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

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This document describes keyboarding approaches to inputting Blissymbols, from the typewriter layouts originally envisioned by Charles Bliss to designs intended for keyboarding a UCS-based encoding. Other input methods are possible making use of head-switches or eye-gaze or joysticks, but a keyboard offers particular utility to researchers and to those preparing educational or other materials for the user community.

1. Handwritten templates. Because the glyphs of Blissymbols must be precise and regular in order to cater for various abilities in terms of visual acuity and cognition, stencil templates were first envisioned to contain the basic shapes needed to build up the glyphs of Bliss-characters.

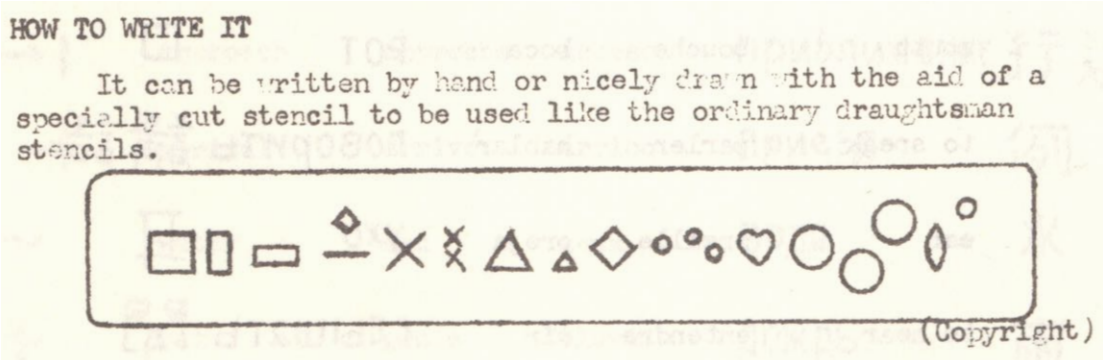


Figure 1. Drawing of a Blissymbols template from Bliss 1978:88, shown at 150%.

Charles Bliss may have used a template like this template to illustrate his book. The first edition of that was published in 1949 and its typewritten pages were retained in the second and third edition along with additional material. Once Blissymbols were being used by children with disabilities, plastic templates were devised and came into general use in both North American and Europe.

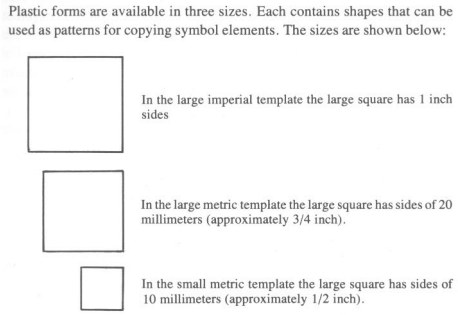


Figure 2. Discussion of the plastic Blissymbols templates from McDonald 1989:73. Shown at 50% size.

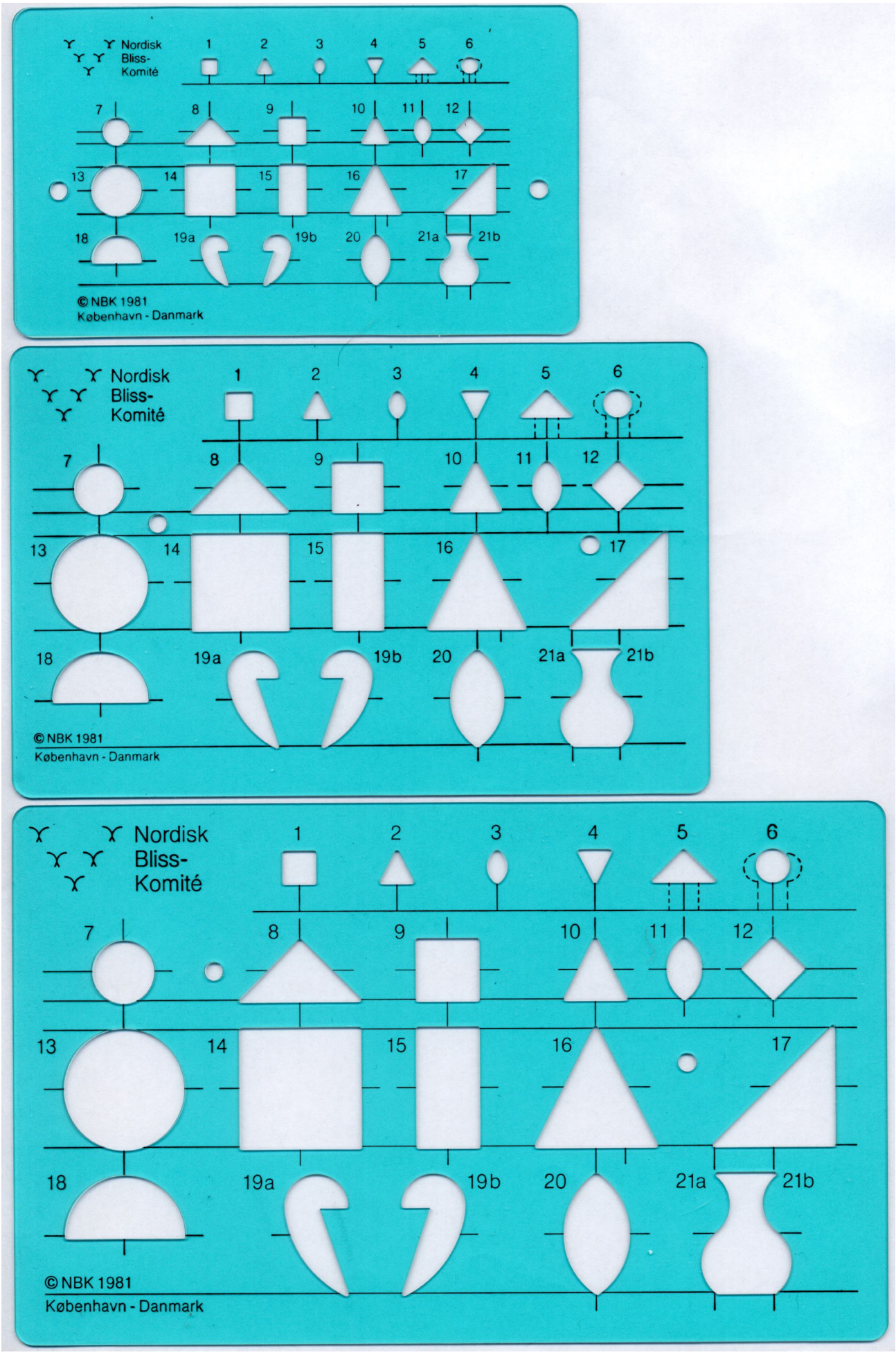
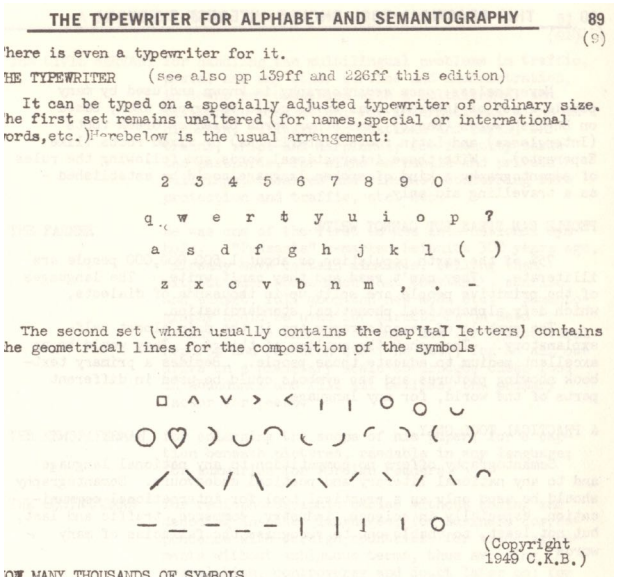


Figure 3. The three plastic Blissymbols templates described in Figure 2. Shown at 90% size.

2. Charles Bliss' typewriter layouts. In Figures 4 through 8 below Charles Bliss' own unrealized ideas about typewriters supporting Blissymbols are given. Figures 5, 6, and 7 above are perhaps best understood as drafts of different types of possible layouts. A comparison might be made of their overlap to understand more about their approaches to they problem of Blissymbol glyph analysis. It can be said that in one sense, Charles Bliss' scheme would work in practice. The bitmap font devised by Peter Reich to typeset the *Blissymbol Reference Guide* on the Apple Macintosh was based in part on a set of nonspacing glyph fragments which were used with a variety of whitespace characters to build up glyphs in a horizontal direction from left to right. Perhaps an input scheme based on this could be devised but it might well not be practical with a character-based encoding.



THE TYPEWRITER FOR ALPHABET AND SEMANTOGRAPHY 89 (9)

here is even a typewriter for it.

HE TYPEWRITER (see also pp 139ff and 226ff this edition)

It can be typed on a specially adjusted typewriter of ordinary size. he first set remains unaltered (for names, special or international ords, etc.) Herebelow is the usual arrangement:

2 3 4 5 6 7 8 9 0 '

q w e r t y u i o p ?

a s d f g h j k l ( )

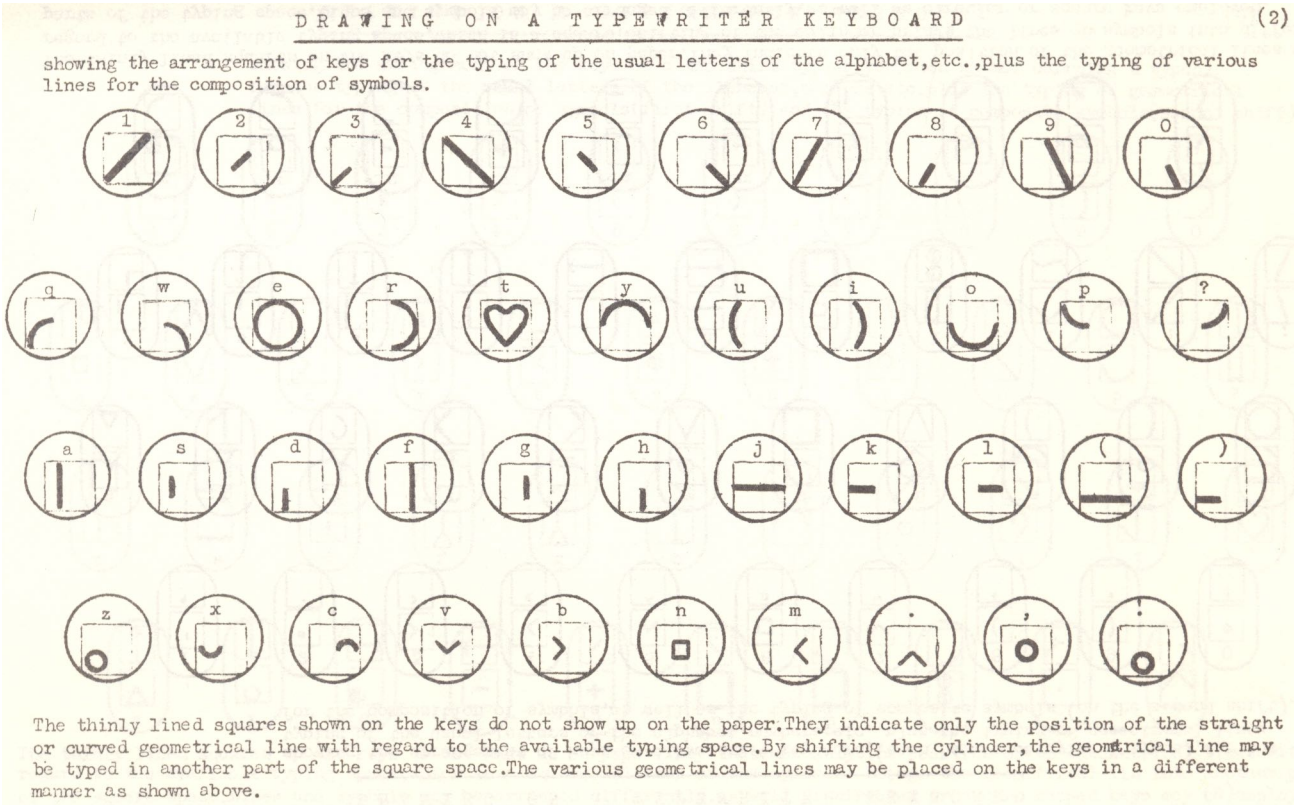
z x c v b n m , . -

The second set (which usually contains the capital letters) contains he geometrical lines for the composition of the symbols

(Copyright 1949 C.K.B.)

OF MANY THOUSANDS OF SYMBOLS

Figure 4. Mapping of a glyph-fragment-based typewriter keyboard from Bliss 1978:89 (reduced to 80%). A keyboard layout of this sort could, in principle, be used for Blissymbols, but a Chinese-style stroke-based input method would be difficult to design for Blissymbols as there is no prescribed stroke order, although shape-based rules exist for determining sorting order.



DRAWING ON A TYPEWRITER KEYBOARD (2)

showing the arrangement of keys for the typing of the usual letters of the alphabet, etc., plus the typing of various lines for the composition of symbols.

1 2 3 4 5 6 7 8 9 0

q w e r t y u i o p ?

a s d f g h j k l ( )

z x c v b n m . ,

The thinly lined squares shown on the keys do not show up on the paper. They indicate only the position of the straight or curved geometrical line with regard to the available typing space. By shifting the cylinder, the geometrical line may be typed in another part of the square space. The various geometrical lines may be placed on the keys in a different manner as shown above.

Figure 5. Mapping of a different glyph-fragment-based typewriter keyboard from Bliss 1978:139. The relative order of the glyph fragments was doubtless intended to be somewhat mnemonic. It has never been considered realistic to base the UCS encoding on glyph fragments.

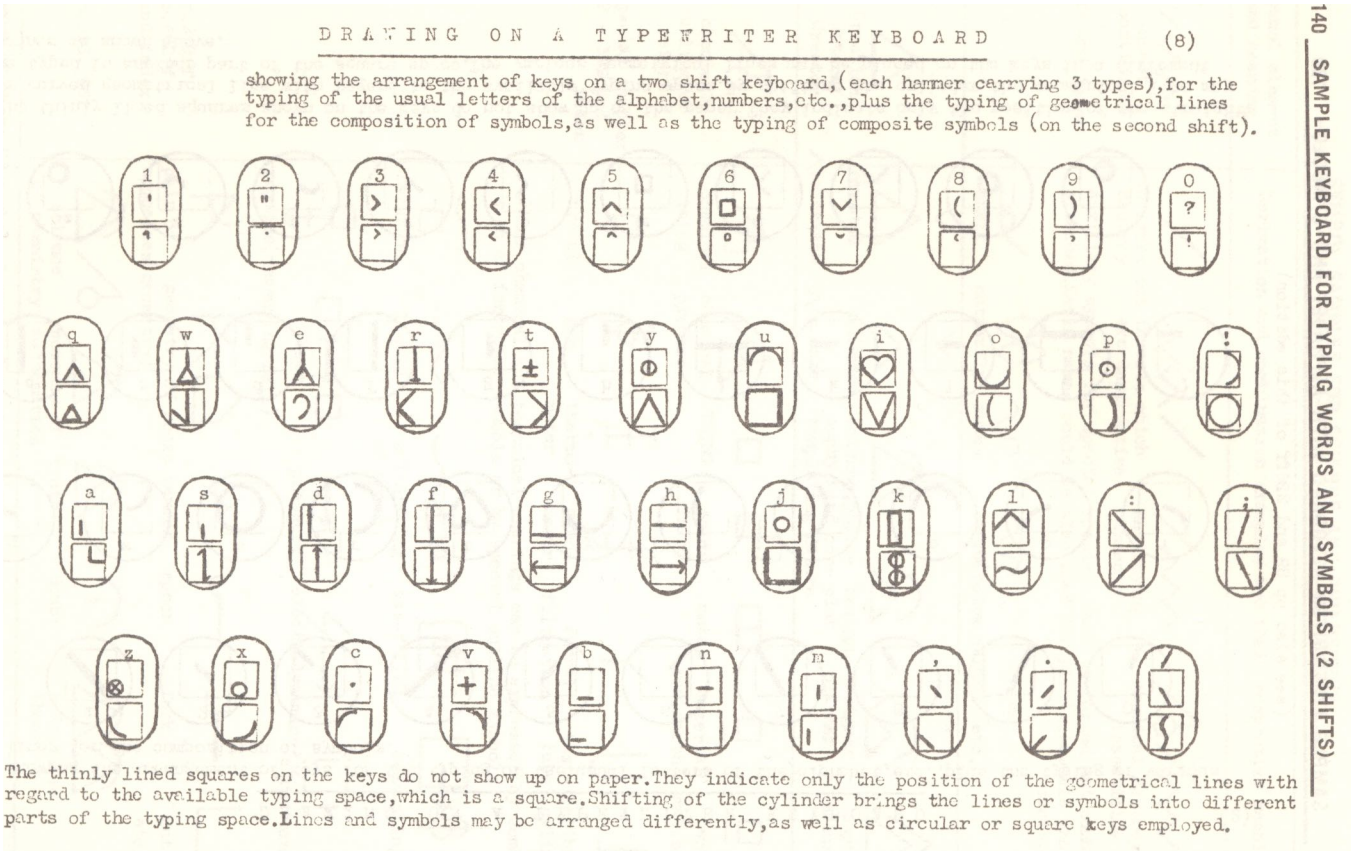


Figure 6. Mapping of a different glyph-fragment-based typewriter keyboard from Bliss 1978:140. Typewriters with three glyphs per hammer did exist for a time; perhaps Bliss had access to one of these, though they were doubtless quite rare in Australia in 1949. The Century 10, made in 1920, was one of them; see links in the Bibliography above.

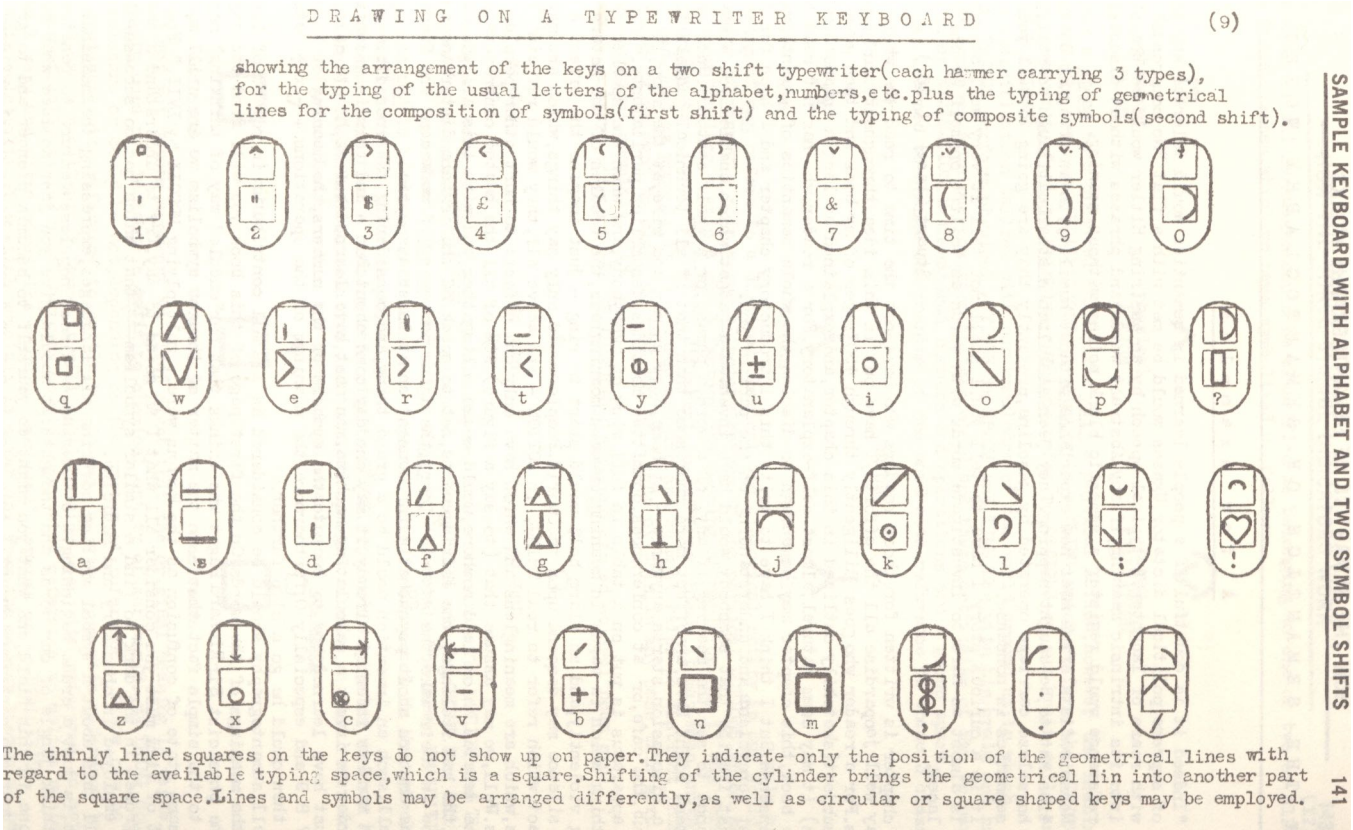


Figure 7. Mapping of a yet another glyph-fragment-based typewriter keyboard from Bliss 1978:141.

THE TYPEWRITER

"Certainly the art of writing is the most miraculous of all things man has devised."

Thomas Carlyle (48)

(see also pp. 89 and 139ff of this edition)

In the first chapter we have learned a few symbols. In this chapter we shall learn how to write them with the semantographic typewriter.

This is a typewriter of the ordinary size. The keyboard shows the usual set of types and keys, which are used to type the small letters of the alphabet, and a few of the usual symbols like , . ? ! ( ). We are thus able to write any international word like proton, radio, television or other scientific or Latin terms like appendicitis, amoeba, as well as any geographical name. We can even write complete letters in English or another language. We would only miss the capital letters, which are superfluous anyway (as this paragraph shows).

Figure 8a. Beginning of a discussion about the use of the typewriter keyboard from Bliss 1978:226.

Here is the first set of the keyboard, the usual arrangement which we find on any typewriter.

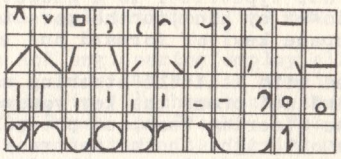
2 3 4 5 6 7 8 9 0 ?

q w e r t y u i o p !

a s d f g h j k l ( )

z x c v b n m , . - '

The second set (which usually contains the capital letters and is operated by the shift key) contains the straight and curved lines which are used to compose the symbols. Here is the complete set. The lines may be arranged in a different way, according to best practical use.



(Copyright)

The symbols are usually drawn within a square. Each line on the typewriter is set in a distinct position within the square. This is indicated in the drawing above, and may be shown with thinner lines on the keys of the typewriter. The following paragraphs will make this clear.

To understand how the symbols are composed, we shall use the practice of the ordinary typewriter, familiar to most people.

Suppose we want to type some geometrical figures using a letter on an ordinary typewriter:

```
      a   a       a    a a    aaa     a      a      a      aaa
aaa   a   a     a      a      a     aaa    a a    a a    aaa
      a     a   a      a a    aaa     a      a    aaaaa    aaa
```

Anybody can do this with any typewriter. We have only to turn the cylinder up or down to get the position we want. Sometimes we would have to shift the cylinder one or two spaces back (or we may use the back-space key for this purpose) because the cylinder jumps always one space ahead after a key has been pressed.

If we want to type the mathematical symbol + by typing first the horizontal line — and then the vertical line | , we would get this —|, simply because the cylinder did jump one space ahead.

To cut out this automatic jumping ahead, in order to compose the symbols, we may employ a little gadget on our semantographic typewriter. This gadget is operated by a small lever. By turning this lever, the cylinder will not jump ahead automatically, but stay put. The symbol completed, we may then press the ordinary long thumb bar (as on any typewriter) to move the cylinder ahead to the next spacing.

If we then want to type ordinary alphabetical words we may turn the lever back and thus engage the automatical jumping device as used on the ordinary typewriter.

With this new gadget it is now easy to type the mathematical symbol +. We type first — and then on top of it (as the cylinder stays put) we type the vertical line +. The symbol completed, we press the long thumb bar to move the cylinder in position for the next symbol.

Figure 8b. Continuation of a discussion about the use of the typewriter keyboard from Bliss 1978:227.

Between two symbols, no matter how big or small they are, there must be always one full square left, to indicate the separate words.

sun enclosure emotion man through bridge translator

The symbols are printed within two lines, the top and the bottom line.

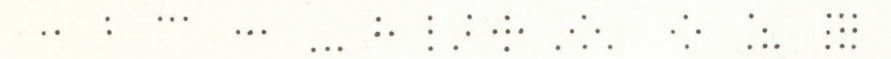
How big is a square compared with the spacing on our typewriter? If we type the dot, we would get it right in the middle of the square. By going up or down a line we would get

:
:
:

We see that a symbol square is quite big and it extends horizontally over three spacings and vertically over three lines.

Another innovation on our typewriter is a gadget, which makes it superfluous to turn the cylinder by hand, furthermore to move the cylinder backwards (with the back-space key) or forward one spacing (with the thumb bar).

This gadget is operated with a little steering stick or the like. You hold it with your left hand and press the key you want, with your right hand. If you don't move the steering knob, and press the dot key, (for instance) the dot will come out right in the centre of the sqare. If you move the steering knob up or down and press the dot key, the dot will appear on the upper or lower line. If you move the steering knob at an angle up, down, right or left, the dot will appear in the four corners of the sqare. In such a way you are able to make the dot appear at nine different positions within the square and you can form the following geometrical constellations:



However if you release the steering knob on your left hand, the cylinder falls back in its original position, in which the dot would appear in the centre. Only if you press the long thumb bar, does the cylinder move finally forward, to take up a new position for the formation of new symbols.

Of course, only the dot is the smallest type; the biggest type fill a whole square and we do not need to move the left hand steering knob at all. Such full-square types are the full circle (sun), the heart (emotion) Other types, like the half circle (for the symbol of the bridge) extend over half a square.

We can type now a few symbols by using the long horizontal and vertical line.

line subtraction addition opening enclosure

And this makes us aquainted with an unexpected advantage of symbol writing: space, time and work economy. It takes us less space, time and work to print those symbols, instead of the long alphabetical words. The symbols above are shown in an enlarged dimension. In reality, the typewriter will print them much smaller.

Figure 8c. Continuation of a discussion about the use of the typewriter keyboard from Bliss 1978:228.

If symbol writing gains ground, the typewriter people may bring out, in addition to the semantographic typewriter mentioned above, a special typewriter, with a second shift set. In such a typewriter each key hammer carries not two, but three types, like in the oldportables with three rows. In addition to the two sets, shown on page 95, this typewriter would carry 42 additional types, giving very important and often recurring composed symbols, like opening, enclosure, addition (as shown on foregoing page). Then one pressing of a key will give you the symbols for these meanings and others.

Needless to say, that it is easy to write semantography by hand. People who want to write it very neatly by hand, could use a draughtmans stencil as shown on page 8.

Figure 8d. Continuation of a discussion about the use of the typewriter keyboard from Bliss 1978:229.

3. Character-based keyboard layouts. The 1200 or so Blissymbol characters are organized as members of a basic 29-letter alphabet. The 29 basic letters as shown in the first two columns below are *Wavy line* to *Diagonal line*; supplementary characters follow as sub-classes of a "letter" containing characters representing or based on international alphanumeric characters.

- Wavy line
- Heart
- Cross hatch
- Building
- Ear
- Arrow
- Wheel
- Large circle
- Small circle
- Half circle
- Quarter circle
- Parenthesis
- Square
- Rectangle
- Open square
- Open rectangle
- Right triangle
- Dot
- Right angle
- Line on a base
- Cross
- Isosceles triangle
- Symmetric acute angle
- Animals
- Asymmetric acute angle
- Horizontal line
- Vertical line
- Slanted line
- Diagonal line
- *(punctuation-derived)*
- *(genuine punctuation)*
- *(alphabets)*
- *(digits)*
- *(fractions)*
- *(currency signs)*
- Quarter space
- Three-quarter space
- Nominal indicators
- Verbal indicators
- Adjectival indicators

There is a finalized mapping now, but of some academic interest may be earlier drafts, in terms of rationale for various choices made The first set of mappings were made by Michael Everson a good few years back. Most of the basic mappings such as ♡ to B and ∧ to V and so on were there from the beginning. In early 2018 Michael met with Hasith Nandadasa and they discussed the layout which was relevant to Hasith's work. Hasith took the principles forward and one iteration can be seen in Figure 9 with a screen-shot of Hasith's browser-based screen keyboard and a normalized version for comparison to other layouts below.

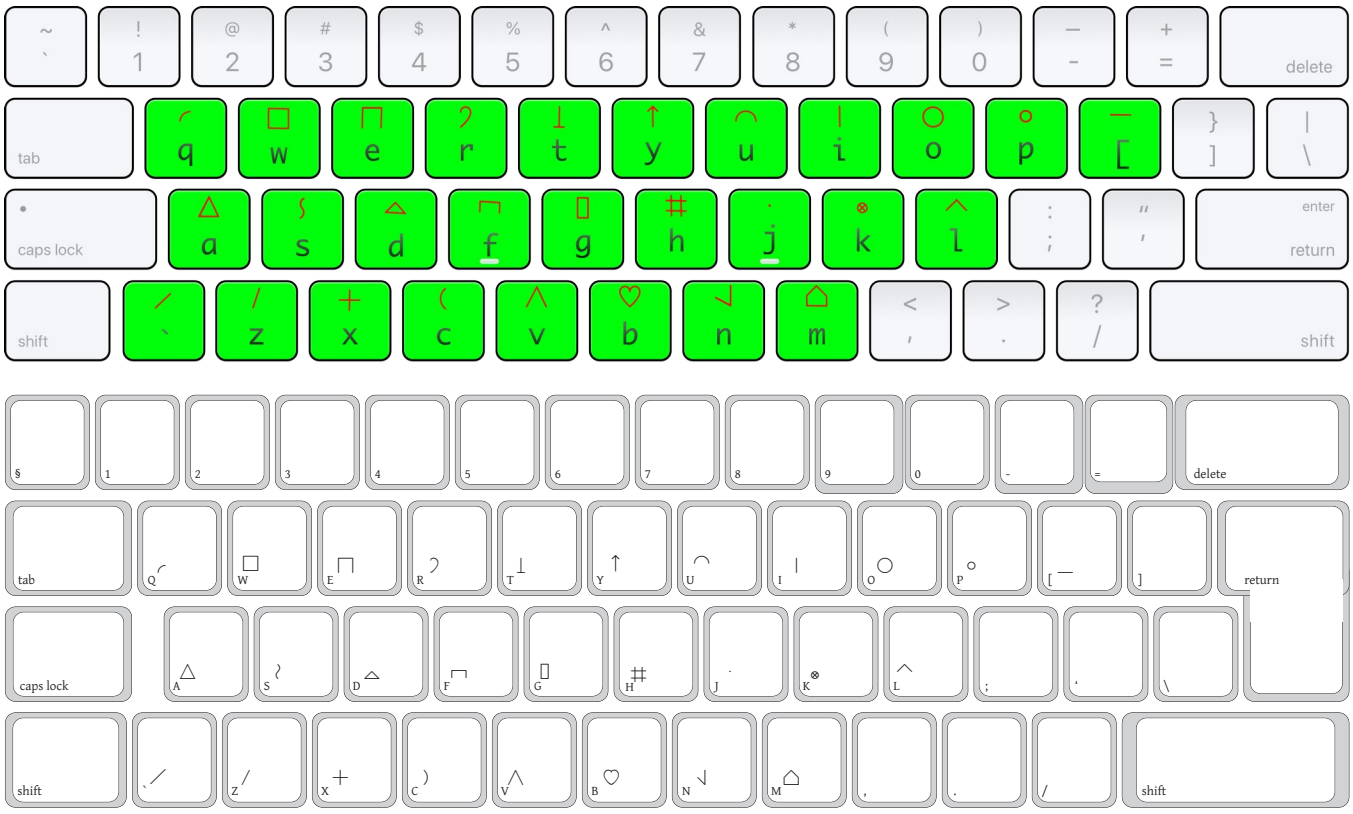


Figure 9. Bliss-alphabet-based keyboard layout by Hasith Nandadasa, 2018-05-01.

In the first quarter of 2020 Hasith and Michael worked together comparing two various approaches, including making one with shift keys and one without. There were other differences. Michael did a frequency count of some of the Bliss-letters in order to optimize positioning of more frequent ones on the keyboard. One change for instance was the swapping of the mappings to the Q and R keys; in 2019 the Ear ☽ was on R (mnemonic the bowl of the R) and the Quarter-circle ◜ was in Q (mnemonic the tail of the Q) but this was altered because there are 41 Bliss-characters in the Quarter-circle class but only 3 in the Ear class, so the more frequent letter was moved to the more central position. Shifted keys were used for a number of characters.

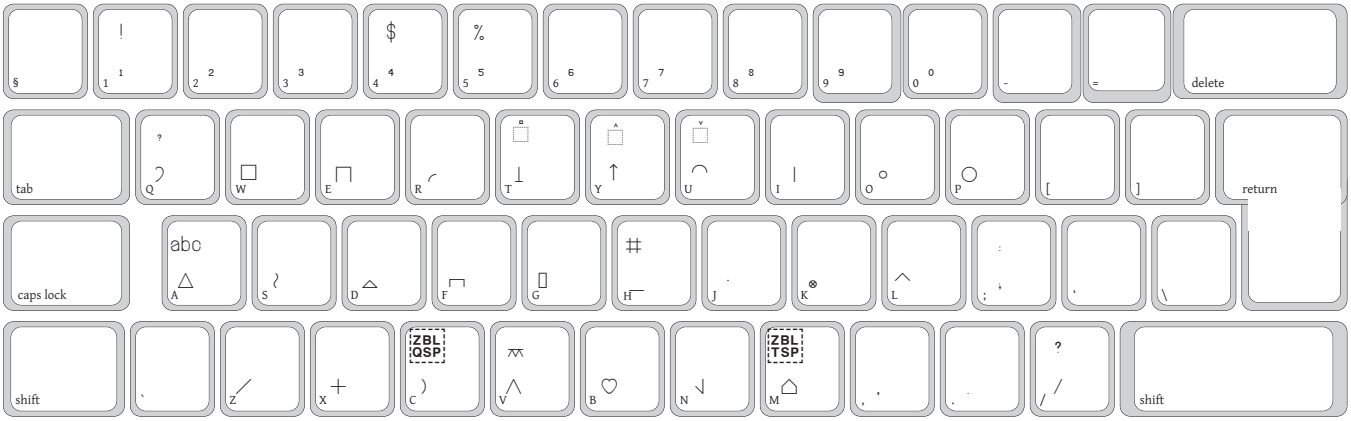


Figure 10. Bliss-alphabet-based keyboard layout by Michael Everson, 2020-01-30.

In a browser-based implementation used for testing with users of Blissymbols, some of the shifted characters (for ordinary punctuation and fractions and such) were ignored as they were not relevant to the study Hasith was making. The punctuation-derived class, the alphabet class, and three grammatical classes were placed on shifted keys, as well as the ⌗ Cross-hatch class (which contains three Bliss-characters).

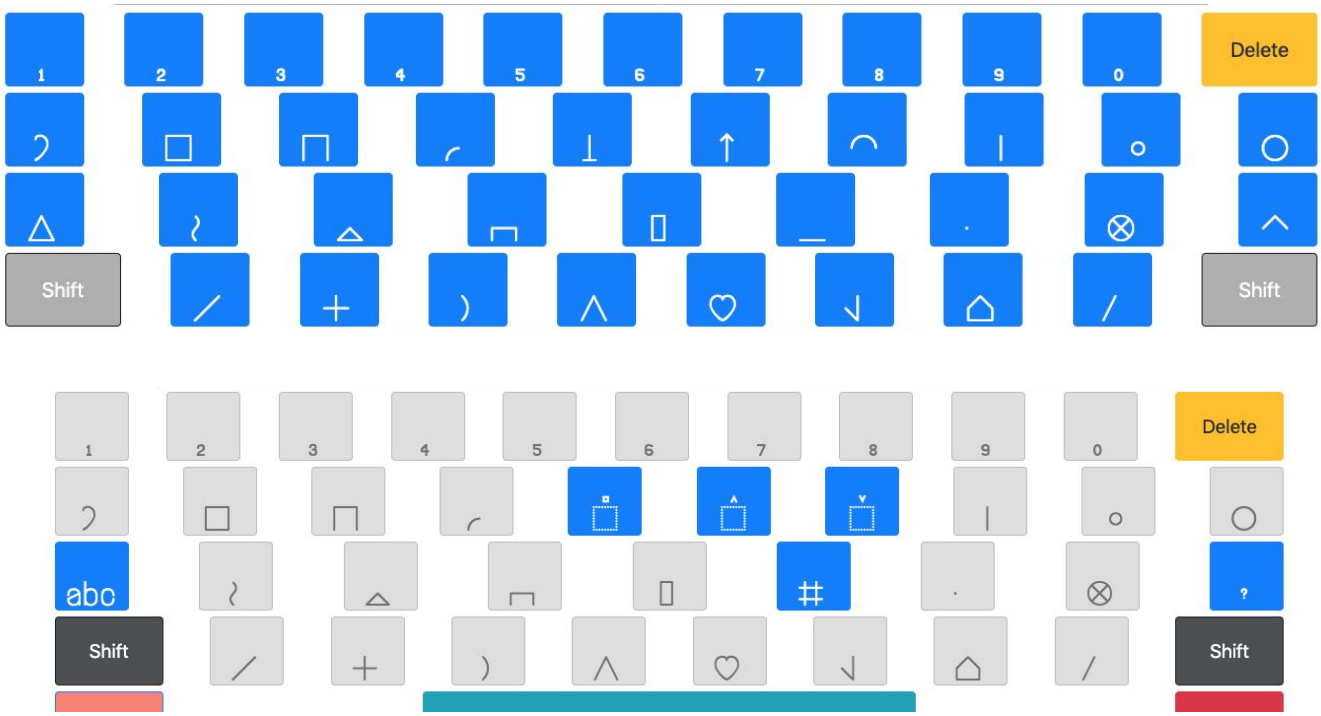


Figure 11a. Bliss-alphabet-based keyboard layout by Hasith Nandadasa, 2020-01-30.

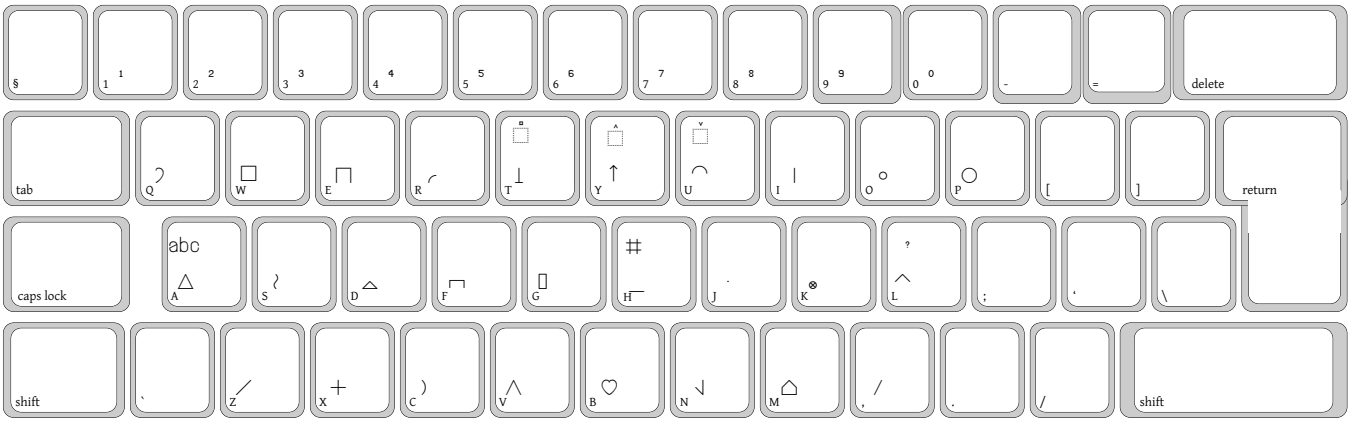
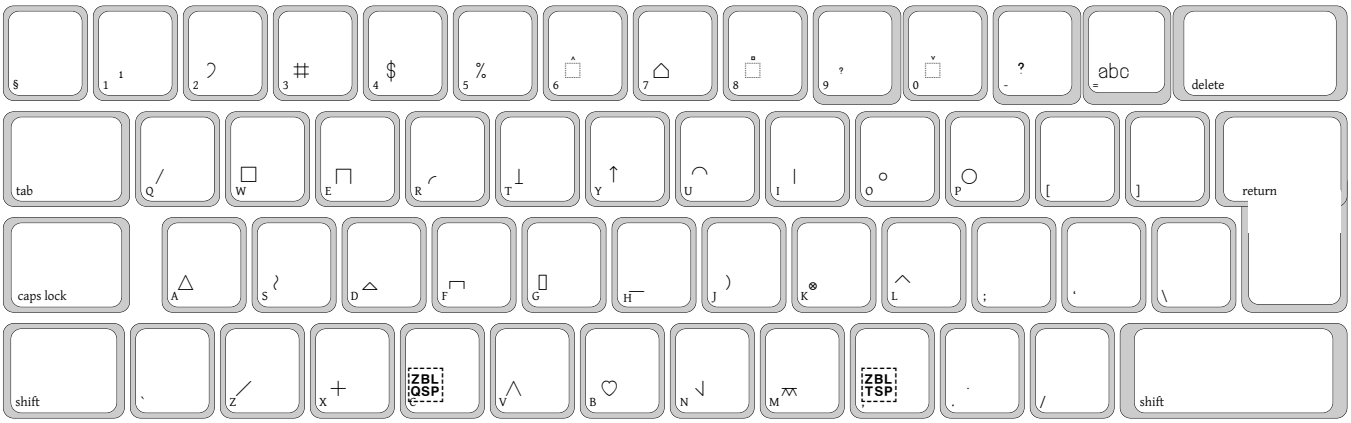


Figure 11b. Bliss-alphabet-based keyboard layout by Hasith Nandadasa, 2020-01-30.

Practical experience suggested that the use of shifted keys was not necessarily advantageous, and further study of character frequency led to a re-organization of some of the layout based on the new criterion "avoid shifted keys". In Figure 12 below the final keyboard layout is given, along with a list of the mappings with a mnemonic for each Bliss-letter to Latin letter.



s	⌇	Wavy line *(looks like reversed S)*
b	♡	Heart *(looks like sideways B)*
3	⌗	Cross hatch *(like # on the 3-key)*
7	⌂	Building *(above Y ARROWS which have a point)*
2	⌒	Ear *(has curve like a 2)*
y	↑	Arrow *(looks like inverted Y)*
k	⊗	Wheel *(has four spokes like K)*
p	○	Large circle *(next to O)*
o	∘	Small circle *(looks like small o)*
u	◠	Half circle *(looks like turned U)*
r	◜	Quarter circle *(looks like r)*
j	)	Parenthesis *(has a curve like a j)*
w	□	Square *(next to E OPEN SQUARE)*
g	▯	Rectangle *(next to F OPEN RECTANGLE)*
e	⊓	Open square *(looks like turned E)*
f	⌐	Open rectangle *(next to E OPEN SQUARE)*
d	◺	Right triangle *(looks like rotated D)*
.	·	Dot *(a full stop is also a dot)*
l	∠	Right angle *(looks like turned L)*
t	⊥	Line on a base *(looks like turned T)*
x	┼	Cross *(looks like X)*
a	△	Isosceles triangle *(looks like A)*
v	⋀	Symmetric acute angle *(looks like turned V)*
m	⩛	Animals *(looks like M)*
n	⍱	Asymmetric acute angle *(looks like N)*
h	—	Horizontal line *(looks like crossbar of H)*
i	|	Vertical line *(looks like I)*
q	/	Slanted line *(above A as ／ is below A)*
z	／	Diagonal line *(looks like Z)*
9	?	*(punctuation-derived Bliss-characters)*
-	?	*(genuine punctuation)*
=	abc	*(for all alphabets)*
1	1	*(for all digits)*
5	%	*(for all fractions)*
4	$	*(for all currency signs)*
c	ZBL QSP	Quarter space
,	ZBL TSP	Three-quarter space
8	▫	Nominal indicators *(plural × like *)*
6	˄	Verbal indicators *(same shape as ^)*
0	˅	Adjectival indicators *(two away from Nominals)*

Figure 12. Final Bliss-alphabet-based keyboard layout with mnemonics by Michael Everson and Hasith Nandadasa, 2020-04-23.

4. Bibliography

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