













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1. Introduction: Counting rods are a positional system of counting used in parts of Asia. They were encoded into Unicode in version 5.0, for practical reasons both vertical and horizontal variants were encoded separately. I noticed while reading the Wikipedia article that there exists another style of the same rods: the Southern Song forms.

2. Separate codepoints: It would be easy to suggest that they should be encoded separately, and the fact that the number 4 looks identical both in horizontal and vertical orientation, that means only 5 codepoints would be needed, enough to fit in the existing block considering other approved characters. One only has to look into the Number Forms block to see precedent for this: U+2185 ROMAN NUMERAL SIX LATE FORM and U+2186 ROMAN NUMERAL FIFTY EARLY FORM are encoded separately even though they are both roman numerals that are technically already encoded. However the situation with the Southern Song forms is different, since (I argue) it was necessary to have separate encoding of the aforementioned numerals, just because the already existing roman numerals have a decomposition mapping to Latin letter sequences, so they would be inappropriate to represent such glyphs, since the user would expect it to be equivalent to “VI” or “L” in their keyboards. Counting rods do not have decompositions, so they should be treated as variants

3. Standardized variation sequences: The fact they are only glyphic variants doesn’t mean they don’t deserve to be encoded, indeed Unicode allows to register a variation sequence if enough demand is seen to see them distinguished like emoji, Han ideographs or Myanmar letters dotted forms. Indeed distinguishing these forms is important due to the fact that from them, the set of Sunzhou numerals is derived. To my knowledge the Japanese never made the shift into Sunzhou numerals, so this would benefit them. So my proposal is like this (The glyphs are extracted from https://en.wikipedia.org/wiki/Counting_rods and are not copyrighted):

Regular glyph	Proposed variant Glyph	Suzhou numerals
 = U+1D363		× = U+3024
 = U+1D364		Ⓝ = U+3025
 = U+1D368		Ⓣ = U+3029
 = U+1D36C		
 = U+1D36D		
 = U+1D371		

As mentioned before, the number four looks identical in both vertical and horizontal forms, which means it is confusable, but it needs to be encoded to preserve the direction information in the backend and overall just be consistent and not force a font developer to use one of the two characters.

4. Not Sunzhou numerals: As one can see the glyph shapes and intended use of these glyphs is clearly distinct from Sunzhou numerals and therefore they deserve to be treated separately. Even though the shapes are not very rod like, they are still part of the same overall system, the glyphs were just modified to reduce the number of strokes while Suzhou numerals deliberately made them look like more like ideographs, which carry a different meaning.

5. Entries into StandardizedVariants.txt:

1D363 FE00; southern song form; # COUNTING ROD UNIT DIGIT FOUR
 1D364 FE00; southern song form; # COUNTING ROD UNIT DIGIT FIVE
 1D368 FE00; southern song form; # COUNTING ROD UNIT DIGIT NINE
 1D363 FE00; southern song form; # COUNTING ROD UNIT DIGIT FOUR
 1D36C FE00; southern song form; # COUNTING ROD TENS DIGIT FOUR
 1D36D FE00; southern song form; # COUNTING ROD TENS DIGIT FIVE
 1D371 FE00; southern song form; # COUNTING ROD TENS DIGIT NINE

Positive numbers (traditional)										
	0	1	2	3	4	5	6	7	8	9
Vertical	○						┌	┌┌	┌┌┌	┌┌┌┌
Horizontal	○	—	==	≡	≡≡	≡≡≡	┐	┐┐	┐┐┐	┐┐┐┐
Negative numbers (traditional)										
	-0	-1	-2	-3	-4	-5	-6	-7	-8	-9
Vertical	⊙	⋈	⋈⋈	⋈⋈⋈	⋈⋈⋈⋈	⋈⋈⋈⋈⋈	⋈	⋈⋈	⋈⋈⋈	⋈⋈⋈⋈
Positive numbers (Southern Song Dynasty)										
	0	1	2	3	4	5	6	7	8	9
Vertical	○				×	○	┌	┌┌	┌┌┌	×
Horizontal	○	—	==	≡	×	○	┐	┐┐	┐┐┐	×

Figure 3: The figure shows a list of rod numerals representation. (See [17] to type out rod numerals in Unicode.)

Figure 1. Table comparing the regular counting rods to the Southern Song forms.

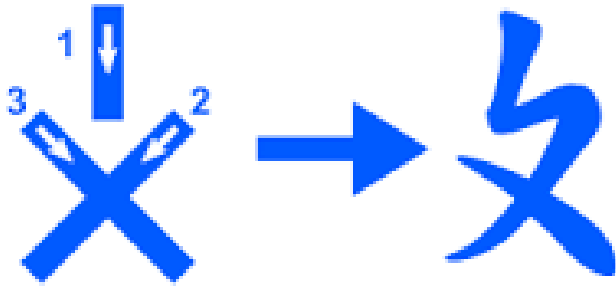
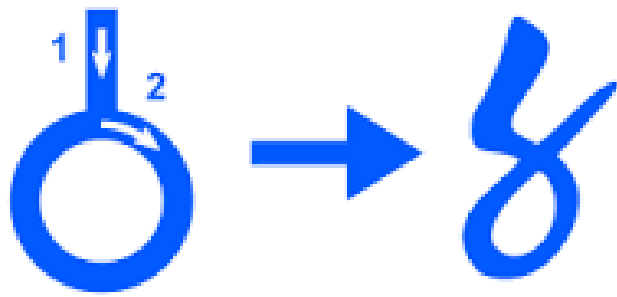


Figure 2. Derivation of Suzhou numerals

Sources:

https://www.google.com.mx/url?sa=t&rct=j&q=&esrc=s&source=web&cd=10&cad=rja&uact=8&ved=0ahUKEwiS9r7G2ILTahWe2YMKHScjByYQFghFMAk&url=http%3A%2F%2Fcs.mcgill.ca%2F~hma41%2Findex_files%2Fwriting%2FTianyuanShu.pdf&usg=AFQjCNFnut223v6gcWLWbCDFTXZWheww-w

http://www.wikiwand.com/en/Suzhou_numerals