Fitting Cuneiform Encoding to Cuneiform Script

L2/04-041

Lloyd Anderson 29 January, 2004
Ecological Linguistics, PO Box 15156, Washington DC 20003

For Unicode Technical Committee, 4 February, 2004
If those who proposed N2664 withdraw their proposal, then this paper constitutes a re-introduction of it with changes to the text and tables as outlined below. Changed text will be provided promptly.

A group which has been preparing a proposal for Cuneiform encoding went through several stages. Decisions included the encoding of signs in the sense traditionally understood in the field.

1. Encode signs not readings (script not language)
2. Encode signs not sequences of signs
3. Encode signs not variants
4. Encode signs not fragments of signs
5. Include sufficient distinctions for each stage covered (currently mostly UrIII and later)
6. Unify those signs which are primary relatives in lineal historical descent, encode them the same.

At a later time, the decision was taken to encode as sequences those elements of text which are referred to as SIGN.SIGN with a period between them, treating them as compounds of those existing signs which are the parts of their names. This is obviously consistent with the decision to not encode sequences of signs. But it also turned out to contradict other decisions taken previously, and the members had not anticipated some of the results. It was also somewhat vague, as it would cover both sequences of signs, and also single signs referred to in this same way for various historical reasons, such as lack of a known single-word reading. In other words, the naming pattern "SIGN.SIGN" was a glyph description languge at the same time as it sometimes represented sequences of signs, without any easy distinction between the two. The group decided to go ahead without yet attempting to consider all of the consequences. Some consider that the decision to split "SIGN.SIGN" superseded all earlier decisions.

When the first results came back, a majority of the active participants were unhappy with some of the exclusions, as of the fundamental syllabary signs. They were also unhappy with encoded units which are fragments, not ever occurring independently. Some of those have been suggested for encoding in N2664R. But they are mere band-aids on a system which systematically disregards both the long-established scholarly tradition on what are signs, and the empirical evidence on what are the units of the script, which most of the participants in the small group have not discussed in any detail.

The question: what is an appropriate encoding for Cuneiform?

I argue that the present proposal would be very damaging to the field of cuneiform studies. The consequences should actually be examined, not shoved under the rug. Analogies will help to make clear what is being proposed for Cuneiform. Then I will survey those consequences which have not been presented systematically by the individuals whose proposal is document N2664 and revision.

Han Characters vs. Components.

CJK Han Characters are not split into fragments in encoding. The decision about what is a character is of course much easier for Han characters than for Cuneiform, because Han characters all fit a standard square block. Not having this tool in Cuneiform means that we must work hard to discover what are the distinctive units of the script. (Or accept that the long

scholarly tradition has already done most of that!) But the Han analogy is close in that we clearly know the difference between full characters and components of characters. The long scholarly tradition of Cuneiform studies is also fully aware of the difference between Signs and Components of signs. The current proposal for Cuneiform violates that tradition in mixing the two, and omitting many standard catalogued signs from the encoding when there is no reason to do so. I here turn the characters sideways, partly also as a reminder that such a rotation occurred early in the history of Cuneiform.

 is not encoded as  with ligaturing etc.

Analogies from Latin script are closer in some other respects.

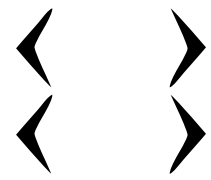
Latin Historical Ligatures which are now Simple Letters

æ is not encoded as ae with ligaturing etc.

w is not encoded as vv with ligaturing etc.

The last of these is very close to what is being proposed for Cuneiform, the encoding of single characters as parts which they may **historically** have arisen from, or which in the Cuneiform case they may later have dissolved into, but which are in the use of the script distinct from those. The <æ> digraph also raises an issue which affects any script of this kind. Whether or not Unicode favors this, implementers may possibly encode it as the sequence <a> <e> and render that via ligaturing as a surface **glyph** <æ>. This possibility is no argument that the single **letter** <æ> which looks the same should not have been encoded.

This next example has been withdrawn in the revised proposal N2664R, but the fact that it could ever have been proposed shows how far off the track the interpretation went both from deliberations and consensus in the working group and from the reality of cuneiform script. There are many more examples of similar kinds, and N2664R has only touched the tip of the iceberg in correcting erroneous analyses from N2664.

 is not to be encoded as  with ligaturing

In this case an existing sign MASHGI (by default, a single character) was split into two fragments, **neither one of which exists as a sign on its own**. The sign which does exist was not proposed for encoding. This is not a unique example. In some way it must reveal the thinking which went into proposal N2664. I can only estimate that the ideas were something like: split any sign if vertical white space can be seen between fragments which would result, and rename

any sign in terms of component parts, disregarding traditional names. A procedure based on white space certainly does not represent any reasonable interpretation of a consensus reached by the working group to encode signs named "SIGN.SIGN" as their parts. This sign was not traditionally named that way. The artificial creation in proposal N2664R itself of a new name (U OVER U U REVERSED OVER U REVERSED), the sequence of names of the two artificial fragments which were substituted for it in N2664, does not cause this to become a sign named "SIGN.SIGN". Or else that has no meaning whatsoever. The sign was split, based not on its actual name but on a **theory** reflected by this artificially created name. Quite a circular proceeding. It makes it clear that what is being proposed is in an important sense an encoding of a **newly invented glyph description language**, not an encoding of the units of cuneiform script.

Our goal is a valid encoding for Cuneiform, so if we find empirical data refutes the assumptions or procedures of a claimed consensus, we must pay attention to the facts. The smallest group seems to have locked itself into a tunnel.

There is another issue raised by the long history of the Cuneiform script, and very real changes which occurred in it. Some characters which were original single characters in the understanding of all of us have dissolved into an apparent sequence, as scribes used familiar elements. A wonderful example is that for the sign UMBIN, used to represent among other things 'talon'. It is composed originally of a leg with a superimposed turned hand which is used in meanings 'attach, join, knot' and similar (Labat 'nouer, attacher'), and went through this evolution. Intermediates exist between the last two not shown here.



The first of these could be **named** (in a glyph description language, a component description language) something like "leg" x TAG4. The second would be **named** GAD.(DU x TAG4). The third would be **named** GAD.TAG4.DU. It appears that the cuneiform writing system of at least the last of these three stages may have changed its set of significant units. But we cannot be sure merely from these three illustrations. We simply **cannot infer status as sign vs. sign sequence merely by thinking of components in later forms**. That is deceiving oneself. The initial GAD of the middle example may never have been separated from the part which followed, they may have been merely **components** of one sign, not two separate signs. In that case the sign would more revealingly be **named** (GAD.DU) x TAG4 In fact that name would work for both of the last two illustrations, since the TAG4 part is infixed between the GAD and the DU parts! (In this instance, the TAG4 is not reduced in size, but the visual form of infixed signs is specified in fonts, not in encodings – see the web page http://www.CuneiformSigns.org/ContainerTypes.htm) I suspect that by the Neoassyrian period, the last of the three illustrations of UMBIN, the three components may possibly have been separable.

But that would have to be verified empirically, it is not appropriate merely to speculate. How can we tell? There are ways, there is evidence. And that evidence strongly correlates with **and thus confirms** the long tradition in assyriology which is embodied in the sign catalogs, carefully worked on with each contributor building on what went before. We can question particular entries in those catalogs, but their compilers were **fully aware of the difference between components, signs, and sequences of signs**. They did not very often assign numbers to mere text units, but treated them as lexical entries with a status distinct from that of head entries (single signs).

The importance of the full historical range

Even without attempting to figure out which sequences of components are single signs, and which sequences of components are sequences of signs, for any texts, another point is already relevant here. The existence of the first of these signs for 'talon' means that we **do need an encoding for it**, whatever the analysis of later forms. Examples of this kind exist even within artificially narrow time range to which the majority of the small working group wishes to limit

our encoding efforts. None of Labat's citations shown above are from the earliest Uruk period. The first two illustrations are from the Fara period (LAK#289), with six attestations like the first illustration, and three like the second. This is surely a secure identification of a sign, by normal standards. In addition there are middle Babylonian and Middle Assyrian sign forms which are not visually decomposable (Labat illustrates these). There is a great resistance to including evidence from the full range of cuneiform in preparing the present proposal, yet that inclusion can precisely warn us against mistakes, not merely omissions of what can be added later, but wrong analyses. We will more likely make an error by **not** considering all of the available information than by considering it. For quite a number of signs, proposal N2664 has **in effect** tended to focus its attention on later forms which use a far smaller number of glyphic sign components, in the extreme focusing on Neo-Assyrian, as for the sign UMBIN.

Sign Identity Is Stable Through Time, Where Components And Glyph Fragments Are Not

Since one of our goals is to unify Cuneiform encodings across time periods, it can be seen that artificial splits into glyphic fragments will hinder that goal. Single signs may have their components arranged differently at different times, which does not itself constitute evidence that the combination of components is more than one sign. For Cuneiform, please see the web page http://www.CuneiformSigns.org/InfixFluctuation.htm and pages linked to frm there. The field of Han CJK characters provides ample analogies for this statement. Please see the web site http://www.CuneiformSigns.org/CJKAnalogies.htm

How can we determine sign boundaries?

By respecting the accumulated tradition of assyriology, is the first answer. We can easily check that tradition against the facts. Two default manifestations of character boundaries are available for cuneiform just as for most other scripts -- spacing and line breaks. Since many Cuneiform words are spelled via a sequence of signs, line breaks between signs of one word in Cuneiform are quite analogous to line breaks between letters of the Latin script. Both can be regulated by special implementations, but there are also important default behaviors on which such implementations rely.

The first full-page figure accompanying this paper is from Gudea Statue F column 4 (as published by Bord and Magnaioni 2002). "Register" 6 of that column begins with the single sign MASH2, which is acknowledged by all to be a single sign, given such status as U+12239 in proposal N2664. Yet it consists of two parts which have some white space between them. White space of this kind is simply not diagnostic of sign boundaries, as shown above for the split of MASHGI into artificial fragments. Attempting to rely on it makes one's methods invalid, one's results insecure, sensitive to the wrong things.

Spacing signals sign boundaries?

If you look a bit more carefully at this example, however, you see that this register is nicely spaced, and that it has two lines (as most of us would refer to them), one with three signs MASH2 ZI MU- and the second line with three signs NI SHAR2 SHAR2. The spacing within the single sign MASH2 is different from the spacing between signs. (There are three words in this register, MASH2 is the first. ZI is the second, and the third word is MU-NI-SHAR2-SHAR2, according to the transcription in Bord and Mugnaioni's publication of it 2002. The third word is broken across lines at a sign boundary.)

Now compare two other lines, as they are usually referred to: line 3 and line 7. (Here we do not have to worry about the confusion we moderns would have in talking about a "line" containing several "lines", or a line containing an "indent", etc.) In line 3, we have text transliterated by the authors as **sipa-bi** 'leur pasteur' 'their shepherd' (or similar). It here consists of two signs, SIPA and BI. When our smaller group started dividing things named "SIGN.SIGN" into single signs, I of course assumed this was a correct decision for all true sign sequences. I even thought SIPA was probably a good candidate to treat that way. I have however discovered that not merely the standard sign catalogs but also an important text with nice typography which I first examined treats this as a single sign. This is so far confirmed by parts of a second important text, the "Codex Hammurabi".

The single sign SIPA has within it the same amount of white space which occurs in line 6 previously discussed within the agreed single sign MASH2. The scribe felt there were only two

signs in this line, and rendered them accordingly, in the process leaving a gigantic white space the width of half the entire line. In line 7, by contrast, the single sign SIPA no longer appears. The scribe used instead the individual signs PA, LU (= UDU), and BI. This made for a more evenly spaced appearance of the line, perhaps. The reading and the context are the same.

Some might argue that this fluctuation shows the units are really PA.LU.BI, just spaced differently, and that the appropriate treatment is to add a zero-width joiner of some kind between the signs to keep them together. This badly misunderstands the nature of cuneiform script. The treatment in line 7 is abnormal in the texts of the ten Gudea statues. I think probably unique there. It appears an absence of split forms may characterize the law code of Hammurapi as well. The other examples of SIPA which I found in the Gudea statues wrote the components not merely closely together, as in Statue F at 4.3, but actually touching, so there is no white space whatsoever between parts. These were on statues B and D, at locations B.2.8 and D.1.11.

What the "joiner" approach is doing is applying bandaids to fix what would be done wrong in fragmenting single signs, treating their components as if they were independent signs. It reverses the relation of normal and exceptional, imposing the burden in the normal cases, not in the exceptional ones. For a component of a sign to look like an independent sign merely as a glyph is **in no way** evidence of any kind that the sign in question is a sequence of independent signs. No more than it would be for CJK Han characters.

Evidence and Traditional Sign Catalogs Agree

A small survey of the spacing of some candidates for single signs in the Gudea statues, and whether they are or are not split across line-breaks (or indent breaks) within a register, yields a very strong correlation between the spacing and line-break treatments, on the one hand, and the standard sign catalogs, on the other hand. This is summarized in table form on the web page http://www.CuneiformSigns.org/SignSpacingCorrelate.htm, included as part of this paper.

What are the Consequences?

The two approaches to encoding Cuneiform differ greatly in the degree to which they respect the empirically determinable significant sign units of the script (different both from components and from sign sequences). This contrast is made clear on the web page http://www.CuneiformSigns.org/TwoApproaches.htm included as part of this paper.

I believe there is simply no contest, and that proposal N2664(R) would do considerable damage to the encoding of cuneiform, by loading large amounts of extra complexity onto many aspects of implementations, and making users and those who serve them needlessly dependent on implementers. The cause of these disadvantages is demonstrable errors in the attempt to identify what are the productive functioning units of the script.

Lists of Signs to Add

Also included as part of this paper are three web pages listing signs which need to be replaced or added (in addition to the changes made in revision N2664R). These web pages are
http://www.CuneiformSigns.org/ReplaceSigns.htm and
http://www.CuneiformSigns.org/AddSigns.htm and
http://www.CuneiformSigns.org/BorgerAdds.htm
A full set of signs with images will be brought to the UTC meeting itself to accompany this paper, but for the sake of conserving trees are not made an official part of the paper. They are available to those who wish to work with them.

Moving Right Along

Doing it right need not interfere with getting a Cuneiform encoding proposal approved in June 2004. Most of the text of N2664 is well written and can be used as is, except where the analysis of this present paper would require changes to it. Most of the very good work in extending sign lists which is manifest in N2664 and N2664R, itself building on the long traditions of the field, stands without need for change. That includes work by Steve Tinney, the CDLI, and Miguel Civil. Only artificial fragments need to be eliminated, and traditional signs added except in individual instances where they can be shown to be errors perpetuated in the traditional lists.

I propose that we stick to our foundations, keep our feet on the ground, and proceed in the following manner.

A. Maintain the solid encoding principles we started with:

1. Encode signs not readings (script not language)
2. Encode signs not sequences of signs
3. Encode signs not variants
4. Encode signs not fragments of signs
5. Include sufficient distinctions for each stage covered (currently mostly UrIII and later)
6. Unify those signs which are primary relatives in lineal historical descent, encode them the same.

7. The standard sign catalogs, as extended by the work of PSL, CDLI, and Civil, and with any additional whole signs found in N2664 and its revision, should be the default list we start with. We can eliminate signs only as we can show **in exceptional instances** that the identifications are not secure, or that the traditional catalogs made some kind of error. In addition to sign catalogs, we will of course use the best available published work by the recognized authorities in each field of cuneiform, and more recent and specific information from experts when it is available.

8. Where we have evidence on spacing or line breaking, we use that judiciously to confirm or call into question status as single sign vs. as sequence of signs

9. In cases of fluctuation, we go usually with normal usage, not with exceptional instances.

B. Keep traditional sign names; names need not be tied to component analyses.

10. Use traditional highly-recognizable sign names (MUL rather than AN OVER AN AN), and for signs for which no reading or alphabetic name is available, the catalog number with an initial letter to identify the catalog the sign is taken from, as "C372")

11. Encoding order can reflect recognized components of signs. Alternate names which represent the components of single signs (and to a degree their arrangement) can be used to help our thinking, and even as a basis for encoding order, but with clear awareness that the componential decomposition of signs is not as stable across time as is the identity of the signs as wholes.

12. Componential analysis of signs should reflect full historical knowledge without limitation, so as to avoid implications for unification which turn out to be false. For example, the two names "SIGN x SHE3" and "SIGN x TUG2" are not distinguishable at a late stage where the components SHE3 and TUG2 merge as KU and we have only "SIGN x KU". Evidence from older time periods can resolve this in particular instances (Steve Tinney has made use of some of this, from Krebernik, as has this writer.)

C. The only criterion is whether we have securely identified signs distinctive from each other. In cases of limited knowledge, we should be explicit about the consequences of each kind of error which we can anticipate. That is done below. We should encode what we can now. There is to be no artificial limitation of time periods covered. Although a few of the following general principles are phrased in terms of older and later signs for which we may consider unification, they apply more broadly to any question whether two signs are the same or are distinctive. More specifically:

13. The fact that we certainly will later discover additional distinctions in no way argues against encoding the distinctions we are already securely aware of.

14. If we have securely identified a distinctive cuneiform sign, it matters not at all if we do not know its exact "reading" or meaning, or even any "reading" or meaning. To be most useful to cuneiform specialists, we provide encodings precisely for signs whose meanings are not yet known, or not fully known, just as for Linear B (Unicode 10040 to 1005D). Having them encoded will assist analysis of texts which use them.

15. For the large bodies of cuneiform texts, we expect those entering the data on computers to be trained professional experts, able to recognize distinctions and make choices as needed. As with any technical field, advances may lead to the correction of readings and even sign identifications in particular texts, but this is simply normal progress of science. It has no implications for our encoding.

16. If we have a sign from an earlier time period which can be securely unified with a sign from a later time period which is its primary lineal descendent, then as with all other unifications, no additional encoded character is appropriate. (Possible error: failure to encode a sign which turns out to be distinctive. Such a newly discovered distinction can be added later. But we do want to avoid the generation of encoded data which has later to be changed, whenever reasonably possible, so if a distinction is highly probable, we should encode it now.)

17. If a catalog listing of a sign does not make a distinction where it should, if it merges what we already know to be two distinct signs, then we make the distinction (by 5. Above). If some of the instances lumped under one catalog listing are known to be unifiable with a later or earlier sign, then (by the preceding paragraph) we do unify them. If other instances lumped under one catalog listing are known to be distinct from other signs in our list, then we encode them separately, devising some practical workable new sign name as needed. (Possible error if we fail to recognize a distinction – as in the preceding item.) Example: ZATU catalog sign Z565 called "U2". According to a discussion by expert Cale Johnson, this catalog listing conflates two distinct signs, one of them indeed unifiable with the later sign "U2", the other distinct from that and not continued in later signs. So the newer sign might be called Z565b or Z565a, as the experts prefer.

18. We do not let ourselves be confused by mere *names*. Giving an old sign the same name as a known later sign does not constitute evidence that the two are lineal descendents. If we have evidence that two signs are not lineal descendents, we do not unify them. If the older sign is securely attested and clear in at least some of its instances, unless the older sign can be identified with *some* later sign, we must seriously consider adding a distinct encoded sign to our list. (For examples from the early Uruk stages, please **after late 1st February** see the web page http://www.CuneiformSigns.org/ZATUSignTriage.htm .)

19. If an identification of a an earlier sign with a later sign is probably false, and there is no other known valid unification with another later sign, then we can usefully consider encoding it separately. Quite a number of examples of this will be noted on the web page just mentioned. (Possible error: two encoded signs are later found to be mere variants of each other. Over-distinction in the encoded data brings with it no information loss. At most, a tiny number of encoded signs would later go out of active new use. Older data using them, to the extent not corrected by its expert custodians, is still readable.)

No Serious Practical or Time Limitations

The task laid out in this paper is already nearly complete. Lists of signs which need to be added are generally already complete. For my own contributions, I am mostly in process of eliminating some mere variant signs and others which are too insecure to encode now, using the available published tools and any expert comments available. I will complete these contributions without fail by the end of February, 2004, and most of them by February 15th. Any expert contributions will of course be reflected in modified lists.

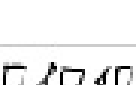
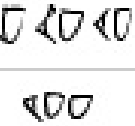
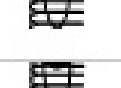
With materials already so fully sorted and controlled for quality through the combined efforts of the entire assyriological tradition, including additions by participants in our current activities, it will be simple for experts to review a nearly-final list, as Steve Tinney has pointed out. They look for the items of most interest to them, items to which their specialized knowledge is most

relevant. To the extent that experts in certain time periods can find even as much as a day free in the next four months, they can warn us of any errors they know in the sources we have available, can tell us of additional distinctions needed, or perhaps in a very few cases tell us of distinctions we have made that are very probably not warranted.

Many of the issues of fact and principle, and many of the signs which are documented in this paper were proposed via general statements and in part via lists of particular signs already in October and November 2003. This current paper is new in its comprehensiveness and in listing signs in a format with pseudo-code-point labels added for easier comparability with N2664(R).

One illustration and accompanying tables:
Gudea F.4 (please expand to larger size if possible)
Pages from the web site http://www.CuneiformSigns.org, namely
SignSpacingCorrelate.htm
TwoApproaches.htm
ReplaceSigns.htm
AddSigns.htm
BorgerAdds.htm
ZATUSignTriage.htm (after 2 February)

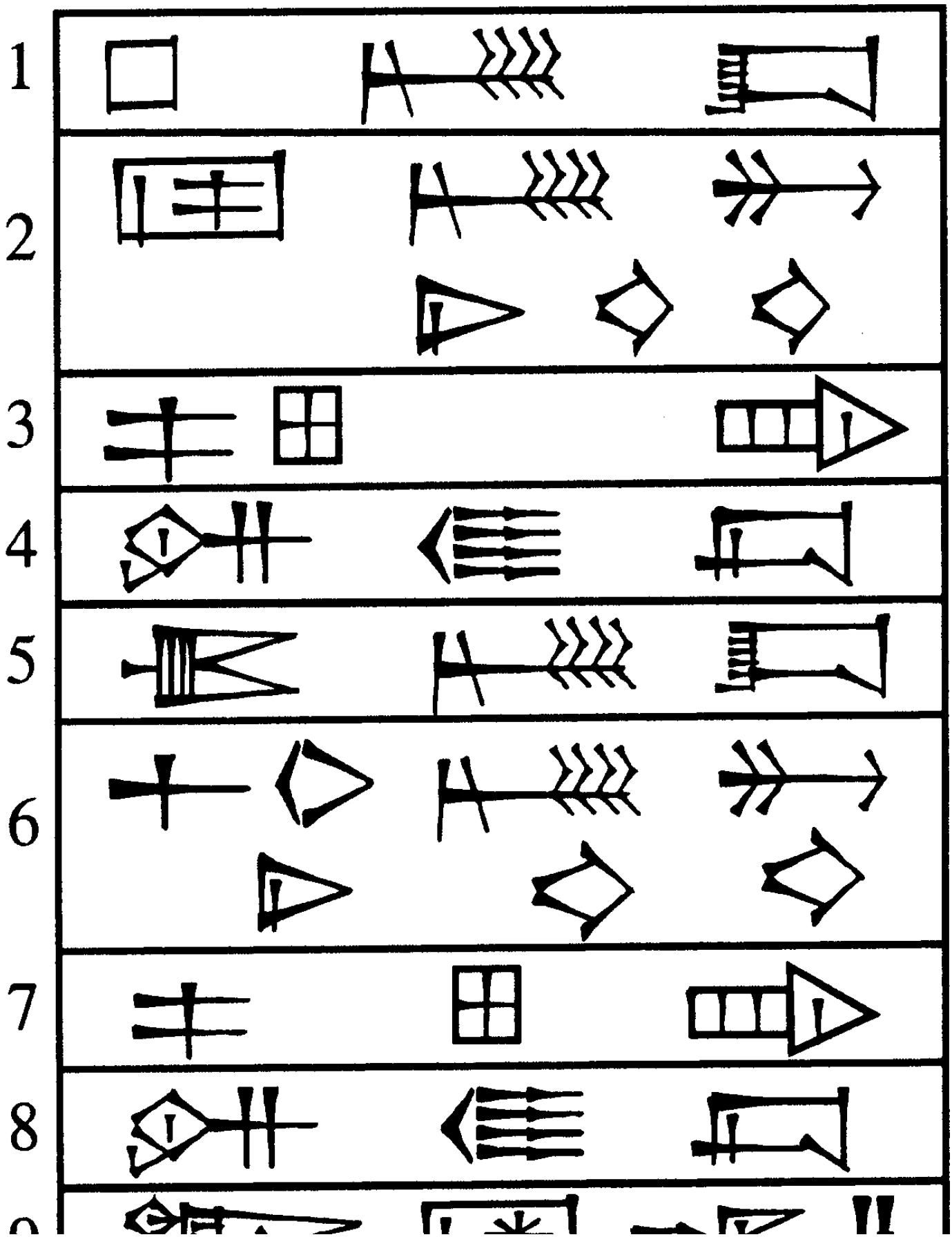
NumberDvpt.jpg

					DISH (sexagesimal sys.)	B748	1 or 60	822 = 841
						B824 (v)	600	823 = 842
					U	B661	10	821, 840 {857 as '1/ BUR)}
					MAN	B708	20	
					ESH	B711	30	? 191
					NIMIN	B712	40	
					NINNU	B714	50	
					SHAR2	B632	3600	825 = 844 = 859 (& 809?)
					SHAR2 x U (sexag. sys.)	B653 B654	10 x 3600 = 36,000	826 = 846 = 860
					(surface measurement)	****	? value = 'Great Shar' 60 x 3600	827 = 861
					(surface measurement)	****		858; old lig. in 824, 845,
Fractions								
					SHUSHANA	B826	fraction 1/3	817
					SHANABI	B832	fraction 2/3	818
					KINGUSILI	B573	fraction 5/6	819
Measures								
					MASH	B120	1/2	816
					BAN2	B122	1 BAN (measure)	829
					BANMIN	B465	2 BAN (measure)	830
					BANESH	B549	3 BAN (measure)	831
					BANLIMMU	B550 (v)	4 BAN (measure)	832 & var't. w/ four horizontals
					BANIA	B551 (v)	5 BAN (measure)	833 & var't. w/ five horizontals

NumbersDvpt.tif

SIPAMASH2.tif

Colonne 4



Cuneiform Signs

Please choose from the categories below

Analysis and reports to support an international standard for computer encoding of the Cuneiform writing system

Research on the development of Cuneiform signs

Sign or Sign Sequence? | Spacing and Line Breaks | Kerning for IGI, SAL? | Atomic Signs by Comparing Times | Container types | Type "SIGN over SIGN" | Fara Signs not yet identified

Two approaches to encoding Cuneiform signs are here contrasted.

One(A) is based on Ken Whistler's approach, on the left, treating as "characters" sometimes signs, sometimes parts of recognized signs which do not divide into parts in actual usage. The other, on the right, respects the 150 year tradition of assyriological scholarship. The two differ greatly in the simplicity of implementation, in how dependent cuneiform users will be on others, vs. in how direct and simple usage will be.

The comparisons below are a sincere attempt is to be fair, but my choice is clearly in favor of the approach on the right, for the reasons of greater simplicity there given. Anyone who thinks the comparison can be made more fair please email Lloyd Anderson with suggestions on what to add or change. The comparison in the third line, concerning avoidance of identical surface forms, is the chief advantage which I think is claimed by advocates of approach A, but I am not sure how to state it in a way which is satisfactory to various people's preferences. Given the complex alternative spellings needed in any case for searching cuneiform, I'm not sure there is much difference here even if there were any significant difference in similar surface forms with distinct character sequences.

Evidence used by the approach on the right includes prominently the following. This evidence is not used slavishly, but with discretion, and any knowledge from experts explaining particular cases is taken into consideration. The two sorts of evidence noted here are highly correlated (see chart), presumably because the assyriologists who determined what are the distinctive "signs" of the script took into account the very behavior of the signs which is most normally diagnostic of status as single sign vs. as sequence of signs.

1. The distinction between signs, compounds (sign sequences), and components of single signs are made by the assyriological tradition. This accumulated knowledge is respected unless there is clear indication not to. This was the original basis for encoding adopted by the small ICE group.

2. Where there is enough space available to see space between signs, as in the Gudea statues, (that is in registers where they are not crushed together), single traditional signs are normally kept together so components of the single sign are at least almost touching, or do touch or overlap. By contrast, compound signs ("diri" compounds and other lexical items) are not kept so close together, thus contrasting in those same texts. Single signs normally are not split into parts across indents (what the rest of the world means by line breaks; not talking here about register breaks).

A	B
Encoding as characters sometimes the traditional signs, sometimes parts of the traditional signs	Encoding as characters the traditional "signs" of cuneiform, as distinct from compounds or sign components..

Neither approach encodes what are traditionally regarded as sign sequences as single characters.	(same)
Belief that this approach avoids having two identical surface forms resulting from distinct sequences of coded characters.	Belief that there will be few or no such cases in normal use and normal spacing, because surface forms differ more often than thought by proponents of approach A.
It is expected that inputting is done by knowledgeable assyriologists.	(same)
Keeping what are traditionally single signs together requires extensive use of "combining grapheme joiner".	Characters (traditional single signs) are kept together by default, as one would expect, keeping their form, but allowing justification space between characters. No special devices needed.
The special joiner is needed in the *normal* cases even to keep traditional signs together, not just in the exceptional cases.	A special joiner would be needed only in exceptional cases, where a document editor might want to control flow to be other than its default.
A word-joiner is needed when one wishes to keep words together contrary to normal flow of text, precisely as in the other approach.	(same)
Fonts are more complex to create, as extensive kerned forms, ligatured forms, fused forms and single glyphs substituting for sequences of "characters". Even when kerning and ligaturing are not the appropriate analyses.	Fonts are far simpler to create. Normally one character corresponds to one font element (glyph).
True ligatures like AN+EN or AN+AG or EN+ME or SHU+LAGAB, which vary between sign sequence and ligatured substitute for that sequence carrying the same function, must be built into fonts in both approaches.	(same)
Input methods are more complex, requiring large numbers of extra elements like "combining grapheme joiner" to be generated.	Input methods are simpler, so more users and semi-programmers can design their own for special time periods.
Sorting tables by various preferences are more complex, since they will more often have to take account of sequences of characters (often components of traditional signs rather than single traditional signs).	Sorting tables by various preferences are simpler, since sort position can be specified for each traditional sign.
Code table order (and binary sort order) is by alphabetical order of sign names. Keeps together signs with the same first named components.	Good idea, with the difference noted immediately below.
Sign names are decomposition descriptions of glyphic forms, so names are based on components of glyphs to the maximum degree possible.	Keep traditional sign names for familiarity as the official names of the code standard, or use the most structurally revealing sign names. But order signs in code table and binary sort order by the same method as in the other proposal, so those with the same components are kept together.

Searching in assyriology must consider multiple possible spellings as soon as one goes beyond the simplest default.	(same)
Makes relation of readings with characters more complex.	The "readings" of cuneiform writing are correlated with the traditional signs and sequences of signs. They are not *as generally and universally* correlated with components which are fragments of signs. Despite some signs.being *named* by their components, that is a separate question.
A belief that the "characters" of a script are whatever the encoders decide they are. Relatively less interest in empirical evidence about distinctive units of a script using standard linguistic criteria for what is distinctive.	A belief that the distinctive units of a communication system like a language or a script are normally and effectively determined by using empirical evidence and standard reasoning, so that the resulting understanding is most structurally appropriate and simplest. (There can be borderline cases allowing two radically different analyses, but the majority of communicaton systems present no major problems of analysis of that type.)

Home

Cuneiform Signs

Please choose from the categories below

Analysis and reports to support an international standard for computer encoding of the Cuneiform writing system

Research on the development of Cuneiform signs

Sign or Sign Sequence? | Spacing and Line Breaks | Kerning for IGI, SAL? | Atomic Signs by Comparing Times | Container types | Type "SIGN over SIGN" | Fara Signs not yet identified

Signs which need to be deleted or replaced, and a few of the needed additions

Information on this page is available free of any restrictions. It is intended to assist preparation of a proposal to Unicode for a standard encoding of Cuneiform. For a selection of signs which need to be ADDED, please click here.

In the following sign names, I retain the traditional cuneiformist naming system, so that the list will be most usable to specialists who we believe should be able to evaluate this, but add some clarity of distinctions. Here are differences from naming practices in N2664(R).

( ) parentheses -- not used in N2664 -- clarifies grouping of sign components, can simply be dropped

Lowercase rather than uppercase -- distinguishes SIGN component names from other descriptors

x -- rendered as "TIMES" in N2664 -- relation of container to infix, or overlap of components, etc.

+ -- used only when discussing true ligatures, which are not to be encoded. Not = "PLUS" in N2664

. period -- rendered as space in N2664 -- ambiguous in Cuneiform names, separates either signs or mere components

paired -- rendered as "SIGN OVER SIGN" in N2664, but the two SIGN are always identical (1 exception)

Entries in the Tables:

The entry "fragment" means that the fragmentation of a single sign into parts must then be fixed by linking the parts together again, by kerning, and often in addition by substituting a single glyph for the purported sequence of parts. A very indirect way of not encoding the actual characters of Cuneiform. The entry "sequence" in quotes means that the sign has been misanalyzed as a sequence.

If there is no independent sign ("no"), it means further that the supposed component does not even exist in that way, in addition to not being a part of a particular sign which N2664 intended it to represent. "Yes" entries are omitted, since any sign proposd to be added "Add" is attested as an independent sign.

The entry "does not occur elsewhere" means that the purported sign does not occur as a component of other signs than the one which replaces it in these listings of needed changes. It is possible that a component might occur in several distinct signs, yet not be attested as an independent sign, and this entry is to allow the possibility of distinguishing those cases. This entry is based on the best

information I have been able to gather from standard sources. It may in one or two instances not be correct. Proposal N2664 does not permit us to judge that, because of its mixture of the real and the artificial.

Traditional sign catalogs are abbreviated respectively "B", "L", "C" "G" "F", and "Z" -- Borger's most recent, Labat's standard, "Classical" Font by Steve Tinney, Gudea font by Margret Studt, Fara (LAK) and Uruk (ZATU) lists. Attestation in these lists for the most part should be taken to imply status as a single sign, since the 150 years of scholarship has been very well done, and these lists certainly do try in general to distinguish between single signs and sequences of signs. Borger's is the most recent and comprehensive, and his work is rather universally respected. Ellermeier has also recently published a comprehensive catalog. Citations in this column are normally only B and L. Occasionally other citations show that a sign is unitary in origin, not compound, or that it has an earlier form in which it is complex, with parts overlapping or infixed, and that later scribes reanalyzed these into glyphic parts more familiar to them (a process noted in N2664R). These citations are not attempting to be comprehensive, but only sufficient to document judgement of professionals that a single sign is in question or illustrations which make that self-evident. I obviously do not include examples where I believe such judgements were wrong, but can list them separately at a later date. Any proposal should highlight such a list of exclusions so the assyriological community can see what is omitted and judge whether those choices are correct.

Arbitrary Fragmentation into Non-Existent Components

This first example shows how far wrong proposal N2664 went. It is partly corrected in N2664R (see illustrations there), but the name used for the real sign falsely implies the sign is composite. In this case there are not even any independently existing signs to use as components for it. Artificial ones were invented in order to permit decomposition. This should be one of several indicators that the fundamental conception of N2664 was wrong, and that many other problems are present (they are).

N2664 Code Point	Sign Name for sign to be deleted or renamed	Glyph Frag-ment or se-quence	Is there an indep. sign?	? Add Delete Rename	Single Sign Name (not sign sequence) and comments	Tradi-tional List?
12309	U OVER U	frag-ment	no	Delete	does not occur elsewhere	no
1230A	U reversed OVER U reversed	frag-ment	no	Delete	does not occur elsewhere	no
	U over U U reversed over U reversed			Add & Rename	MASHGI / BARGI (rare, but at least unitary)	B713, L474

Fragmentation into Wrong Components; Omission of Unitary Container & Sign

In this section I give a set of five lines each to illustrate three sets of signs. Most of the individual signs with infixes were proposed for addition in the N2664R corrrectionn to N2664, but the independent

signs were omitted, and those independent signs are also the container for the complex signs with infixes. The infixation is into the unitary sign, not into the artificial component of it which was fragmented in N2664. There are thus three signs added here beyond N2664R, TUR3, HUBUR, and UTUA2. These unitary signs were probably omitted from N2664 purely because there happen to exist single signs which look like the glyphic parts of these single signs. The names TUR3 and UTUA2 are the only names given in Labat for these signs. While the name HUBUR used below is not a common one, and not in Labat, that name could be replaced by any other unitary name, so as to not be misleading as to sign structure.

A sign list intended for human use can perfectly well include more commonly known names, reflecting the language of glyph description used to name many signs.

N2664 Code Point	Sign Name for sign to be deleted or renamed	Glyph Frag-ment or se-quence	Is there an indep. sign?	? Add Delete Rename	Single Sign Name (not sign sequence) and comments	Tradi-tional List?
--	NUN LAGAR	"seq"		Add	TUR3 (see note intro to this part of tables; not added in N2664R) Early Labat examples and also Fara and Uruk examples all show there is a single sign here, this is not a mere sequence.	B145 L87a F77 Z563
121FB	LAGAR TIMES SAL	frag-ment	no	Delete	does not occur elsewhere	no
	NUN LAGAR TIMES SAL			Add & Rename	TUR3 x SAL (or SHILAM)	B147 L87b
	NUN LAGAR TIMES SAL OVER NUN LAGAR TIMES SAL			Add & Rename	(TUR3 x SAL) paired (or SHILAM paired)	B147a
					(Four more pairs to delete and add like the two above. Already done in N2664R, except for the structurally misleading names and the lack of the independent sign and container.)	
--	NUNUZ AB2	"seq"		Add	HUBUR (see note intro to this part of tables; not added in N2664R)	B615
12017	AB2 x ASHGAB	frag-ment	no	Delete	does not occur elsewhere	no

	NUNUZ AB2 x ASHGAB			Add & Rename	HUBUR x ASHGAB	B619 L394c
12019	AB2 x BI	frag-ment	no	Delete	does not occur elsewhere	no
	NUNUZ AB2 x BI			Add & Rename	HUBUR x BI	B621 L394d
					(Eight more pairs to delete and add like the two above. Already done in N2664R, except for the structurally misleading names and the lack of the independent sign and container.)	
--	DAG KISIM5	"seq"		Add	UTUA2 (see note intro to this part of tables; not added in N2664R)	B439, L281
121A4	KISIM5 x GIR2	frag-ment	no	Delete		no
	DAG KISIM5 x GIR2			Add & Rename	UTUA2 x GIR2 (infixation is into a unitary container, not into a part of it)	B440
121AA	KISIM5 x LA	frag-ment	no	Delete		no
	DAG KISIM5 x LA			Add & Rename	UTUA2 x LA (infixation is into a unitary container, not into a part of it)	B441, L282
					(Approx. 20 more pairs to delete and add like the two above. Already done in N2664R, except for the structurally misleading names and the lack of the independent sign and container.)	

Fragmentation; Glyph Description Instead of Standard Names and Unitary Signs

This example shows the disregard of the standards of the standard names of the field, and how N2664 would have forced a known sign to be encoded wrongly as a sequence, before the revision N2664R. Consequences include incorrect spacing and glyphic forms, and incorrect line breaks. Even after the

revision, many signs are fragmented this way. A long list is in preparation, examples here are merely selected from the few corrected in N2664R.

N2664 Code Point	Sign Name for sign to be deleted or renamed	Glyph Frag-ment or se-quence	Is there an indep. sign?	? Add Delete Rename	Single Sign Name (not sign sequence) and comments	Tradi-tional List?
add ##	AN OVER AN	frag-ment		Rename	NAB	B246 L129
--	AN OVER AN AN	"seq"	yes		Wrong glyphic shape and line breaks.	
	AN THREE TIMES			Add & Rename	MUL	B247 L129a
--	IGI RI	"seq"	yes		Wrong glyphic shape and line breaks. Gudea form fused, elements not at all separated.	
	IGI RI			Add & Rename	AR (standard syllabary sign) No other name is adequate to the range of shapes (Gudea included).	B726 L451 G
--	U GUD	"seq"	yes			
	U GUD			Add & Rename	UL (basic syllabary sign) or SHU4 x GUD	B698 L441 G, F
					There are many more signs of this type ("U" x SIGN = SHU4 x SIGN). "U" acts here as a container, just like the "roof" radical in Chinese characters, the section beginning with U+219BA. In Cuneiform, the so-called "U" as container is not a separate character spaced apart from the other components in the same character. It is also not the same as the number sign U, as can be seen by looking to older forms. Under our principles of distinguishing signs in	

splits and mergers, we need a name for it different from the name of the number sign '10'. SHU4 is an existing name for it, and emphasizes the relation to SHU2, which had the same origin, while yet distinguishing them.

Cuneiform Signs

Please choose from the categories below

Analysis and reports to support an international standard for computer encoding of the Cuneiform writing system

Research on the development of Cuneiform signs

Sign or Sign Sequence? | Spacing and Line Breaks | Kerning for IGI, SAL? | Atomic Signs by Comparing Times | Container types | Type "SIGN over SIGN" | Fara Signs not yet identified

Signs Which Need to Be Added

Information on this page is available free of any restrictions. It is intended to assist preparation of a proposal to Unicode for a standard encoding of Cuneiform.

For Name Format and Table Entries, please see the top of the page ReplaceSigns, click here.

Sign Forms Which Demonstrate Need for a Sign, where late scribal reanalyses into more familiar components do not cover the repertoire of needed signs.

The type of IGI.RI, IGI.RU and signs including SAL are in the third table on this page. Examples on this page do *not* include those where naming may contribute to incorrect unification with a wrong earlier sign form.

N2664 Code Point	Sign Name for sign to be deleted or renamed	Glyph Frag-ment or se-quence	Is there an indep. sign?	? Add Delete Rename	Single Sign Name (not sign sequence) and comments	Tradi-tional List?
--	GAD.KID2.UR2	seq.			late dissolution of earlier sign UMBIN	
	UMBIN		yes	Add	For Old and Middle Babylonian the sequence analysis does not work, the sign is unitary; Classic Sumerian some form of "leg" x KID2, or in one form partly dissolved into GAD.(DU x KID2).	B160 L92b

	AKKIL		yes	Add	AKKIL (unitary) = ?? x KID2 (the analysis (GAD.SI) x KID2 would represent the earlier form decently, see analysis of containers which surround an infix on left and right only)	B159 L92a
--	SHE.NAGA	seq			was a single sign in Gudea, Fara, Uruk	B293v L375a Z381
--	SHU.KAD2	seq				
			yes	Add	KAD4 single sign as seen in Gudea	B568 L354b
--	SH.KAD3	seq				
			yes	Add	KAD5 single sign as seen in Gudea	B569 L354b
	GA.DUN3	seq			disproved for the following	
			yes	Add	IL2 Classic Sumerian and Uruk show its lower part as LU2 not DUN3, variation which can only be captured by encoding entire sign	B493 L320
	MA2.KASKAL	seq			disproved by Gudea and Uruk for following:	
			yes	Add	UD5 (UDU with teats, 'nanny goat')	B203 L122b
	SU.AB	seq				
			yes	Add	ABZU in Gudea either ligatured or fused	F292

Signs Which Did Not Undergo Historical Reanalysis, But Whose Parts are Components, Not Separate Signs in Sequence. The "Cover" Containers x Infixes.

Container signs here are SHU4 and SHU2. The obvious analog in Han CJK characters is the "roof" radical, U+219BA and following. The two cuneiform signs SHU4 and SHU2 had the same source, with significance 'cover' or 'vault of heaven' and the like. That sign later split, and only SHU4 merged later visually with the number sign U. But it is not here called "U", despite that being the usual name for the component SHU4 as seen in time periods after Fara (where there was fluctuation). Probably no sign begins with the true number sign U.

Uruk shows the true container nature for those signs which are known that early (noted below), since for "infixed" URI3 and partly for AN and EN, the "cover" wraps around three sides of the infixed portion just as does the accepted container NINDA2. In NeoAssyrian, these signs are very unlikely to be split across line breaks (the container is so narrow), or to have extra white space within the single sign between their components. So there is probably no evidence whatsoever that they are sequences of SIGNS rather than combinations of components. There is thus no justification for fragmenting them. We are not limited in the number of signs we can encode for cuneiform, within the limits of what we could conceivably want.

N2664 Code Point	Sign Name for sign to be deleted or renamed	Glyph Frag-ment or se-quence	Is there an indep. sign?	? Add Delete Rename	Single Sign Name (not sign sequence) and comments	Tradi-tional List?
--	U.AD	seq				
			yes	Add Rename	SHU4 x AD = GIR4	L430
--	U.BURU14	seq				
			yes	Add Rename	SHU4 x BURU14 = SHIBIR	B666 L413
--	U.DIM	seq				
			yes	Add Rename	SHU4 x DIM = GAKKUL3	B667 L415a
--	U.(DIM x KUR)	seq				
			yes	Add Rename	(SHU4 x DIM) x KUR = GAKKUL (grouping?)	B668 L416
--	U.(DIM x SHE)	seq				
			yes	Add Rename	SHU4 x DAR = GAKKUL (this was	L416v

					early distinct from the preceding, later merged)	
--	U.DAR	seq				
			yes	Add Rename	SHU4 x DAR	B670 L418
--	U.E2	seq				
			yes	Add Rename	SHU4 x E2 = SHITA4 (Components touch in Uruk form)	B699 L442 Z535
--	U.GA	seq				
			yes	Add Rename	SHU4 x GA = UTU2	B700 L443
--	U.GAN	seq				
			yes	Add Rename	SHU4 x GAN = SHAGAN	L428
--	U.GAR	seq				
12278			yes	Add Rename	SHU4 x GAR = PAD	B746 L469
--	U.GIR3 (= U.PIRIG)	seq				
			yes	Add Rename	SHU4 x GIR3 (or PIRIG) = KUSHU	B710 L448
--	U.GUD	seq				
N2664 R			yes	Add Rename	SHU4 x GUD = UL	B698 L441
--	U.GUR	seq				
			yes	Add Rename	SHU4 x GUR	B669 L417
--	U.ITI	seq				
			yes	Add Rename	SHU4 x ITI	B664 L414
--	U.KA	seq				

			yes	Add Rename	SHU4 x KA = UGU	B663 L412
--	U.MU	seq				
			yes	Add Rename	SHU4 x MU = UDUN	B665 L415
--	U.SAG	seq				
			yes	Add Rename	SHU4 x SAG	B671 L419
--	U.UD.KID	seq				
			yes	Add Rename	SHU4 x (UD.KID) = NIGIN3	B707 L447a
--	U.ZAG	seq				
			yes	Add Rename	SHU4 x ZAG	B700a
--	SHU2.AN	seq				
			yes	Add Rename	SHU2 x AN = EN2 (Uruk form has SHU2 partly surrounding AN)	B870 L546 Z138
--	SHU2.AN lig.(SHAR2 x GAD)	seq				
			yes	Add Rename	SHU2 x AN lig.(SHAR2 x GAD) = KESH3	B871
--	SHU2.ASH2	seq				
			yes	Add Rename	SHU2 x ASH2 = GIBIL	B875 L548
--	SHU2.DUN4	seq				
			yes	Add Rename	SHU2 x DUN4 = SHUDUN	B876 L549
--	SHU2.ESH	seq				
			yes	Add Rename	SHU2 x ESH = LIL3	B879 L553

--	SHU2.KISAL	seq				
			yes	Add Rename	SHU2 x KISAL (in Fara mistaken for SHU4 ?)	B877 L550
--	SHU2.MUL	seq				
			yes	Add Rename	SHU2 x MUL = KUNGA	B872 L547
--	SHU2.NAGA	seq				
			yes	Add Rename	SHU2 x NAGA = SHEG8	B873 L551
--	SHU2.NE	seq				
			yes	Add Rename	SHU2 x NE = LIL5	B874 L552
--	SHU2. (SHE.KU.KAK)	seq				
			yes	Add Rename	SHU2 x (SHE.KU.KAK) = SHEG9	B878 L551v
--	SHU2.UR SHESHIG	seq				
1212F			yes	Add Rename	SHU2 x (UR sheshig) = HUL2	B880 L550a

Sign Forms Which Demonstrate Need for a Sign, where late scribal reanalyses into more familiar components separate components which were fused in earlier usage.

The use of "x" here can be considered like other uses in that the overlap of components, or their penetration into each other's bounding boxes, means that they are not renderable as a simple sequence of glyphs.

Near the end of this subsection are included six items which may be demonstrable as single signs, but about which judgement is not passed at this time (blank instead of "no" or "yes" in the column "Is there an indep. sign?"). It is conceivable that judgement will be possible within the next few months.

N2664 Code	Sign Name for sign to be	Glyph Frag-ment	Is there	? Add Delete	Single Sign Name (not sign sequence) and	Tradi-tional

Point	deleted or renamed	or se-quence	an indep. sign?	Rename	comments	List?
	IGI+MIN ligature			?	IGI + MIN or IGI x MIN ? Does the form alternate with a sequence IGI.MIN, as appears to be shown in Labat449 ? If not, probably a unitary sign.	B724a L449
--	IGI.RI	seq				
N2664 R			yes	already	IGI x RI = AR more evidently a single sign in Gudea and Fara	B726 L451 F422
--	IGI.RU	seq				
			yes	Add	IGI x RU = PAD3 more evidently a single sign in Gudea, Fara, and Uruk (RU with IGI inside)	B725 L450 F423
--	IGI.UM (IGI.DUB ?)	seq				
			yes	Add	IGI x UM (or IGI x DUB) = AGRIG	B727 L452
--	IGI.DIB = U3	seq				
			yes	Add	IGI x DIB (Components touch in Gudea, Fara)	B731 L455
				?	IGI x LU (if distinct from IGI x DIB)	
--	IGI.TUG2 or IGI.SHE3	seq				
			yes	Add	IGIx TUG2 or IGI x SHE3 (Components touch in Gudea and later)	B732 L455 F434
--	IGI.ERIM	seq				
			yes	Add	IGI x ERIM (Components touch in Fara)	B729 B730 L454

--	IGI.PUR2	seq				
			yes	Add	IGI x PUR2 (Components touch in Fara)	F425
--	IGI.SHE3 or .KAR2?	seq				
			yes	Add	IGI x SHE3 (or IGI x KAR2 ?) (Components touch in Fara)	F426
--	IGI.E2	seq				
			yes	Add	IGI x E2 = U6 (Components touch in Fara)	B728 L449 F429
--	IGI.SHID	seq				
			yes	Add	IGI x SHID (Components touch in Fara)	F430
--	IGI.LAGAB	seq				
			yes	Add	IGI x LAGAB (Components touch in Fara)	F431
--	IGI.NI	seq				
			yes	Add	IGI x NI	F435
--	IGI.ZI	seq				
			yes	Add	IGI x ZI	L452
--	IGI.UR	seq				
			yes	Add	IGI x UR = HUL (looser connection of components than many signs above in this list; one early attestation has parts side-by-side, analog of the Uruk combinations that often correspond to later complex signs)	B733 L456 F428 U
					Examples treated differently by Labat, not given separate numbers,	All under L449

					and shown without such close joins as the other signs above. IGI.DU, IGI.KAK	
--	NE.RU	seq				
			yes	Add	NE x RU (RU with NE inside: RU x NE ?)	L172b Z144
--	NI.RU	seq				
			yes	Add	NI x RU (RU with NI inside: RU x NI ?)	Z
--	KUR.RU	seq				
			yes	Add	RU with KUR inside = SHURUPPAK	Z544a
					RU with THREE STROKES (perhaps alternate of preceding)	Z544b
--	SAL.SI	seq				
12088			yes	already	EL = SIKIL (SAL nested into SI in Classic, Gudea, Fara, and Uruk; fused in NeoAssyrian)	B899 L564
--	SAL.KUR	seq				
			yes	Add	SAL x KUR (later also read GEME2)	B890 L558
--	SAL.SHE3	seq				
--	SAL.TUG2	seq				
			yes	Add	SAL x SHE3	B897
--	SAL.SHU2	seq				
						Z
--	SAL.Z751	seq				
					SAL x Z751	Z
--	SAL.LAGAR	seq				

					SAL x LAGAR	Ellerm.
--	SAL.KAB or SAL.HUB2	seq				
					SAL x KAB or SAL x HUB2	Ellerm.
--	SAL.ME	seq				
					SAL x ME	Ellerm.
--	SAL.TUK	seq				
					SAL x TUK	Ellerm.
--	SAL.ASH2	seq				
12366	ZUM		yes	already	SAL x "comb" = ZUM (appears as SAL x ASH2 in NeoAssyrian, but not elsewhere)	B884 L555
			yes	Add	Same as above, with LAGAB around the ASH2	B885
12061	DAM		yes	already	Looks like SAL x something, not analyzable	B889 L557
--	SAL.NAM2	seq				
			yes	Add	SAL x NAM2 = NIN	B886 L556
--	SAL.MA	seq		no	SAL + MA (ligature?) read mim-ma	B888 L556

Cuneiform Signs

Please choose from the categories below

Analysis and reports to support an international standard for computer encoding of the Cuneiform writing system

Research on the development of Cuneiform signs

Sign or Sign Sequence? | Spacing and Line Breaks | Kerning for IGI, SAL? | Atomic Signs by Comparing Times | Container types | Type "SIGN over SIGN" | Fara Signs not yet identified

Beginning through L. For second half M to Z please click here.

B298v ooooo (! distinct ? !)
B388 ooooo "GA2"
B825 12393 1223D # MIN
B864 ooooo # VARIANT USSU
B839 12000 A
**** A with crossing lines
B845 12001 A x A
B840 12002 A x BAD
B843 12006 A x DU6
**** A x EN
**** A x ESH2 ?
**** A x ESH2 ? variant ?
**** 12003 A x (GAN2 TENU)
B846 12004 A x HA
B844 12005 A x IGI
B842 12007 A x MUSH
B841 12008 A x SAG
**** A x SHUBUR
**** A x U
**** A x ZATU672
A.A
B839a ooooo A.AN
B839c ooooo A.ENGUR
B839b ooooo A.IGI
**** A.(LAGAB x KUL)
B223 1200A AB
**** 1200B AB gunu
**** AB gunu sheshig
**** AB gunu x (A tenu)
B223v ooooo AB variant
**** AB with ALIM above
**** AB with U4 above
**** AB with ZU above
**** AB x A
B227 1200C AB x ASH2
AB x ASH2 variant
**** 1200E AB x GAL
B225 1200F AB x GAN2 <tenu>
B235 1200D AB x GIN2
B236 (v) 12010 AB x HA
B229 12014 AB x IGI energetic
B229v ooooo AB x IGI energetic variant

B237 12011 AB x IMIN
B233 ooooo AB x KI
B234 12012 AB x LAGAB
B224 ooooo AB x NUN
B226 12013 AB x SHESH
B231 ooooo AB x U
AB x U variant
B232 12015 AB x (U.U.U)
**** AB x ZATU659
B672 12016 AB2
**** AB2 + AB2
**** AB2 TENU
**** AB2 with number
**** AB2 with ONE STROKE above
**** AB2 with TWO STROKES above
B680 ooooo AB2 x A
**** 12017 AB2 x ASHGAB
B676 12018 AB2 x BALAG
**** 12019 AB2 x BI
**** 1201A AB2 x DUG
B674 1201B AB2 x GAN2 (GIR3 x GAN2)
**** 1201C AB2 x GUD
**** 1201D AB2 x KAD3
B674v ooooo AB2 x KAR2
**** AB2 x KU
**** 1201E AB2 x LA
B679 1201F AB2 x (ME.EN)
**** 12020 AB2 x NE
B677 12021 AB2 x SHA3, AB2.SHA3
**** 12022 AB2 x SIG7
**** 12023 AB2 x SILA3
B673 12024 AB2 x TAK4
**** 12025 AB2 x U
B258 12026 AD
**** AD3
**** ÅEÅ+hill??
B127 12027 AG
B127 lig ooooo AG ligature AN+AG
**** AG TENU
B129 12028 AG x ERIM
**** 12029 AG x (SAL.GISH)
B128 ooooo AG x SHITA
**** 1202A AG x (SHITA.GISH)
B727 (v(2)) ooooo AGRIG
B636 ooooo AH
B638 ooooo AH+ME
B639 ooooo AH+ME.U
B474 1202B AL
**** 1202C AL crossing
**** AL SHESHSHIG
B478 ooooo AL x AL
B480 1202D AL x DIM2
B477 1202E AL x GISH
B482 1202F AL x HA
? 12030 AL x KAD3
B481 12031 AL x KI

B479 12032 AL x SHE
B475 ooooo AL x TAK4
B476 12033 AL x USH
B573 12034 ALAM
**** ALAM paired
B635 12035 ALEPH
**** ALIM GUNU + PA
**** ALIM GUNU + PA + LAGAB
B695 12036 AMAR
**** AMAR paired
**** AMAR striped
**** AMAR striped TENU
**** AMAR with FOUR STROKES above
**** AMAR with NUMBER ONE
**** AMAR with THREE STROKES
B697 ooooo AMAR x KUG
B696 12037 AMAR x SHE
B010 12038 AN
**** 12039 AN opposed
AN.IM.GI6
**** - (AN.NAGA) opposed
**** 1203B (AN.NAGA) squared
B353 1203C ANSHE
B090 1203D APIN
**** APIN inversum
**** APIN tenu
**** APIN.APIN
**** 12040 ARKAB
B001 12042 ASH
ASH
B002 ooooo ASH + ASH
B011 ooooo ASH + SUR
***** ASH.TUG2.TUG2.ASH crossing
B548 12048 ASH2
B862 ooooo ASH3
B217 ooooo ASH4
B173 12049 ASHGAB
B710 ooooo ÅU4 x GIR3
**** ÅUBUR w ONE STROKE above
**** ÅUBUR w TWO STROKES above
**** ÅUBUR with THREE STROKES above
**** AZU x ???
B014 1204A BA
B113 1204B BAD
**** BAD with DISH above
BAD with DISH above variant
**** 1204C BAHAR2
**** BAHAR2
B005 1204D BAL
**** 1204E BAL paired
B565 1204F BALAG
**** BALAG paired
**** BALAG x UZ3
B122 ooooo BAN2
B549 ooooo BANESH
B551 (v) ooooo BANIA

B550 (v) ooooo BANLIMMU
B465 ooooo BANMIN
B377 ooooo BANSHUR2
B121 12050 BAR
**** BAR x AN
BAR x AN
B554 12051 BARA2
**** BARIGA
B358 12052 BI
**** BI
BI
**** BI with SHE attached
**** 12053 BI x A
B361 12054 BI x GAR
B360 12055 BI x (IGI energetic)
**** BI x TALLY crossing
B643 ooooo BIR
**** BISEXAGESIMAL120
**** BISEXAGESIMAL1200
**** BISEXAGESIMAL7200
**** BOWL
**** BOWL ONE EIGHTH
**** BOWL ONE FIFTH
**** BOWL ONE FOURTH
**** BOWL ONE HALF
**** BOWL ONE NINTH
**** BOWL ONE SEVENTH HYP
**** BOWL ONE SIXTH
**** BOWL ONE TENTH
**** BOWL ONE THIRD
**** BOWL UPSIDE DOWN
B580 12056 BU
**** BU + BU + NA2
**** BU + KASKAL
B581 12058 BU crossing
B582v ooooo (BU crossing) + AB
B586v2 ooooo (BU crossing) .A.NA
**** (BU crossing) as part of signs
B584 12057 BU gunu
B580a 12059 BU paired
B582 ooooo (BU paired) + AB
**** BU TENU
**** BU TENU + NA2
**** BU x A
**** BU x DU6
B806 ooooo BUL+BUL
B169 1205A BULUG
B169a 1205B BULUG paired
B559 1205C BUR
B008 1205E BUR2
**** BUR2 with GAL
**** BURU
B165 ooooo BURU14
Container name HUBUR or NISAGGA ? forms vary between "NUNUZ.AB2" and "NUNUZ.KISIM5"
**** COUNT DAYS

**** COUNT MONTHS
**** COUNT YEARS
B561 1205F DA
**** DA x ESH2 ?
**** DA x NUN ?
B560 12009 DA x SHE
B560a ooooo (DA x SHE) + MIN
12060 DAG
B438 ooooo DAG
B438v ooooo DAG variant
B889 12061 DAM
B183v 12062 DAR
B166 ooooo DAR3
**** 12063 DARA3
B736 12065 DI
**** diagonal colon
**** DILMUN
B167 12067 DIM
**** DIM x GU
B168 ooooo DIM x KUR
**** 12068 DIM x SHE
B686 12069 DIM2
B119 1206A DIN
**** DIN tenu
B207 ooooo DIR
B748 1206B DISH
DISH x STROKE
DISH x TWO STROKES
B350 1206D DU
B351 1206E DU gunu
B350a 12070 DU paired
B352 1206F DU sheshig
DU x KASKAL
**** DU x UD
B721 121F6 DU6
**** DU6
B721a ooooo (DU6 paired).SHE.SAR
**** DU8
**** DU8 GUNU
DU8 variant
**** DU8 x HI
**** DU8 x UDU
B242 Jan-37 DUB
243 12072 DUB x ESH2
B245 ooooo DUB x LAGAB
DUB x LAGAB
B244 ooooo DUB x SHA3
**** DUB x SHE
**** 12074 DUB2
B499 12074 DUG
DUG
**** DUG TENU
**** DUG x (? .SA)
**** DUG x AB2
**** DUG x ANSHE
**** DUG x ASH

DUG x ASH variant
DUG x ASH variant
**** (DUG x ASH) x KUG?
**** DUG x BA
**** DUG x BALA
**** DUG x BIR3
**** DUG x DIN
**** (DUG x DIN) INVERSUM
**** DUG x GA
**** DUG x GESHTU
**** DUG x GIR3
**** DUG x GISH
**** DUG x HA
**** DUG x HI
DUG x HI
**** DUG x HI striped
**** DUG x (IGI energetic)
**** DUG x KAK
**** DUG x KASKAL
DUG x KASKAL variant
**** DUG x KUR
DUG x LAM
**** DUG x (LAM+KUR)
**** DUG x MASH
**** DUG x MI
**** DUG x NAGA
DUG x NAGA variant
**** DUG x NAM2
**** DUG x (NAM2 with SHE attach)
**** DUG x NI
**** DUG x SA
**** DUG x (SA.GI)
**** DUG x SHAH2
**** DUG x SHE
**** DUG x SHU ?
**** DUG x SI4
**** DUG x SIG
**** DUG x SIG2
**** DUG x SUHUR
**** DUG x SUKUD
**** DUG x TAK4
**** DUG x (TAK4.SA)
**** DUG x (TAK4.SAL)
**** DUG x TI
**** DUG x U2
DUG x U2 variant
**** DUG x UH3
**** DUG x ZATU764
**** DUG x ZATU779
**** DUG x ZATU780
DUG x ZATU781
**** DUG.SILA2 .BUR
B704 12075 DUGUD
**** DUL
B720 ooooo DUL
B836 (v) 12077 DUN3

****	12078	DUN3 gunu
****	12079	DUN3 gunu gunu
****	1207A	DUN3 gunu gunu SHESHIG
B557	ooooo	DUN4
1207B	DUR2	
B498	1207C	E
****	1207D	E paired
****	1207E	E x PAP
B498a	ooooo	(E.NUN) paired
****		(E.NUN) paired variant
B495	1207F	E2
****		E2 with U4 above
****	12080	E2 x (A.HA.DA)
****	12081	E2 x GAR
****		E2 x KASKAL
****		E2 x KASKAL
	E2 x KASKAL	
****		E2 x KASKAL variant ?
****		E2 x KASKAL with THREE STROKES above
****		E2 x KUR
****	12082	E2 x MI
****		E2 x PAP
****	12083	E2 x SAL
****	12084	E2 x SHE
****	12085	E2 x U
B300	12086	EDIN
****		EDIN x AB2
****		EDIN x GA
****		EDIN x KAK
****		EDIN x KI
****		EDIN x NI
****		EDIN x SHE x KI
****		EDIN x ZA
B356	12087	EGIR
****		EGIR GUNU
	EIGHT SHAR2	
B867	ooooo	EIGHT variant USSU
B538	ooooo	EIGHT variant USSU3
B164	12089	EN
B164c	1208A	EN crossing
****		EN crossing .IM crossing
****		EN energetic
****		(EN (EZEN w SHE)) (NUN x ME) IGI energy
****		(EN NE) (IGI energetic) (NUN w ME)
****	1208C	EN opposed
B164a	ooooo	EN paired
****	1208B	EN squared
B164lig	ooooo	EN with determinative AN
****		EN x A
****	1208D	EN x GAN2
****	1208E	EN x GAN2 tenu
B164lig2	1208F	EN x ME
	EN x ME with ATU120	
****		EN x NUN
****		(EN+ME) with LI (LI = SHA x SHE)
****		EN.KID

****		(EN.ME) with GI
****		(EN.ME) with MU or EN w MU
****		EN.ZU
B818	12090	EREN
B612	12091	ERIM
****		ERIN, SHESH4
B711	ooooo	ESH
B629	ooooo	ESH16
B810	12092	ESH2
****		ESH2 + NUMBER ONE
****		ESH2 tenu
B834	ooooo	ESH5
B004	ooooo	ESH6
B434	ooooo	ESHDA
****		ESHDA x TWO STROKES
B271	12093	EZEN
	EZEN ?	
****		EZEN nutillo
****		EZEN nutillo tenu
	EZEN x ?	
B288	12094	EZEN x A
B289	12095	EZEN x (A.LAL) or EZEN x (LAL x A)
B290	12096	EZEN x (A.LAL2)
B282	ooooo	EZEN x ÅE
B272	12097	EZEN x AN
****		EZEN x (AN. ?)
****		EZEN x ASH
B275	12098	EZEN x BAD
B275v	ooooo	EZEN x BAD var (SAR instead)
B287	12099	EZEN x DUN3
****	1209A	EZEN x DUN3 gunu SHESHIG
****		EZEN x DUN4
****		EZEN x EN
****		EZEN x GIR
B278	ooooo	EZEN x GUD
B291	1209B	EZEN x HA
****	1209C	EZEN x (HA gunu)
****		EZEN x HAL
****		EZEN x (HI x DISH)
B281	120A4	EZEN x IGI energetic
****		EZEN x KAB
B277	1209D	EZEN x KASKAL
****	1209E	(EZEN x KASKAL) SQUARED
****		EZEN x KI
B284	1209F	EZEN x KUG
B274	120A0	EZEN x LA
B285	120A1	EZEN x LAL2
B273	120A2	EZEN x LI
B286	120A3	EZEN x LU
B280	ooooo	EZEN x MIR
****		EZEN x NIM
****		EZEN x number?
****		EZEN x PA
****		EZEN x RAD
****		EZEN x SAG
****		EZEN x SHID

B276 ooooo EZEN x SI
**** EZEN x SIG7
**** EZEN x SU
**** EZEN x TAR
B279 120A5 EZEN x U2
**** EZEN x U2
**** EZEN x (U2.A)
**** EZEN x U4
B283 120A6 EZEN x UD
**** EZEN x UN
**** EZEN x URUDU ?
**** EZINU
**** EZINU with SHE attached
FIVE BURU
FIVE GESHU
FIVE SHAR2
FOUR BURU
FOUR GESHU
FOUR SHAR2
B860 ooooo FOUR variant LIMMU
B506 ooooo FOUR variant LIMMU4
**** FRACTION EN SIXTEENTH
**** FRACTION HALF
**** FRACTION TINY EIGHT BARS
**** FRACTION TINY FOUR BARS
**** FRACTION TINY NINE BARS
**** FRACTION TINY SIX BARS
B491 120A7 GA
B492 120A8 GA gunu
**** GA with ZATU753
**** GA x U
**** GA x ZATU659
**** GA'AR
**** GA'AR variant
B491a ooooo GA.KASKAL
**** GA.NI
B387 120A9 GA2
**** 120AA GA2 paired
**** GA2 with markings
**** GA2 x ?
**** GA2 x ?
**** GA2 x A
**** 120AB GA2 x (A.HA)
B428 120AC (GA2 x (A.HA)) x DA
B429 120AD GA2 x (A.IGI)
**** GA2 x AB
B423 ooooo GA2 x AB2
**** 120AE (GA2 x AB2 tenu) x TAB
B392 120AF GA2 x AN
B392 ooooo GA2 x AN
B393 ooooo GA2 x (AN.KAK.A)
B389 120B0 GA2 x ASH
B408v ooooo GA2 x ASH2
B414 120B1 (GA2 x ASH2) x GAL
B395 120B2 GA2 x BAD
**** 120B3 GA2 x (BAR.RA)

**** GA2 x BI
**** 120B4 GA2 x BUR
B415 120B5 GA2 x (BUR.RA)
B400 ooooo GA2 x BURU14
B416 120B6 GA2 x DA
B425 120B7 GA2 x DI
B401 120B8 GA2 x (DIM x SHE)
B403 120B9 GA2 x DUB
**** GA2 x EDIN
**** 120BA GA2 x EL
B433 120BB GA2 x (EL.LA)
B399 120BC GA2 x EN
**** 120BD GA2 x (EN.KAR2)
**** GA2 x ESH2
**** (GA2 x ESH2) x GUD
**** GA2 x GA2
B431 120BF GA2 x GAR
**** GA2 x (GAR.NE)
**** GA2 x GESHTU
B396 120C0 GA2 x GI
**** GA2 x (GI.NE)
B412 120C1 GA2 x GI4
**** 120C2 GA2 x (GI4.A)
**** GA2 x GIR
**** GA2 x (GIR+HA)
B391 120C3 GA2 x (GIR2.SU)
**** GA2 x GISH tenu
**** GA2 x GUD
**** GA2 x GUD
**** GA2 x HA
**** GA2 x (HA+HA)
B430 120C4 GA2 x (HA.LU.ESH2)
**** 120C5 GA2 x HAL
B390 120C6 GA2 x (HAL.LA)
**** GA2 x HI
**** GA2 x (HI TRIPLED)
**** GA2 x (HI+SUHUR)
B421 120C7 GA2 x (HI.LI)
**** GA2 x (HU.KASKAL)
B398 120C8 GA2 x HUB2
B417 120C9 GA2 x IGI energetic
**** GA2 x ISH
B406 120CA GA2 x (ISH.HU.ASH)
B407 120CB GA2 x KAK
B402 ooooo GA2 x KAR2
B405 120CC GA2 x KASKAL
**** 120CD GA2 x KID
B409 120CE GA2 x (KID.LAL)
GA2 x KUG
GA2 x KUG
B426 120CF GA2 x (KUG.AN)
**** GA2 x LAGAB
**** GA2 x LAM
**** GA2 x LI
**** GA2 x MASH
B427 120D0 GA2 x (ME.EN)

****		GA2 x ME++
B424	120D1	GA2 x MI
****		GA2 x MUSH
****		GA2 x NAGA
****		GA2 x NE
****		GA2 x NI
B397	120D2	GA2 x NUN
B411	120D3	GA2 x (NUN paired)
B408	120D4	GA2 x PA
****		GA2 x PAD
****		GA2 x PAP
B432	120D5	GA2 x SAL
B413	120D6	GA2 x SAR
****		GA2 x SAR
B418	120D7	GA2 x SHE
B419	120D8	GA2 x (SHE.TUR)
B410	120D9	GA2 x SHID
****		GA2 x (SILA3.DI)
****		GA2 x SU
****		GA2 x SUHUR
****		GA2 x SUHUR gunu
****		GA2 x SUKUD
B404	120DA	GA2 x SUM
****		GA2 x SUMASH
B394	120DB	GA2 x TAK4
B422	120DC	GA2 x U
B420	120DD	GA2 x UD
****	120DE	GA2 x (UD.DU)
****		GA2 x ZI
B298v2	ooooo	GAB
B299	ooooo	GAB.LISH
****	120DF	GABA
****	120E0	GABA crossing
B157	120E1	GAD
****		GAD x SHE
****		(GAD.GAR) paired
PA*2		(GAD.GAR) paired with GAL
B161	ooooo	(GAD.GISH) x TAK4
B159	ooooo	(GAD.SI) x TAK4
B158	ooooo	GAD.TAK4
B553	120E3	GAL
B338 (v)	120E4	GALAM
B576	120E5	GAM
B576	120E5	GAM
****	120E6	GAN
****		GAN+GIÅ+DIN
B174	120E7	GAN2
****	120E9	GAN2 crossing
B174a	120EA	GAN2 paired
B175 (v)	#####	GAN2 tenu
B859	120EB	GAR
****		GAR gunu
B588v2	ooooo	GAR w SHE. TAB before paired
B588v3	ooooo	(GAR w SHE.PA before) paired
****		GAR with FIVE STROKES above
****		GAR with FOUR STROKES above

B588v4	ooooo	(GAR with SHE before) paired
****		GAR with SIX STROKES above
****		GAR with THREE STROKES above
B543	120ED	GAR3
****		GAR3 ?
		GAR3 with stripes ??
****		GARA2
****		GARA2 x DISH
****		GARA2 x SILA3
B662 (v)	120EE	GASHAN
B562	ooooo	GASHAN
B562v	ooooo	GASHAN
B647	ooooo	GE22
****		GE23
B212	120EF	GESHTIN
****		GESHTIN + KI
****		GESHTIN x '10'
****		GESHTIN x DIN
B213	120F0	GESHTIN x KUR
B141	120F1	GI
B105	120F2	GI crossing
B507	120F3	GI energetic
B508	120F4	GI energetic crossing
****	120F5	GI energetic paired
****		GI energetic x A
****		GI tenu
****		GI triple
****		GI triple x SIG2
****		GI twin
****		GI twin x ESH2
****		GI with TALLY
****		GI x ?
****	120F6	GI x E
****		GI x ESH2
****		GI x GISH tenu
****		GI x LAGAB
****		GI x NAM2
****		GI x SIG2
****	120F7	GI x U
B312	ooooo	GIBIL
****		GIBIL tenu
B830	120F8	GIDIM
B705	120F9	GIG
****		GIN2
B006	120FA	GIR2
B007	120FB	GIR2 gunu
****	120FC	GIR3
B701	ooooo	GIR3
B701a	ooooo	GIR3 + MIN
****		GIR3 + NITA
****		GIR3 + SHE
****		GIR3 GUNU
B701c	ooooo	GIR3 opposed
B703	120FD	GIR3 x (A.IGI)
B678	1219A	GIR3 x ESH2
****	120FE	GIR3 x (GAN2 TENU)

**** 120FF GIR3 x IGI
B702 12100 GIR3 x (LU.IGI)
B701b ooooo GIR3 x MIN
**** 12101 GIR3 x PA
B295 ooooo GIR3 x RIB
B297 ooooo GIR3 x ZA
B376 12102 GISAL
B469 12103 GISH
**** GISH crossing
**** GISH paired
B470 12104 GISH TENU
**** GISH with SHE attached
**** GISH with SHE attached x A
B471 12105 GISH x BAD
**** 12106 GISH x TAK4
**** GISH.BIL3
**** GISH.GIBIL
**** GISH.TUG2
**** GISHGAL
GISHGAL
B079v ooooo GISHGAL x IGI
B075v ooooo GISHGAL x URUDU
B571 122B4 GISHIMMAR
B571 122B4 GISHIMMAR
B891 (v) 12107 GU
B892 12108 GU paired or crossing
B176 12109 GU2
**** GU2 + NUNUZ
B177 1210A GU2 GUNU
B179 ooooo GU2 MODIFIED
**** GU2 x "V"
**** (GU2 x GISH) + GISH?
B170 ooooo GU2 x HI
**** GU2 x (IGI energetic)
B178 1210B GU2 x KAK
**** 1210C GU2 x (KAK x IGI energetic)
**** GU2 x ME
**** 1210D GU2 x NUN
**** GU2 x PA
**** 1210E GU2 x (SAL.TUG2)
**** GU2 x ZA
B472 1210F GUD
**** GUD striped
**** GUD with ZATU755
B473 ooooo GUD x KASKAL
B309 12112 GUD x KUR
B310 12111 (GUD x KUR) x A
**** GUD x TALLY across
**** GUD x UD
B858 ooooo GUG
**** GUKKAL
**** GUKKAL+(HI x ASH gunu) tenu
B339 12113 GUM
B340 12114 GUM x SHE
B180 12115 GUR
B819 12116 GUR7

B088 ooooo GUR8
12118 GURUSH
B856 12119 HA
**** HA + HA
B558 1211B HA gunu
**** HA gunu + HA
HA SHESHIG ?
1211A HA TENU
B857 ooooo HA tenu
HA TENU GUNU
(HA variants)
**** HA with TWO STROKES above
**** HA x GISH
**** HA x NUMBER ONE
B003 1211C HAL
B644 ooooo HAR
**** 1211D HAR energetic
B631 1211E HI
**** HI gunu
B632v ooooo HI variant
**** HI x A
B634 1211F HI x ASH
B634v3, v, v2 ooooo HI x ASH
**** HI x ASH paired
**** 12120 HI x ASH2
B640 (v) 12121 HI x BAD
B659 12122 HI x DISH
**** HI x DISH paired
**** HI x ESH2
**** HI x ESH2 tenu
B650 12123 HI x GAD
**** HI x GASHAN
**** HI x HAL
**** HI x IGI ?
B660 12124 HI x KIN
**** HI x KUSHU2
**** 12125 HI x NUN
**** HI x SAL. ??
**** HI x SAR
**** 12126 HI x SHE
**** HI x TALLY
(HI x TALLY).ME
(HI x TALLY).ZA
B688 (v (2)) 12127 HI x U
**** HI x ZATU707
B631a ooooo HI.A
B132 12128 HU
B134 ooooo HU falling marks
**** HU GUNU
B583 (v) ooooo HU with SHE
**** HU x A
B135v ooooo HU x ERIM
B135 ooooo (HU x ERIM) x SHE
B137 ooooo HU x HI
B133 ooooo HU x SI
**** HU.A

B138 ooooo HU.NA2
B149 12129 HUB2
B150v2 ooooo HUB2 with UD above, UD.HUB2
**** 1212A HUB2 x AN
**** 1212B HUB2 x HAL
**** 1212C HUB2 x KASKAL
**** 1212D HUB2 x LISH
B150 1212E HUB2 x UD
B615 ooooo HUBUR
B619 ooooo HUBUR x ASHGAB
**** HUBUR x BA
B621 ooooo HUBUR x BI
**** HUBUR x BUR2
B625 ooooo HUBUR x DUG
B623 ooooo HUBUR x GUD
B626 ooooo HUBUR x (GUG2.BULUG3)
B627 ooooo HUBUR x IGI energetic
B618 ooooo HUBUR x KAD3
**** HUBUR x (KUR2.LU3)
B616 ooooo HUBUR x LA
B620 ooooo HUBUR x NE
B619v ooooo HUBUR x SA
B6`17 ooooo HUBUR x SILA3
HUBUR x U2
B624 ooooo HUBUR x (U2.BA)
B645 ooooo HUSH
B252 12130 I
B252lig ooooo I+NA
B252lig2 ooooo I+NA
B260 ooooo IA
B861 ooooo IA2
B216 ooooo IA7
IA7
B513 ooooo IA9
B807 12131 IB
**** IB with PA
**** IB with PAP
**** 12132 IDIM
**** 12133 IDIM paired
**** 12134 (IDIM paired) squared
B113a, b 12117 IDIM squared
B136 12135 IG
B724 12136 IGI
B728 ooooo IGI + E2
**** IGI + KAR2 ?
B724a ooooo IGI + MIN
**** IGI + UD
B564 12137 IGI energetic
B564v ooooo IGI energetic
B734 ooooo IGI. (UR x KASKAL)
B731 ooooo IGI.DIB
**** IGI.DU
B729, B730 ooooo IGI.ERIM
B732 ooooo IGI.ESH2 ?
B735 ooooo IGI.GAR
**** IGI.KAK

**** IGI.LAGAB
**** IGI.LU
**** IGI.NI
**** IGI.PUR2
B726 (v) ooooo IGI.RI
B725 ooooo IGI.RU
**** IGI.SHID
**** IGI.SHIR.UD paired
**** IGI.TUG2
B733 ooooo IGI.UR
**** IGI.ZI
B348 1213A IL
B349 1213B IL x GAN2 TENU
B493 1213C IL2
B220 ooooo ILIMMU2
B577 ooooo ILIMMU4
**** 1213D IM
**** IM GUNU
B863 12142 IMIN FOUR BY THREE
B218 ooooo IMIN2
B261 12143 IN
B437 12144 IR
**** IR x GA2
B018 (v2) 1203E IR3
**** IR3 gunu
**** IR3 paired
**** IR3 x KID2
B019 1203F IR3 x KUR
B357 12145 ISH
B021 ooooo ITI x BAD
B024 12147 KA
**** KA with GI
**** KA x SAR
B064 12148 KA x A
**** 12149 KA x (A.LAL)
B067 ooooo KA x AÅ3
**** 1214A KA x AD
B034 1214B KA x (AD.KUG)
B046 1214C KA x ASH2
B029 1214D KA x BAD or KA x USH2
B047 1214E KA x BALAG
B030 1214F KA x BAR or KA x MASH
**** 12150 KA x BI
**** 12151 KA x DE2
12152 KA x DUB2
B053 12153 KA x ERIM
B058 ooooo KA x ESH
B062 12154 KA x ESH2
B044 12155 KA x GA
**** 12156 KA x GAL
B033 12157 KA x GAN2 TENU
B065 12158 KA x GAR
B066 12159 KA x (GAR SHA3 A)
**** 1215A KA x GI
**** 1215B KA x GIG
B025 1215C KA x GIR2

B041 ooooo KA x GISH
**** 1215D KA x (GISH.SAR)
B069 1215E KA x GU
B063 1215F KA x GUR7
B059 12160 KA x IGI
B054 12161 KA x IM
B038 12162 KA x KAK
B060 12163 KA x KI
B037 12164 KA x KIB
**** 12165 KA x KID
B026 12166 KA x LI
**** 12167 KA x LU
B070 ooooo KA x LUM
B061 12168 KA x ME
**** 12169 KA x (ME.DU)
**** 1216A KA x (ME.GI)
**** 1216B KA x (ME.ME)
**** 1216C KA x (ME.TE)
B057 1216D KA x MI
B035 1216E KA x NE
B031 (v) 1216F KA x NUN
B040 ooooo KA x PA
B052 12170 KA x PI
B028 12171 KA x RU
B032 12172 KA x SA
B045 12173 KA x SAR
B048 12174 KA x SHA
B050 12175 KA x SHE
B042 12176 KA x SHID
B049 12177 KA x SHU
B068 12178 KA x SIG
**** 12179 KA x SUHUR
**** 1217A KA x TAR
B027 ooooo KA x TU
B056 1217B KA x U
B043 1217C KA x U2
B051 1217D KA x UD
B036 ooooo KA x UR2
B039 1217E KA x USH
**** 1217F KA x ZI
**** KA x ZI3
**** 12181 KA2
**** 12182 KA2 crossing
B148 12183 KAB
B108 12184 KAD2 or SHU tenu
B109 12185 KAD3 or SHU tenu
B568 12186 KAD4
**** KAD4
**** KAD4 x BAR
B569 12187 KAD5
**** 12188 KAD5 paired
B569v ooooo KAD5 variant
B379 12189 KAK
**** KAK x GA2
**** KAK x GISH
**** 1218A KAK x (IGI energetic)

**** KAK x LAGAB
1218B KAL
B496 ooooo KAL
**** 1218C KAL crossing
B496 ooooo KAL paired
B497 1218D KAL x BAD
254 1218E KAM2
B097 1218F KAM4
B599 ooooo KAR2 variant, do not list
B572 ooooo KASHSHEBA
B302 12190 KASKAL
B307 ooooo KASKAL. LAGAB
**** (KASKAL. LAGAB) paired
B307a ooooo KASKAL. (TUL2 paired)
B308 ooooo KASKAL.ASH3
B303 ooooo KASKAL.ITI
B304 ooooo KASKAL.KUR
**** (KASKAL.TUL2) paired
**** KESH2
B871 ooooo KESH3
B737 12192 KI
**** KI (KAL x BAD)
B742 ooooo KI + MIN
**** KI nutillo (?)
B738 12193 KI x BAD
**** KI x KAK
**** KI x LAM
B740 12194 KI x U
B739 12195 KI x UD
**** KI.GAL
B378 12196 KIB
**** KIB
**** KIB
**** 12197 KID
B484 ooooo KID
**** KIMIN
B815 12198 KIN
**** KIN with SHE above
**** KIN2 with SHE attached
B573 ooooo KINGUSILI
**** KIR2 paired
**** 12199 KISAL
**** KISAL x UD ? rather x PUR2 ?
B743 ooooo KISHI4
B687 (v) 1219B KISIM5
**** 1219C KISIM5 paired
**** KISIM5 x U
B808 121B4 KU
**** 121B5 KU OVER (HI x ASH2) twice
**** KU.tenu
B086 121B7 KU4
B087 121B8 KU4 variant
B171 121B9 KU7
B745 121B6 KUG
B117 121BA KUL
**** 121BB KUL gunu

B131 121BC KUN
B578 121BD KUR
B578a 121BE KUR opposed
**** KUR (six impressions)
B089 121C0 LA
B755 (v) 121C1 LAGAB
B756, B757 ooooo LAGAB + AN
B804 ooooo LAGAB + LAGAB
B805 121C2 LAGAB squared
**** LAGAB with SHE attached
**** LAGAB x (NAGA inversum)
B795 121C3 LAGAB x A
B797 121C4 LAGAB x (A.DA.HA)
B799 121C5 LAGAB x (A.GAR)
B798 121C6 LAGAB x (A.LAL)
B796 ooooo LAGAB x (A.TAR)
B784 ooooo LAGAB x AH
B773 121C7 LAGAB x AL
B758 121C8 LAGAB x AN
**** LAGAB x ASH
**** 121CA LAGAB x ASH2
B760 121CB LAGAB x BAD
**** LAGAB x BANSHUR
B769 121CC LAGAB x BI
B765 121CD LAGAB x DAR
**** LAGAB x DU6
**** LAGAB x (E2 with NE)
B764 121CE LAGAB x EN
B783 ooooo LAGAB x ERIM
B775 121CF LAGAB x GA
**** LAGAB x GA'AR
B801 121D0 LAGAB x GAR
B776 ooooo LAGAB x GAR3
B778 121C9 LAGAB x GE23
**** LAGAB x GI
B763 ooooo LAGAB X GI
B772 121D1 LAGAB x GUD
B766 121D2 LAGAB x (GUD paired)
B800 121D3 LAGAB x HA
(LAGAB x HA) + A
(LAGAB x HA) . A
**** LAGAB x (HA.A)
**** 121D4 LAGAB x HAL
**** LAGAB x HI
**** LAGAB x (HI TRIPLE)
**** 121D5 LAGAB x (HI.NUN)
B776v 121D6 LAGAB x IGI energetic
**** LAGAB x IGI energetic
B785 121D7 LAGAB x IM
**** 121D8 LAGAB x (IM.HA)
**** 121D9 LAGAB x (IM.LU)
B781 ooooo LAGAB x (KAR.SU.NA)
**** LAGAB x KAR2
B789 121DA LAGAB x KI
**** LAGAB x KI.nutillo
B794 121DB LAGAB x KIN

B790 121DC LAGAB x KUG
B761 121DD LAGAB x KUL
B762 121DE LAGAB x (KUL.HI.A)
**** 121DF LAGAB x LAGAB
**** LAGAB x LAL
B782 (v) 121E0 LAGAB x LISH
B793 121E1 LAGAB x LU
B777 121E2 LAGAB x LUL
B791 121E3 LAGAB x ME
B792 121E4 LAGAB x (ME.EN)
B780 121E5 LAGAB x MUSH
B768 121E6 LAGAB x NE
**** LAGAB x numbers
**** LAGAB x NUN
B813 12066 LAGAB x PA
**** LAGAB x SA2
**** LAGAB x SHA
**** LAGAB x SHA
**** LAGAB x SHE
B779 121E7 LAGAB x (SHE.SUM)
**** LAGAB x SHITA
**** LAGAB x SHITA
121E9 LAGAB x (SHITA tenu)
**** 121E8 LAGAB x (SHITA.ERIM)
B771 ooooo LAGAB x SHITA2
**** LAGAB x (SHITA2.ERIM)
**** LAGAB x SHU
B802 121EA LAGAB x SHU2
**** LAGAB x SI
B803 121EB LAGAB x SIG
B776 ooooo LAGAB x SIG7
**** LAGAB x SU
**** LAGAB x (SU paired)
B767 121EC LAGAB x SUM
**** LAGAB x TAB
**** 121ED LAGAB x TAG
B759 121EE LAGAB x TAK4
**** 121EF LAGAB x (TE.A)
**** LAGAB x TI
B786 ooooo LAGAB x U
B787 121F0 (LAGAB x U) x A
B788 121F1 LAGAB x (U.U.U)
B774 (v) 121F2 LAGAB x (U2.ASH)
**** LAGAB x U4
**** LAGAB x UB
B783 121F3 LAGAB x UD
B770 121F4 LAGAB x USH
**** LAGAB x Z305
**** LAGAB x ZATU 766
LAGAB x ZATU49
**** LAGAB x ZATU753
(LAGAB xSUM) .ZIB
B719 121F5 LAGAR
**** LAGAR inversum
LAGAR with (EN x ME)
**** LAGAR with SAL

****	121FA	LAGAR x NUN
B722	121FC	LAGAR x SHE
B722v	ooooo	LAGAR x (SHE.SHE)
B723	121FD	LAGAR x (SHE.SUM)
****		LAHSHU
B750	121FF	LAL
B750v	ooooo	LAL x NI
****		LAL x RIN
****		LAL x SAR
B750v2	ooooo	LAL x U
****		LAL x (U NI)
B751	12200	LAL2
B849	ooooo	LAL2
****	12201	LAL2 x DU
****		LAL2 x EZEN
****	12202	LAL2 x HAL
****		LAL2 x HI
****	12203	LAL2 x KAK
****		LAL2 x LAGAB
B751v	12204	LAL2 x NI
****	12205	LAL2 x SAR
B75`1v2	ooooo	LAL2 x U
****	12206	LAL2 x (URU.MIN)
****		LAL2 x ZATU606
B693	12207	LAM
B694	12208	LAM x KUR
****	12209	LAM x KUR x RU
B085	1220A	LI
****		LI paired
B879	ooooo	LIL3
B847	ooooo	LIMMU ABBREVIATION
B215	1220C	LIMMU2
B852	ooooo	LIMMU5
B852	ooooo	LIMMU5
B591	1220D	LISH
B516	12215	LU.sheshshig
B518	ooooo	LU.sheshshig x BAD
B514	12210	LU2
****	12212	LU2 crossing
****		LU2 GUNU x HAL
****		LU2 GUNU x NUMBER ONE
****		(LU2 LU2) opposed
B514a	12214	LU2 opposed
****		LU2 paired
****	12213	LU2 SQUARED
B515	12211	LU2 TENU
****		LU2 x (A.NE)
B523	12216	LU2 x AL
B517	12217	LU2 x BAD
****	12218	LU2 x ESH2
B531	12219	LU2 x ESH2 TENU
B532	ooooo	LU2 x (ESH2.LAL)
B521	1221A	LU2 x GAN2 tenu
****	1221B	LU2 x (HI.BAD)
****		LU2 x (HI??. ??)
B526	1221C	LU2 x IM

B5`19	1221D	LU2 x KAD2
****	1221E	LU2 x KAD3
****	1221F	LU2 x (KAD3.ASH)
B525	ooooo	LU2 x KAM
B527	12220	LU2 x KI
B520	ooooo	LU2 x KID2
B529	ooooo	LU2 x KU
****	12221	LU2 x (LA.ASH)
B528	12222	LU2 x LAGAB
B527'	12223	LU2 x (ME.EN)
B522	12224	LU2 x NE
****	12225	LU2 x NU
****		LU2 x NUMBER ONE
****		LU2 x NUMBER ONE TENU
B524	ooooo	LU2 x SHU
****	12226	LU2 x (SI.ASH)
B533	12227	LU2 x (SIG2.BU)
B530	12228	LU2 x TUG2
B555	12229	LU3
****		LU3 tenu
****		LU3 with SHE attached
****		LU3 with TALLY
****		LU3 x SILA3
****		LU3 x TUR
B266	1222A	LUGAL
****		LUGAL crossed ????
B268	1222B	LUGAL opposed
****	1222C	LUGAL paired
****	1222D	LUGAL SHESHIG
****		LUGAL with (GUD paired) above
B267	ooooo	LUGAL x GAN
B269	ooooo	LUGAL x KAM2
B494	1222E	LUH
B570	1222F	LUL
B901, B900 (v)	12230	LUM
B902	12231	LUM paired
B903	ooooo	(LUM paired) .SHU2
B904	ooooo	(LUM.GAR) paired

Home

Cuneiform Signs

Please choose from the categories below

Analysis and reports to support an international standard for computer encoding of the Cuneiform writing system

Research on the development of Cuneiform signs

Sign or Sign Sequence? | Spacing and Line Breaks | Kerning for IGI, SAL? | Atomic Signs by Comparing Times | Container types | Type "SIGN over SIGN" | Fara Signs not yet identified

Uruk III and IV signs in the Zeichenliste der Archaischen Texte aus Uruk --

Distinguishing Securely Identifiable Signs from Insecure Items

For signs numbered in the range Z001 to Z199, which have been most fully sorted, the results statistically at this point are:

64 securely unifiable with later signs, so do not warrant encoding (category 4)
38 insecure signs, badly attested or not clearly distinguishable, so do not warrant encoding at least at this time (category 7)
****
83 securely distinguishable complex signs not unifiable with later signs, so *do* warrant encoding (category 5a)
17 securely distinguishable simple signs not unifiable with later signs, so *do* warrant encoding (category 5b)

Contents:

1. Intro discussion

The following list is in process. The most systematic and recent parts of this triage work are categories 4., 5., and 7 below.
The lists do not yet reflect additional information from signs numbered beyond Z771 (provided by Englund on CD). Nor information from ATU. For any signs for which readings or identification with later signs are uncertain, the names can be simply "Z###" with the individual sign numbers substituted for the "###", just as for undeciphered signs in the Linear B portion of Unicode 4.0.

Authorities:

The publication ZATU has been reviewed by Piotr Steinkeller, who published a detailed critique of identifications. To the extent possible his critique has mostly been taken into account. The lack of an explicit comment in this summary triage does *not* imply acceptance of all other readings (identifications) published in ZATU. Fonts are not produced from illustrations in ZATU, but rather from clearer .eps images on a CD supplied more recently by Robert Englund, which includes some additional numbered signs and additional images (usually approximately or precisely described or identified by their file names). The security of identifications of signs in ZATU is of course judged from various authorities in addition to Steinkeller, especially these two: *Archaic Bookkeeping* by Hans J. Nissen, Peter Damerow, and Robert K. Englund. University of Chicago Press 1993; *Mesopotamien. Späturuk-Zeit und Frühdynastische Zeit*, by Josef Bauer, robert K. Englund, and Manfred Krebernik. Orbis Biblicus et Orientalis 160/1, Universitätsverlag Freiburg Schweiz u. Vendenhoeck & Ruprecht, Gøttingen.1998.

Decipherment of "readings" is not crucial to encoding. In fact it will probably benefit from the ability to handle data via a standard encoding, much more than an encoding could benefit from waiting for new text discovery or analysis to yield new readings.

From among the signs for which ZATU claims or suggests an identification, those should be encoded which are highly frequent or clear standing alone. For Container x Infix signs, those should be encoded whose components are clearly known and recognizable in the complex, even if the specific complex itself occurs only a few times, or only once. If the components are not clearly identifiable, then complex signs should be omitted.

2. Sign numbers which lump two or more distinct signs

(Examples from expert discussions by Cale Johnson and later also Piotr Steinkeller.)
Example: ZATU catalog sign Z565 called "U2". According to a discussion by expert Cale Johnson, this catalog listing conflates two distinct signs, one of them indeed unifiable with the later sign "U2", the other distinct from that and not continued in later signs. So the newer sign might be called Z565b or Z565a, as the experts prefer. Given Johnson's commentary, there is clearly justification for encoding one additional sign.

2.-3. An earlier warning list not yet sorted into the other categories. Signs whose readings may perhaps be changed from those proposed in ZATU, but which warrant encoding if they are not unified with other known signs; or which should be split into distinct (a) vs. (b)

As with anything else, this list can be refined by specialists. Changed readings *do not affect encoding* unless they change the status of a sign (becoming unifiable with a known sign, or ceasing to be unifiable with a known sign).

Several of the animal heads
Z001 A but not ZA
Z019 ADAB, last two in Uruk IV may be a distinct sign
Z026 not ALIM but rather a caprid or cervid, MA indicating captive ?
Z032 AN$E for the Uruk III forms
Z044a EZEN [rum] = DURUM
Z044b EZEN [AN] = UG5
Z048 BAN only for (b) ?
Z060
Z071 DARA3 + KAR2 rather + $E3
Z147 E$DA ? etymologically $ITA ligatured with GI$
Z149 "female kid"

Z150 BAD in Uruk IV since no EZEN [BAD] occurs there
Z180 perhaps = Z173 GA2 x HA (=KUA)
Z184 "cheese"
Z215 GI phonetic to GIBIL
Z219 ALIM
Z221 ALIM gunu insteaad of GIR3 gunu
Z228 U$ instead of GI$3
Z242 GUL ? perhaps not ligature of E2 with TAR but rather with LAM ?
Z247 KAL instead of GURU$
Z248 KAL instead of GURU$, and not TAR but pictorial rollers (dragging a load)
Z270 separate (a) and (b); (a) uncertain unless ATU resolves it
Z277 KAB and TUKU
Z278 KAB + TALLY mark ?
Z295 KISAL (b); encode (a) distinctly
Z297 AN$E not KI$ (hashing is the mane of the equid – male)
Z328 distinguish (a) and (b)
Z329 someone (Steinkeller ? check that) has suggested ISH-11
Z357 single reading MA$
Z368 not MUN ? (and omit Z368b)
Z388 perhaps E x NA ?
Z341 through Z351
Z411 distinguish four distinct signs here
Z414 NIR in Uruk III and one example in Uruk IV;
others perhaps a distinct sign.
Z423 NUNUZ, NA4, ZA2 distinguish at least (a) and (b)
Z438 SAG + GE$TU or + LAM ?
Z442 SAG$U ?
Z445 distinct signs here? To be safe, encode (a) (b) (c) distinctively?
Z452 Encode distinguishing (a) (b) (c) (d) (e), Z453
Z482 encode (a) (b) (c) distinctively
Z486 perhaps SU + TALLY mark ?
Z489 not SUG5; perhaps TUN3, DUN3, DU5
Z499 UIN instead of SUSA ?
Z506 $AGAx instead of $AGAM. Not from DIG+KUG
Z523 URI3 instead of E ?
Z526 encode (a) (b) distinctively
Z534 Does the distintion between curved and angled forms in Uruk IV
still hold up? If so, encode the two separately
Z544 $URUPPAK, SUD3 distinguish two sign forms ?
Z547 see Z541; "the possible range of graphic variation needs further clarification"
Perhaps encode (a) only.
Z549 "Note graphic variation when occurring in ligature with other signs."
Z566 also perhaps HUD "morning"
Z585 Are the GI on each side in Uruk III phonetic complements GI ?
Z587 perhaps not UR gunu but UR x $E3 ?
Z595 E rather than URI, compare Z388 perhaps E x NA ?
Z596 E +AB instead of URI5
Z601 perhaps URU + TALLY marks ?
Z604 perhaps not U$ but GI$3
Z605 U$ + TAR ? not TAR
Z613 perhaps distinguish (a) and (b) ?
Z616 distinguish first Uruk IV example from the others

3. Signs numbers whose identification with later signs is incorrect or not secure. Some of these are however securely identified as distinct signs and warrant encoding. Some are early only.

(This section will be expanded to include a full list of changes to the ZATU list proposed in expert review of ZATU by Piotr Steinkeller.)

If identification with a sign required in any case for later periods is secure, then no independent encoding is needed. No serious harm is done if an identification is later discovered permitting unification.
Z18 AD ?
Z24 AL, MAH ?
Z36 not ASAR, SILI, contrast …
"later develops into URU + IGI"
Z39 do not encode
Z49 BAN$UR ?
Z261 IDIGNA ?
Z295 *not* KISAL xcept possibly variant (a)
Z298 KISIK ?
Z290 KIB ?
Z323 *not* LAGAR, compare Z563
Z326 is probably a diagram (map), not a sign; encode only if as special symbol?
Z341 through Z351
Z352 through Z354
Z361 MES
Z442 *not* SAG$U, rather Labat illustration
Z446 SAR x KUA ?
Z524 $IDIM
Z541 $UM ?? In Early Dynastic mergers with TAG Z547
Z579 UH3 Is the Early Dynastic duplicate adequate evidence for identification?
Z581 UMBIN ?
Z592 *not* UR4
Z593 UR5 ? (BUR with SHU2 above ?)
Z775 BALAG ?

4. Signs which are securely unifiable with later signs and which do not warrant a separate encoding. If the identification later turns out not to be secure, a new sign can be recognized and encoded.

Z001 A
Z006 A2
Z007 AB (unless (b) distinct?)
Z008 AB x A
Z009 AB x ASH2
Z012 AB2
Z016 ABRIG probably a compound of DU and Z015 (NUN x/+ ME).
Z018 AD (Lexical lists Professions, Trees, Tribute(?), Plants; Adm. (a) 7x, (b) none)
Z022 AGAR2
Z023 AK
Z024 AL (Lex Prefessions, Trees, Vocag; Adm. 30x)
Z025 ALAN (Lex; Adm. 12x)
Z028 AMA, DAGAL
Z029 AMAR

Z031 AN, DINGIR
Z032 ANSHE (Uruk III examples) (Lexical lists Geog., Tribute; Adm. 11x)
Z033 APIN
Z035 ARATTA (?) (Adm. 1x)
Z036 ASAR, SILIG; if does develop into URU x IGI, then no separate encoding;
If that is incorrect, may need separate encoding as original NIM x IGI ?
Z037 ASH, RUM, 1 (but segmenting out the uses as marker of field length or width)
Z038 PIRIG x ZA (Adm. 2x)
Z040 BA, IGI (not distinguishable in archaic script)
Z041 BAD
Z048b BAN (Z48a a different sign)
Z051 BAR
Z055 BIR3 (common till UR dyn.; = ERIM ?)
Z056 BU and BU tenu
Z060 "PUZUR5", "BU3" or rather SUM4 ? (x SHE3 or x GAN2 tenu ?)
(Lexical list Professions, Geog.; Adm. 8x) = UET, LAK ##
Z061 BULUG (Lexical list Metals; Adm 3x)
Z062 BULUG3 (Lexical lists Professions; Adm 1x) = UET II, LAK ##
Z063 BUR (Lexical list Metals; Adm 7x) = ATU, PI, UET II, LAK ##
Z064 BUR2, USUM (Lexical list Professions, Vessels; Adm 21x mostly textile accounts)
= ATU, UET, LAK ##)
Z065 DA (Lexical many; Adm 45x) = ATU, PI, UET II, LAK ##
Z066 DAH (Adm. 3x + ATU) = ATU, PI, LAK ##
Z069 DAR
Z070 DARA3 (see Fara, Gudea, etc.)
Z075 DI
Z078 DIM
Z079 DIN
Z080 DIN tenu
Z081 DISH (but segmenting out the uses as marker of field length or width)
Z082 DU
Z088 DUG (unless need to distinguish (a,b))
Z105 DUG x KUR (Lexical list Vessels 1x) = PI, LAK ##
Z125 DUGUD
Z129 E2
Z134 EN
Z138 EN2
Z143 ERIM
Z144 ERIM23 = RU with NE inside
Z145 ERIN (excluding four of the forms, a separate sign)
Z147 ESHDA
Z150 EZEN
Z154 EZEN x MIR (or x NIMGIR)
Z159 GA
Z162 GA2 (Lexical list Officials , Food, Vocab., Unident.; Adm (a) 38x, (b) 15x)
= ATU, PI, UET II ##
Z166 GA2 x DUB
Z183 GA2 x U4 (Lexical list Fish 1x; Adm. 9x) = LAK #
Z186 GAD
Z188 GAL
Z189 GALGA = GA2 x GAR
Z190 GAN
Z195 GAN2
Z196 GAR = NINDA

5. Sign numbers which are securely identifiable as distinct signs, not unifiable with later signs, so warrant distinct encoding now. This list currently covers signs from the range Z001 to Z199, and then those from among the "unidentified" Z620 and following.

First, Container-x-Infix signs and similar ones having novel combinations of known elements. After that, novel single-component signs.

Container-x-Infix signs whose components are securely identifiable with later signs, or at least recognizably distinct and clear, but which as a total sign are not identifiable with later signs, and thus *do* warrant separate encoding, unless the attestations are damaged or otherwise too unclear to confirm. Those which are attested only once are the ones which most need to be checked. Notes from the ZATU list on the existence of administrative attestations in ATU are merely that, do not imply that ATU has yet been checked.

Z002 A x EN (Adm. only as in ATU)
Z003 A x SHUBUR (Adm. only as in ATU)
Z004 A x U Adm. 1x
Z010 AB x Z659 ("ARKAB") = Fara LAK542
Z011 "AB.gunu" wrong name (not UNUG); "=PI374, UET II 334"
Z610 AB2 with ZATU755 later written AB2 with KU; "UTUL";
Z014 AB2 with one stroke above (Adm. only as in ATU)
Z014 AB2 with two strokes above (same entry) = ATU ##
Z??? AB2 + AB2 (if not a compound)
Z015 NUN x ME or NUN + ME = ABGAL (Adm. 3x) (if not a ligature)
Lexical texts show equivalent to NUN alone (also ED)
Z019 ADAB (all examples except last two under Uruk IV) = UET II, ATU ##
Z020 ADDA (= UET II #
Z026a "ALIM" as DARA3 x MA (Lexical lists Vessels, Cities, Geog., Trees)
= UET II, LAL ##
Z026b PIRIG x MA (only if lexical attestation is secure)
Z034 ARARMA2 (single sign in Uruk IV; AB with U4 above in Uruk III)
(Lex Cities; Adm. 5x, once with geographical determinative) = ATU, UET II ##
Z042 BAD paired (BAD OVER BAD)
Z043a "BAD+DISH" really single indivisible sign?) (Z043b esp. compare textile signs?)
= ATU, PI, UET II, LAK ##
Z044a EZEN x ASH ([rum]) = DURUM (Lexical list Cities)
Z044b EZEN x AN (Adm. 2x) = UG5 (Adm. 2x)
= UET II, LAK ##
Z045 "BAHAR2" wrong name? (Lexical list Cities, Plants, Dogs; Adm 19x)
= ATU, PI, UET II, LAK ##
Z050 BAPPIR (Lexical lists Vessels, Cities; Adm 3x) = Atu, UET II, LAK ##
Z052a "BARA2" (Lexical Practice list; Adm 40x)
= ATU, UET II, LAK ## (No separate encoding yet for Z052b)
Z053 "BARA3" = E2 x KASKAL (Lexical Professions list; Adm. 5x) =PI, UET II, LAK ##
Z057 BU x A (Lexical list Geog.; Adm. only as in ATU)
Z058 NA2 with RI8 above (ARINA ?) (Adm. 2x and as in ATU)
Z059 DU6 with BU attached above (Lexical list Professions, Dogs; Adm 9x)
Z068 KASKAL with BU attached above (Adm. 2x)
Z072 SHEG9 x SHE ?? (Adm. Only as in ATU)
Z090 DUG x ANSHE (Lexical list Vessels) = LAK#
Z091 DUG x ASH (Lexical list Vessels; Adm.(a) 25x, (b) 72x, (c) 13x) = ATU, PI, LAK ##
Z093 DUG x BA (or DUG x IGI ?) (Lexical list Foods; Adm 1x)
Z096 DUG x DIN (Lexical list Vessels 3x, Adm. 3x) = LAK #
Z097 DUG x GA (Lexical list Vessels 1x) = PI, LAK ##

Z098 DUG x GESHTU (Lexical list Vessels 1x) = LAK #
Z099 DUG x MI (= GI6) (Lexical list Vessels 1x) = PI, LAK ##
Z100 DUG x GISH (Lexical list Vessels, Food) = LAK ##
Z101 DUG x HI (Lexical list Vessels 1x) = ATU, UET II, LAK ##
Z102 DUG x HI gunu (Only as in ATU)
Z103 DUG x KASKAL (Lexical list Vessels 1x) = PI, LAK ##
Z104 DUG x HA (Lexical list Vessels 1x) = LAK #
Z106 DUG x LAM (Lexical list Vessels 1x) = LAK #
Z107 DUG x LAMKUR (Lexical list Vessels 1x) = LAK #
Z108 DUG x MASH (Lexical list Vessels 1x; Adm. 2x and as in ATU) = ATU, PI, LAK ##
Z109 DUG x NAGA (Lexical list Vessels 1x; Adm. only as in ATU)
Z110 DUG x SA (Lexical list Vessels 1x)
Z111 DUG x (SA with GI) (Lexical list Vessels 1x) =
Z112 DUG x SI4 (Lexical list Vessels 1x) = PI, LAK ##
Z113 DUG x SIG2 (Lexical list Vessels 1x)
Z114 DUG x SIG7 (or x IGI energetic) (Lexical list Vessels 5x) = LAK ##
Z115 DUG x SUHUR (Lexical list Vessels 1x)
Z116 DUG x SUKUD (Lexical list Vessels 1x; Adm. only as in ATU)
Z117 DUG x SHAH2 (Lexical list Vessels 1x; Adm. 1x) = LAK #
Z118 DUG x SHE ((Lexical list Vessels 1x; Adm. 1x) = ATU, PI, LAK ##
Z119 DUG x (NAM with SHE attached) (Lexical list Vessels 1x)
Z120 DUG x TAK4 (Lexical list Vessels 1x)
Z121 DUG x TI (Lexical list Vessels 1x)
Z122 DUG x U2 (Lexical list Vessels 1x; Adm. 3x) (perhaps split as U2 is split?)
Z123 DUG x UH3 (Lexical list Vessels 1x)
Z124 DUG x Z764 (Lexical list Vessels 1x)
Z130 E2 x KUR (Lexical list Unident. 2x; Adm. 8x) = LAK #
Z131 E2 x diagonal line (Lexical list Cities 1x; Adm. 3x) = LAK #
Z132 DU with U4 (Lexical list Officials 1x; Adm. 3x) = ATU?, UET II ##)
Z135 EN x NUN (Lexical list Vocab., Unident. 2x; Adm. 29x) = ATU, PI ##
Z135 EN energetic ("gunu") (Adm. 10x) = ATU #
Z139 ENDIB = EN+ME with MU (Lexical list Professions 1x; Adm. 1x)
Z140 ENGIZ = EN with GI (Lexical list Professions 1x; Adm. 2x) = UET II
Z142 ENLIL, NIBRU (Lexical list Cities 1x)
Z151 EZEN x EN (Adm. 1x) = ATU #
Z156 EZEN x SU (Uruk IV ex.) (Lexical list Geog. 1x; Adm. 3x) = UET II
Z157 EZEN x (U2.A) (Adm. 3x Uruk III (Uruk IV not clear))
Z160 GA x U (Lexical list Vessels 1x)
Z151 GA x Z753 (Adm. 60x) "Nearly always written as a ligature" (meaning what?)
Z163 GA2 x AB
Z167 GA2 x GIR (Adm. 3x fish account)
Z169 (GA2 x SHE3) x GUD (Adm. 3x) = UET II #
Z170 GA2 x HI (Adm. 1x, fish account) = ATU #
Z171 GA2 x (HI.SUHUR) (Adm. 2x fish account)
Z172 GA2 x KU3 (Adm. 1x)
Z173 GA2 x KU6 (Lexical list Fish 1x?; Adm. 9x)
Z174 GA2 x (KU6 x KU6) (Adm. 1x) = LAK #
Z176 GA2 x MASH (Adm. 1x)
Z177 GA2 x NAGA (Adm. 1x)
Z178 GA2 x NI (or x GAR) (Adm. 2x)
Z179 GA2 x SUHUR (Adm. 3x or 6x) =ATU #
Z180 GA2 x SUKUD (Lexical list Fish 1x; Adm. 2x in fish account) = ATU #
Z182 GA2 x U (Adm. only as in ATU)
Z185 Z737 x BUR GABURRA (Lexical list Cities 1x; Adm. 1x) = ATU, PI, LAK ##
Z187 GAD x SHE3 (Adm. 7x, 6 of those in textile accounts)
Z191 GAN x (GISH.DIN) (Adm. 2x)

Z192 GAN x LAGAB (Adm. 3x, in accounts of fruits)
Z193 GAN x NE (Adm. 2x)
Z194 GAN x SHE (Adm. 1x)
Z197 GAR gunu (Lexical list Food 1x; Adm. 1x) = ATU ##

Fully independent signs securely identifiable / distinguishable, yet not identifiable with later signs, and thus presumptively should be encoded unless attestation is for some other reason weak

Z071 SHEG9 variant? (Adm. 2x and as in ATU)
Z519 SHEG9 (Adm. 2x and as in ATU; Lexical list Professions 1x)
Z073 DARA4a (Lexical list Professions, Cattle; Adm. 9x)
Z073 DARA4c (Adm. 28x)
Clear association in Adm. with sheep / wool; distinction / ident. not complete?
Z077 DILMUN (Lexical list Professions; Metal, Geog.; Adm. 9x) =ATU, UET II, LAK ##
Z083 DU6 (Lexical list Professions, Cities, Plants; Adm. 10x) = ATU, PI, UET II, LAK ##
Z086 DUB, UM, KISHIB (at least one of any variants distinguishable;
(Lexical list Professions , Trees, Birds; Adm. 72x) = AT, PI, UET II, LAK ##
Z126 DUR (?) (Adm. 34x) = ATU, PI, UET II, LAK ##
Z127 DUR2 (Lexical list Cities, Geog., Trees, Birds, Fish, Vocab.; Adm. 15x)
Z128 E (?) (Adm. 5x) (Adm. as subscript in field surveying texts 2x) = ATU, UET II, LAK ##
Z133 EDIN (Lexical list Metals 1x, Kish 1x) = UET II, LAK ##
Z149 ESHGAR (Adm. 12x) = ATU, UTE II, LAK ##
Z158 EZINU (Lexical list Cities, Geog.; Adm. 12x) = ATU, LAK ##
Z184 GA'AR "cheese" Lexical lists Metals, Vessels passim; etc.; Adm. 17x)
Rotations are merely graphic variants
Z198 GAR3 (Adm. 2x) = ATU, UET II, LAK ###
Z199 GARA2 "cream"? (Englund) (Lexical list Tribute; Adm. 23x)
DUG.gunu? = UET II, LAK ##

DO encode these from among the "unidentified".

Z624 (4 occurrences in administrative texts)
Z625 (2 administrative occurrences in metals account, 7 in textitles account)
Z628 (6 occurrences in administrative texts)
Z629 (9 occurrences in administrative texts)
Z644 (20 occurrences in administrative texts, 12 in textile accounts)
Z647 (17 occurrences in administrative texts)
Z648 (30 occurrences in administrative texts)
Z649 (21 occurrences in administrative texts)
Z651 (9 occurrences in administrative texts)
Z652 through Z657 (= Z651 as container x infixes.
Infixed parts are clearly identifiable according to drawings)
Z652 1x, Z653 15x, Z654 14x, Z655 1x, Z656 1x, Z657 1x)

Z658 (9 occurrences in administrative texts)
Z659 (15 occurrences in administrative texts, also as infixed element)
Z661 (ATU; = Z659 + numerals)
Z662 (13 occurrences in administrative texts, 10 of those in textile accounts)
Z663 (2 occurrences in administrative texts; = Z662 + U)
Z676 (8 occurrences in administrative texts)
Z686 (28 occurrences in administrative texts)
Z694 (45 occurrences in administrative texts)
Z697 (17 occurrences in administrative texts)
Z714 (10 occurrences in administrative texts)
Z715 (= Z714 x HI.gunu; 1 occurrences in administrative texts)
Z716 (= RU with Z714 in it; 1 occurrences in administrative texts)

Z718 (3 occurrences in administrative texts; one lexical text parallel)
Z719 (3 occurrences in administrative texts, in textile accounts)
Z728 (9 occurrences in administrative texts, all in fish accounts)
Z735 (6 occurrences in administrative texts)
Z737 (a new "container" sign)
Z738 through Z748 (= Z737 as container x infixes.
Infixed parts are clearly identifiable according to drawings
Excepting Z742, here omittted.
Corresponding spellings in ED orthography are known.)
Z738 1x, Z739 3x, Z740 ATU, Z741 2x, Z743 12x, Z744 1x, Z745 ATU,
Z746 1x, Z747 Lexical, Z748 ATU, Z185 1x)

Z749 (16 occurrences in administrative texts)
Z750 (9 occurrences in administrative texts)
Z751 (6 occurrences in administrative texts)
Z752 (48 occurrences in administrative texts)
Z753 (59 occurrences in administrative texts, also as infix)
Z755 (ATU 3 texts)
Z756 (6 occurrences in administrative texts)
Z757 (2 occurrences in administrative texts)
Z758 (7 occurrences in administrative texts)
Z759 (14 occurrences in administrative texts)
Z760 (16 occurrences in administrative texts)
Z762 (a new "container" sign; 11 occurrences in administrative texts with
No infix. Z763 1x with clear infix)

7. Sign numbers which do not currently warrant encoding.

All those listed as "unidentified" (numbers ZATU620 up to Z771) should also be omitted from encoding at this time, with the exception that some noted in a separate list below are secure enough to encode. In addition to the occurrences mentioned, for some signs there are additional illustrations supplied on Englund's CD for occurrences not printed in ZATU. There are also earlier citations in ATU I.

Do not encode these (and do not consider them identified with a sign known from later periods)

Z005
Z013
Z017 not fully preserved anywhere ?
Z021 AG2 ?
Z027 AM ?
Z030
Z037 (as measure of length or width, treat as diagram not as a sign???;
Not numeral usage except as tally mark?)
Z039
Z048a not BAN
Z049 "BAN$UR" wrong name? (Lexical list Trees; Adm. Only as in ATU)
(Is this one known mainly from Proto-Elamite? – see A. B. p.
Z052b (but do encode Z52a)
Z054 (BIR?)
Z061 BULUG ?
Z067 ?
Z073b (but do encode Z73a and Z73c, distinct from each other)
Z074 (1x)
Z076

Z081 (as for Z37)
Z084
Z085
Z087
Z089 (infixed sign not identifiable with high probability)
Z092 (infixed sign not identifiable with high probability)
Z094 (infixed sign not identifiable with high probability)
Z095 (infixed sign not identifiable with high probability)
Z102
Z133
Z136
Z142 more than one sign in illustration
Z143 more than one sign in illustration
Z148 ?
Z152 unclear
Z155 unclear
Z164 ?
Z165
Z168 GA2 x GISH tenu
Z175 (infixed sign not identifiable with high probability)
Z181 = ATU, PI ##
Z222
Z229
Z231 may remain functionally a transparent compound, or may fuse,
Encoding can depend on later analysis. Only 1x.
Z233 GU2 ?
Z244
Z246
Z255 perhaps rather HI with TALLY mark
Z273
Z281 perhaps GURU$; not KAL; perhaps several distinct signs
Z292
Z298
Z305 not related to later KU$U
Z309 because Z49 is uncertain
Z312 insecure
Z314 because Z305 is uncertain
Z320 LAGAB lig. TAR ??
Z322 because Z766 is uncertain
Z326 "drawn very large on reverse, possibly a design" a map !!?
Z331 LU2 + LAM instead of GE$TU ?
Z340 distinguish two signs here
Z369 no single lexical occurrence fully preserved
Z372 sequence of three signs
Z383 until further specification
Z397 perhaps instead variant of NIM Z398
Z441 SAG.nutillo ??
Z454 SIG4
Z457 infixed sign uncertain
Z466 infixed sign uncertain
Z505 $ABRA
Z507 $AGINA
Z528 infixed sign uncertain
Z538
Z552
Z559

Z573 sign forms are unclear for Uruk III; Perhaps divide among UBI and
Compare #198 GAR3
Z590 UR2 + TAR ?

This sign list is free of any restrictions.

Home