

Khmer Angkor Keyboard

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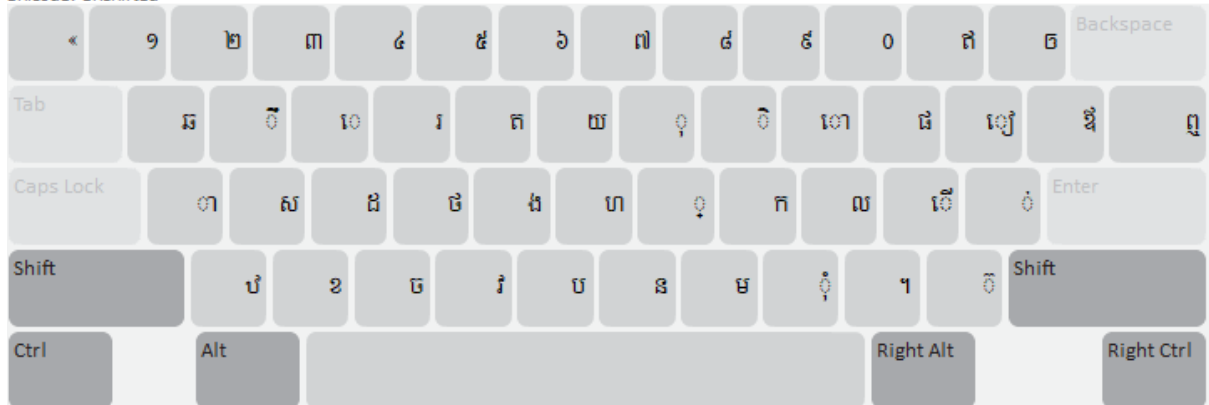
Overview

This documentation is adapted from three sources: ‘How to Type Khmer Unicode,’ ‘the Unicode Standard, Version 10.0.0’ and a paper authored by the Keyman team entitled ‘Spoof-Vulnerable Rendering in Khmer Unicode Implementation’ presented at Asia Conference on Information System in 2017. Customizations have been made by the Keyman team. A layer is added to both desktop layout in order to dedicate to the Khmer divination lore and Khmer lunar dates.

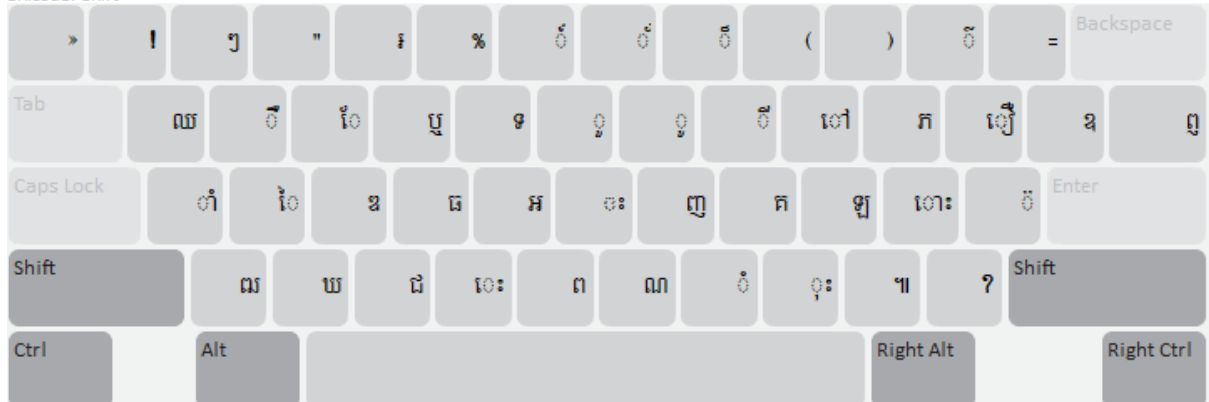
Khmer Angkor Keyboard Layouts

Desktop Layout –Windows/macOS

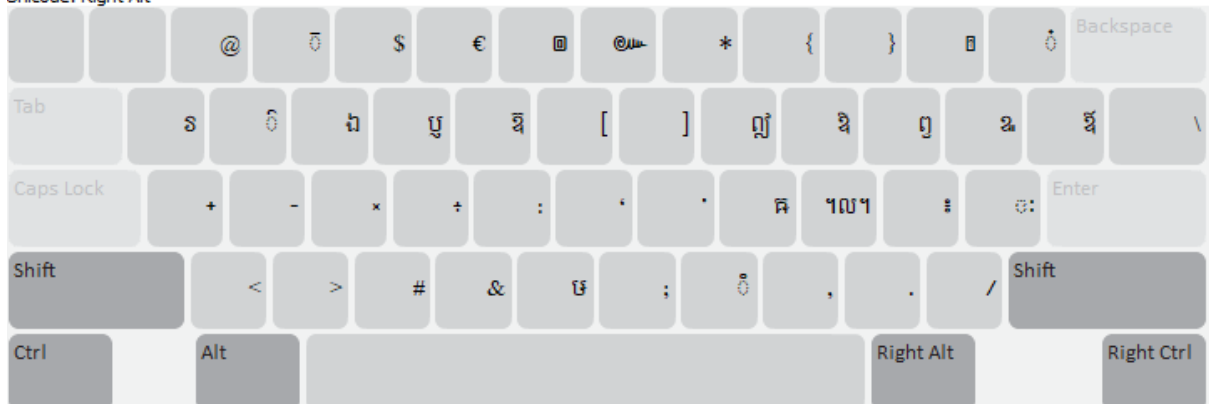
Unicode: Unshifted

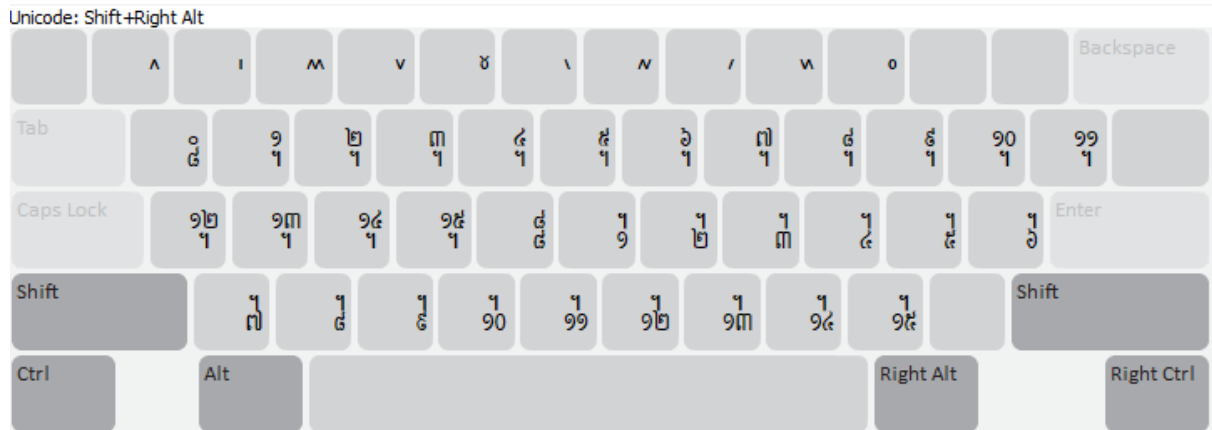


Unicode: Shift



Unicode: Right Alt





Touch Layout –Android/iOS

On a normal keyboard, one ought to select "្ក" and a consonant to get a ceong. For example, "្ក" + "ក" will output "ក្ក". But on this keyboard, "្ក" is no longer needed. Simply press and drag down (flick down) on any consonant key, and you will have the corresponding ceong. Using the flick gesture is much quicker than having to press twice to get a ceong of a consonant!

Switching Layouts:

This keyboard offers four layouts for your convenience: default, shift, Khmer numeric, and Arabic numeric.

- **Shift Layout:** press "្ក" to switch to the shift layout for more consonants and vowels.
- **Khmer Numeric Layout:** press "១២៣" to switch to the Khmer numeric layout for Khmer numerals and symbols.
- **Arabic Numeric Layout:** double-press "១២៣" to switch to the Arabic numeric layout for standard numbers and symbols.

To go to a certain layout, press the key as mentioned above. The key you press will turn blue meaning that you are currently on that layout. To return to the previous layout, press the key again.



Phone - Default layout with flick gesture example on “ក” key

This is the first layout that you will see after you installed the keyboard. It contains important consonants and vowels that are commonly used in Khmer texts. Look closely at the top right corner of each key, you will see a small indicator showing what a flick down will produce. This can be a ceong, a dependent vowel, or a symbol.

For example, flicking down on “ក” (ka) gives you “ក្រ” (ceong ka), while flicking down on “ិ” gives you “ី”.



Phone - Shift layout

Similar to the Default layout, the Shift layout includes both consonants and vowels, but it also provides additional diacritics.



Phone - Khmer Numeric layout

This layout provides easy access to Khmer numerals, symbols, and independent vowels. For convenience, almost all independent vowels are grouped together on this layout.



Phone - Numeric layout

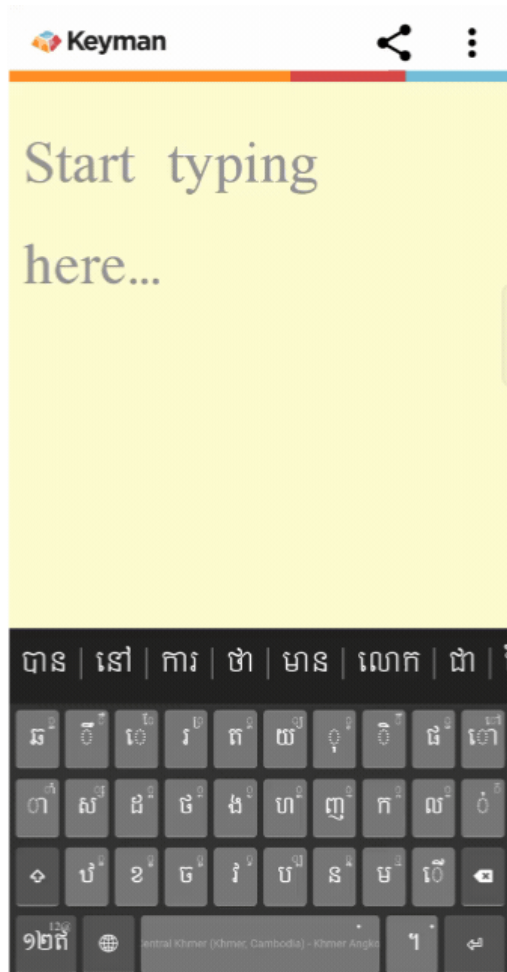
This layout offers standard Arabic numbers and symbols for your convenience.

Keys with a small dot on the top right corner, indicating it has hidden keys. To access them, simply press and hold (long press) the key for a few seconds. More keys will appear with a selected key highlighted in blue. If that's not the key you need, slide your finger left or right to choose the desired key. To cancel the long press and hide the key menu, simply drag your finger away from the key and release it.

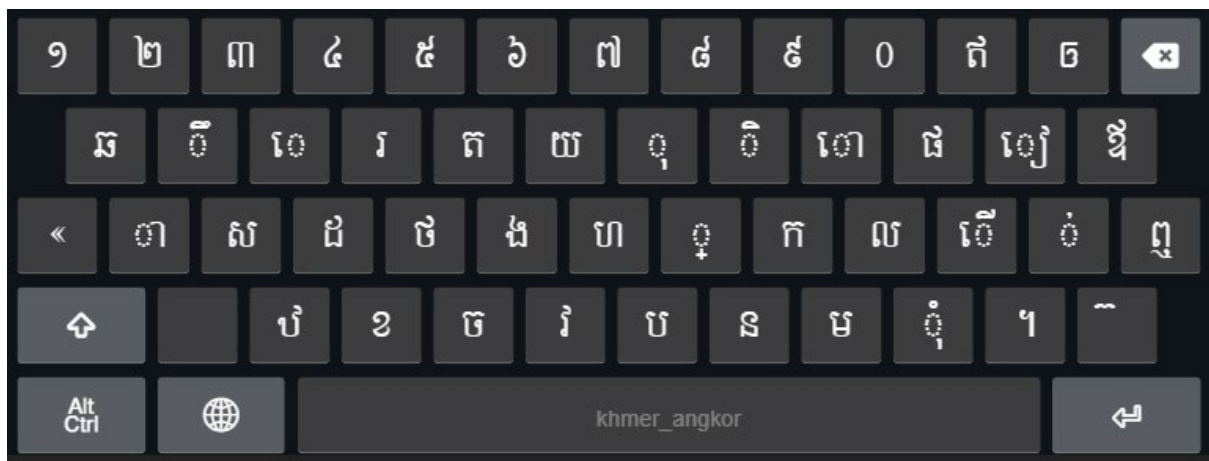


Available on mobile devices only, a feature called text prediction ([lexical model](#)) will be included with the Khmer Angkor keyboard. This feature enhances your ability to write Khmer text more easily and efficiently.

Example: “ខ្ញុំនៅសាលារៀន។”



Tablet - Default layout



Tablet - Shift layout



Tablet - AltGr layout



Khmer Character Categories and Keystrokes for Desktop

Consonants

Consonant	Keystroke
ក [U+1780]	K
ខ [U+1781]	X
គ [U+1782]	Shift K
ឃ [U+1783]	Shift X
ង [U+1784]	G
ច [U+1785]	C
ឆ [U+1786]	Q
ជ [U+1787]	Shift C
ឈ [U+1788]	Shift Q

Consonant	Keystroke
ផ [U+1790]	F
ឡ [U+1791]	Shift T
ធី [U+1792]	Shift F
ន [U+1793]	N
ប [U+1794]	B
ផ [U+1795]	P
ព [U+1796]	Shift B
ភ [U+1797]	Shift P
ម [U+1798]	M

ញ [U+1789]	Shift J
ដ [U+178A]	D
ប [U+178B]	Z
ខ [U+178C]	Shift D
ឆ [U+178D]	Shift Z
ណ [U+178E]	Shift N
ត [U+178F]	T

យ [U+1799]	Y
រ [U+179A]	R
ល [U+179B]	L
វ [U+179C]	V
ស [U+179F]	S
ហ [U+17A0]	H
ឡ [U+17A1]	Shift L
អ [U+17A2]	Shift G

Dependent Vowels

Dependent Vowel	Keystroke
ា [U+17B6]	A
ិ [U+17B7]	I
ី [U+17B8]	Shift I
ុ [U+17B9]	W
ួ [U+17BA]	Shift W
ូ [U+17BB]	U
្ុ [U+17BC]	Shift U
្ូ [U+17BD]	Shift Y
េ [U+17BE]	;
ៃ [U+17BF]	Shift [

Dependent Vowel	Keystroke
័ [U+17C0]	[
៑ [U+17C1]	E
្ [U+17C2]	Shift E
៓ [U+17C3]	Shift S
។ [U+17C4]	O
៕ [U+17C5]	Shift O
៖ [U+17BB] [U+17C6]	,
ៗ [U+17B6] [U+17C6]	Shift A
៘ [U+17BB] [U+17C7]	Shift ,
៙ [U+17C1] [U+17C7]	Shift V
៚ [U+17C4] [U+17C7]	Shift ;

Signs

Sign	Keystroke
◌◌ [U+17C6]	Shift M
◌៖ [U+17C7]	Shift H
◌ៗ [U+17C8] ¹	AltGr '

Independent Vowels

Independent Vowel	Keystroke
ា [U+17A5]	-
្ុ [U+17A6]	AltGr I
ខ [U+17A7]	Shift]

Independent Vowel	Keystroke
ឡ [U+17AD]	Shift \
្ូ [U+17AE]	\
ឡ [U+17AF]	AltGr E

¹ It is actually not a vowel, but it behaves like one. To some, this is a diacritics.

ឡ [U+17A9]	AltGr [ព្យ [U+17B0]	AltGr P
ឺ [U+17AA]]	ឺ [U+17B1]	AltGr O
ឺ [U+17AB]	AltGr R	ឺ [U+17B2]	=
ឺ [U+17AC]	Shift R	ឺ [U+17B3]	AltGr]

Diacritics

Diacritics	Keystroke	Diacritics	Keystroke
" [U+17C9]	Shift '	៥ [U+17CF]	Shift 8
˘ [U+17CA]	/	៦ [U+17D0]	Shift 7
' [U+17CB]	'	* [U+17CE]	AltGr =
˘ [U+17CC]	Shift -	៧ [U+17D3]	AltGr M
˘ [U+17CD]	Shift 6	៨ [U+17D2]	J

Native Punctuations

Native Punct.	Keystroke	Native Punct.	Keystroke
៊ [U+17D4]	.	័ [U+17D9]	AltGr 6
៊ [U+17D5]	Shift .	៑ [U+17DA]	AltGr 7
័ [U+17D6]	AltGr ;	៊ [U+17D7]	Shift 2

Latin Punctuations

Latin Punct.	Keystroke	Latin Punct.	Keystroke
! [U+0021]	Shift 1	« [U+00AB]	`
? [U+003F]	Shift ?	» [U+00BB]	Shift `
" [U+0022]	Shift 3	- [U+002D]	AltGr S
. [U+002E]	AltGr .	: [U+003A]	AltGr G
, [U+002C]	AltGr ,	' [U+2018]	AltGr H
; [U+003B]	AltGr N	' [U+2019]	AltGr J
# [U+0023]	AltGr C	& [U+0026]	AltGr V

Currencies

៛ [U+17DB]	Shift 4
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Khmer Numerals

Khmer Numeral	Keystroke	Khmer Numeral	Keystroke
១ [U+17E1]	1	៦ [U+17E6]	6
២ [U+17E2]	2	៧ [U+17E7]	7
៣ [U+17E3]	3	៨ [U+17E8]	8

៤ [U+17E4]	4
៥ [U+17E5]	5

៩ [U+17E9]	9
០ [U+17E0]	0

Divination Lore

Divination Lore	Keystroke
Λ [U+17F1]	AltGr Shift 1
Ι [U+17F2]	AltGr Shift 2
Μ [U+17F3]	AltGr Shift 3
Υ [U+17F4]	AltGr Shift 4
Υ [U+17F5]	AltGr Shift 5

Divination Lore	Keystroke
\\ [U+17F6]	AltGr Shift 6
ℵ [U+17F7]	AltGr Shift 7
/ [U+17F8]	AltGr Shift 8
⋖ [U+17F9]	AltGr Shift 9
⊖ [U+17F0]	AltGr Shift 0

Khmer Lunar Dates

Khmer Lunar Date	Keystroke
០ [U+19E0]	AltGr Shift Q
១ [U+19E1]	AltGr Shift W
២ [U+19E2]	AltGr Shift E
៣ [U+19E3]	AltGr Shift R
៤ [U+19E4]	AltGr Shift T
៥ [U+19E5]	AltGr Shift Y
៦ [U+19E6]	AltGr Shift U
៧ [U+19E7]	AltGr Shift I
៨ [U+19E8]	AltGr Shift O
៩ [U+19E9]	AltGr Shift P
១០ [U+19EA]	AltGr Shift [
១១ [U+19EB]	AltGr Shift]
១២ [U+19EC]	AltGr Shift A
១៣ [U+19ED]	AltGr Shift S
១៤ [U+19EE]	AltGr Shift D
១៥ [U+19EF]	AltGr Shift F

Khmer Lunar Date	Keystroke
៩ [U+19F0]	AltGr Shift G
១ [U+19F1]	AltGr Shift H
២ [U+19F2]	AltGr Shift J
៣ [U+19F3]	AltGr Shift K
៤ [U+19F4]	AltGr Shift L
៥ [U+19F5]	AltGr Shift ;
៦ [U+19F6]	AltGr Shift '
៧ [U+19F7]	AltGr Shift Z
៨ [U+19F8]	AltGr Shift X
៩ [U+19F9]	AltGr Shift C
១០ [U+19FA]	AltGr Shift V
១១ [U+19FB]	AltGr Shift B
១២ [U+19FC]	AltGr Shift N
១៣ [U+19FD]	AltGr Shift M
១៤ [U+19FE]	AltGr Shift ,
១៥ [U+19FF]	AltGr Shift .

Discouraged/Obsolete characters

Character	Keystroke
១៧១ [U+17D8]	AltGr L
៨ [U+17A8]	AltGr T
៩ [U+17DC]	AltGr Q

² [U+17D1]	AltGr 3
³ [U+17D3]	AltGr M

Characters used in minority languages

Other Character	Keystroke
Ṛ [U+179D]	AltGr K
Ṛ [U+179E]	AltGr B
Ṛ [U+17DD]	AltGr W

Joiners and Spaces

Key name	Keystroke
Zero-width non-joiner [U+200C]	AltGr + 1
Zero-width joiner [U+200D]	AltGr + ‘
Zero-width space [U+200B]	Spacebar
White space [U+0020]	Shift + Spacebar or Press spacebar twice
No break space [U+00A0]	AltGr + Spacebar

Typing in Khmer

Khmer Angkor keyboard adopted the key arrangement from that of Khmer NiDA keyboard. More functionalities have been added to it to assist in typing (i.e. reduce inconsistency in character sequences). Regardless of how the user may type, a well-formed word will be produced. Please note that only issues identified are covered. For how to install the Khmer Angkor keyboard, please click [here](#) for the instructions.

You can simply use Khmer Angkor as you would for any NiDA based keyboard. You may type a word in an order of how it is spelled, not how it appears to be, especially when the vowel is to the left of the consonant. For example, to type the word “តែ” which means ‘tea’, one should type the consonant first and then the vowel (i.e. press key “T” and then “Shift E”).

The order of characters is:

Consonant + Subscript(s) + Consonant Shifter + Vowel + Diacritic

Silent Auto-correction

There are eight cases of invisible typos that Khmer Angkor keyboard automatically corrects. They could not be detected with the naked eye; and the rendering engines may render them all the same on the screen. The auto-correction involves reordering and/or transducing of certain incorrect characters to the correct ones in a split second.

² Note the difference between this character and ៣ [U+17CA] .

Subscript + Vowel

When a subscript and a vowel occur together, the vowel has to come after the subscript. For instance, “ខ្មែរ” and “ខ្មែរ” look the same, but they are encoded differently.

1. ខ្មែរ = ខ្ម ែរ (correct)
2. ខ្មែរ = ខ ្មែរ (incorrect)

Thanks to the context dependent rules, Khmer Angkor keyboard is able to output the second typing sequence the same as that of the first one.

Subscript + ្រ [U+17D2] ្រ [U+179A]

According to the spelling rule, in a sequence of two subscript and one of which is ្រ [U+17D2] ្រ [U+179A], the ្រ [U+17D2] ្រ [U+179A] should come after another subscript.

- ក្រឡើល = ក ្រឡើល (correct)
- ក្រឡើល = ក ្រឡើល (incorrect)

As you can see the two-character sequences yield the same visual output on the screen. Once again, Khmer Angkor will be able to automatically swap the sequence of the second to the first; so that the output would be both looked and encoded correctly and consistently.

Subscript + Consonant Shifter + Vowel

This is a case whereby the character sequence is vague in the Unicode Standard. Unicode Standard 4.0 and later have the consonant shifter come between the consonant and the subscript while Unicode Standard 3.0 has it after the subscript. Khmer Angkor conforms to Unicode 3.0 and it is taken as the standard sequence. If one typed a consonant shifter before a subscript, the order would be switched silently.

ម្រាង ្រ ម្រាង

Consonant Shifter + Vowel

Consonant shifters should be typed before a vowel. (See the same in the section above)

Vowel with Nikahit [U+17C6]

Nikahit is considered as a sign in the Unicode Standard. However its function is more like that of a vowel. It is usually combined with another vowel, i.e., ្រ [U+17BB] ្រ [U+17B6], and it should always be typed after these vowels.

ក្រ ្រ ្រ ្រ
ក្រ ្រ ្រ ្រ

Vowel ្រ [U+17C4] and Vowel ្រ [U+17BE]

These two vowels could be mistakenly typed by adding ្រ [U+17B6] and ្រ [U+17C1] respectively to ្រ [U+17C1]. Given this sequence, Khmer Angkor would transform them to ្រ [U+17C4] and ្រ [U+17BE], the correct vowel encodings.

Visually Identical Subscript

Two subscripts look exactly the same, but they are encoded with different Unicode code points, ᨶ [U+17D2] [U+178A] and ᨷ [U+17D2] [U+178F]. According to the spelling rule, it governs that the first should come after ᨵ [U+178E] and the latter should come after ᨶ [U+1793].

Vowel Rotation

Since no two-vowel sequence is allowed, once one is typed after another, the vowel would switch to the one typed last. For example, if the current character is vowel ᨶ [U+17B6], and then ᨷ [U+17C2] is typed, the final output would be ᨷ [U+17C2], not ᨶ [U+17B6].

NOTE: The vowel rotation would not be triggered in the following cases:

- If the first vowel is ᨶ [U+17C1] and the second is ᨷ [U+17B8] or vice versa, then the switch would not happen, but the output would be ᨷ [U+17BE] instead.
- If the first vowel is ᨶ [U+17C1] and the second is ᨸ [U+17B8] or vice versa, then the switch would not happen, but the output would be ᨸ [U+17C4] instead.
- If the first vowel is on the above vowels³ and the second is ᨶ [U+17BB] or vice versa, then the switch would not happen, but the output would be the corresponding consonant shifter instead. For examples: a sequence of ᨶᨶ or ᨶᨷ would be automated as ᨶᨶ (ᨶᨶ); ᨶᨸ or ᨶᨹ would be automated as ᨶᨸ (ᨶᨸ).
- When ᨶ [U+17BB] is typed after ᨶ , it will be transformed to a consonant shifter corresponding with the consonant before ᨶ before which the shifter will be placed. For example,
 - ᨶᨶ + ᨶ ® ᨶᨶᨶ (ᨶᨶᨶ) and
 - ᨶᨸ + ᨶ ® ᨶᨸᨶ (ᨶᨸᨶ).
- When ᨸ or ᨹ is typed after ᨶ , the order will be reversed. For example,
 - ᨶᨶ + ᨸ ® ᨶᨶᨸ (ᨶᨶᨸ) and
 - ᨶᨶ + ᨹ ® ᨶᨶᨹ (ᨶᨶᨹ).

Beep / Constraints

- No two consecutive vowels in a syllable.
- No Bantoc is allowed after a vowel, a pseudo vowel⁴, a consonant shifter or a subscript.
- No two consecutive subscript signs (ᨶ) are allowed.
- No two consecutive consonant shifters are allowed.

³ ᨶ [U+17B7], ᨷ [U+17B8], ᨸ [U+17B9], ᨹ [U+17BA], ᨺ [U+17BE], and ᨻ [U+17B6] [U+17C6] are considered as superscript vowels or above vowels.

⁴ Three characters play a role similar to that of vowels, thus they are called 'pseudo vowel'. They are: ᨶ [U+17C6], ᨷ [U+17C7], and ᨸ [U+17C8].

Mistyped Characters

No	Mistyped as ...	Transformed to ...
1	ឡ (ឡ)	ឡ
2	ប្រ (ប្រ)	ប្រ
3	ប្រ (ប្រ)	ប្រ
4	ព្យា (ព្យា)	ព្យា
5	ព្យា (ព្យា)	ព្យា
6	ព្យ (ព្យ)	ព្យ
7	ព្យ (ព្យ)	ព្យ
8	ព្យ (ព្យ)	ព្យ
9	ឌី (ឌី)	ឌី
10	ឌី (ឌី)	ឌី
11	ឌី (ឌី)	ឌី
12	ដូ (ដូ)	ដូ
13	ឡូ (ឡូ)	ឡូ
14	ពន្ល (ពន្ល)	ពន្ល
15	ពន្ល (ពន្ល)	ពន្ល
16	ឡី (ឡី)	ឡី
17	ឡី (ឡី)	ឡី
18	ព្យ (ព្យ)	ព្យ (ឧទា. សព្វាវុធ)
19	រឿ	រឿ
20	រឿ	រឿ
21	រឿ	រឿ