄟ	ㄟ				
uei		ㄟ	ㄟ				
ua	ua	ㄟ	ㄟ				