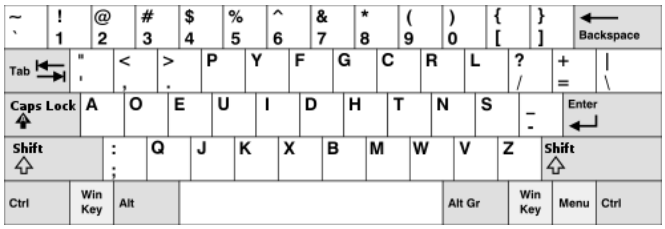
Other Latin-script keyboard layouts

See also: List of Latin-script keyboard layouts

There are also keyboard layouts that do not resemble traditional typewriter layouts very closely, if at all. These are designed to reduce finger movement and are claimed by some proponents to offer higher typing speed along with ergonomic benefits.

Dvorak

Main article: Dvorak keyboard layout



The Dvorak keyboard layout

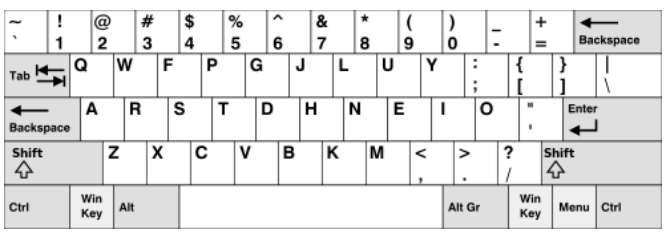
The Dvorak layout was named after its inventor, August Dvorak. There are also numerous adaptations for languages other than English and single-handed variants. Dvorak's original layout had the numerals rearranged, but the present-day layout had them in numerical order. Dvorak has numerous properties designed to increase typing speed, decrease errors, and increase comfort. Research has found a 4% average advantage to the end user in typing speed.[38] The layout concentrates the most used English letters in the home row where the fingers rest, thus having 70% of typing done in the home row (compared to 32% in QWERTY).

The layout came before computers came to be, so it challenges programmers and power users because keyboard shortcuts, like copy-paste are in totally different locations, punctuation symbols are significantly affected, while common commands like `ls -ls` result in strenuous use of the pinky finger.

The Dvorak layout is available out-of-the-box on most operating systems, making switching through software very easy. "Hardwired" Dvorak keyboards are also available, though only from specialized hardware companies.

Colemak

Main article: Colemak



Colemak keyboard layout (US)

The Colemak layout is another popular alternative to the standard QWERTY layout, offering a more familiar change for users already accustomed to the standard layout.[39]

It builds upon the QWERTY layout as a base, changing the positions of 17 keys while retaining the QWERTY positions of most non-alphabetic characters and many popular keyboard shortcuts, supposedly making it easier to learn than Dvorak for people who already type in QWERTY without sacrificing efficiency. It shares several design goals with the Dvorak layout, such as minimizing finger path distance and making heavy use

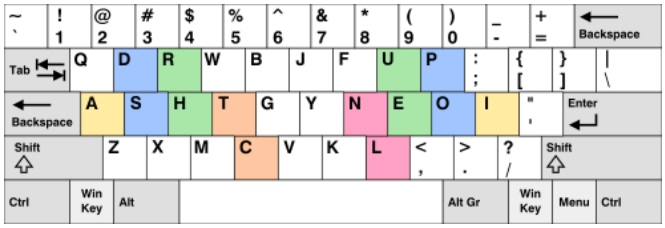
of the home row.[40] An additional defining (albeit optional) feature of the Colemak layout is the lack of a caps lock key; an additional backspace key occupies the position typically occupied by Caps Lock on modern keyboards.[39]

Operating systems such as macOS, Linux, Android, ChromeOS, and BSD allow a user to switch to the Colemak layout. A program to install the layout is available for Microsoft Windows, as well as a portable AutoHotKey implementation.[41]

Colemak variants exist, including Colemak Mod-DH, which seeks to rectify concerns that the layout places too much emphasis on the middle-row centre-column keys (D and H), leading to awkward lateral hand movements for certain common English bigrams such as HE.[42] Others seek to have more compatibility with other keyboard layouts.[43]

Workman

Workman is an English layout supported out-of-the-box in Linux/X11 systems.[44]



Workman layout for the English language, showing home keys highlighted

The Workman layout employs a hypothesis about the preferential movement of each finger rather than categorically considering the lowest letter row to be least accessible. Specifically, the index finger prefers to curl inwards rather than stretch outwards. So for the index finger, the position of second preference goes to the bottom row rather than the top row. Contrarily, the middle and ring fingers are relatively long and prefer to stretch out rather than curl in. Based on this, weighting is allotted to each key specifically rather than each row generically.

Another principle applied is that it is more natural and less effort to curl in or stretch out fingers rather than rotate one's wrist inwards or outwards. Thus the Workman layout allots a lower priority to the two innermost columns between the home keys (G and H columns on a QWERTY layout), similarly to the Colemak-DH or "Curl" mods. Workman also balances the load quite evenly between both hands.

The Workman layout is found to achieve overall less travel distance of the fingers for the English language than even Colemak.[45][46] It does however generally incur higher same-finger n-gram frequencies; or in other words, one finger will need to hit two keys in succession more often than in other layouts.

Other English layouts

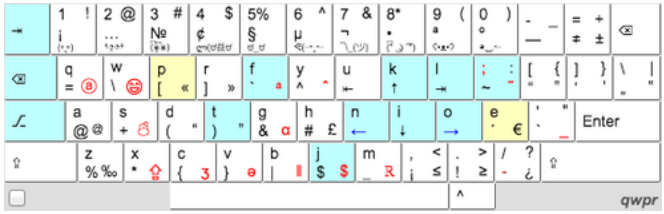
There are many other layouts for English, each developed with differing basic principles.

The *Norman Layout*, like Workman, deprioritizes the central columns but gives more load to the right hand with the assumption that the right hand is more capable than the left. It also gives importance to retaining letters in the same position or at least the same finger as QWERTY.

MTGAP's Layout for a Standard Keyboard / an Ergonomic Keyboard has the lowest finger travel for a standard keyboard, and travel distance for an ergonomic keyboard second only to Arensito's

keyboard layout.[47] Further variations were created using the keyboard layout optimizer.[48]

Other layouts lay importance on minimal key deviation from QWERTY to give a reasonable increase in typing speed and ergonomics with minimal relearning of keys.[49]



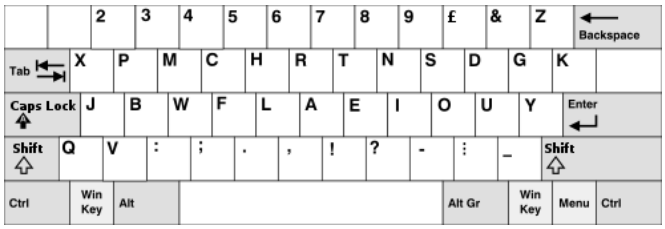
Qwpr keyboard layout (letters moved from QWERTY in teal, or yellow if different hand)

Qwpr is a layout that changes only 11 basic keys from their QWERTY positions, with only 2 keys typed with different fingers.[50] Minimak has versions that changes four, six, eight, or twelve keys, all have only 3 keys change finger.[51] These intend to offer much of the reduced finger movement of Dvorak without the steep learning curve and with an increased ability to remain proficient with a QWERTY keyboard. The Qwpr layout is also designed for programmers and multilingual users, as it uses Caps Lock as a "punctuation shift", offering quicker access to ASCII symbols and arrow keys, as well as to 15 dead keys for typing hundreds of different glyphs such as accented characters, mathematical symbols, or emoji.

In Canada, the CSA keyboard is designed to write several languages, especially French.

Sholes' 2nd Layout

Christopher Latham Sholes, inventor of the QWERTY layout, created his own alternative, and patented it in 1896.[52] Similar to Dvorak, he placed all the vowels on the home row, but in this case on the right hand. The layout is right-hand biased with both the vowels and many of the most common consonants on the right side of the layout.



Sholes' second layout

JCUKEN (Latin)

> This section needs additional citations for verification. *(March 2016)*
> Learn more

The JCUKEN layout was used in the USSR for all computers (both domestically produced and imported such as Japan-made MSX-compatible systems) except IBM-compatible ES PEVM due to its phonetic compatibility with Russian ЙЦУКЕН layout (see right). The layout has the advantage of having punctuation marks on Latin and Cyrillic layouts mapped on the same keys.[53]


JCUKEN keyboard of the UKNC computer

Neo

Main article: Neo (keyboard layout)

The Neo layout is an optimized German keyboard layout developed in 2004 by the Neo Users Group,[54] supporting nearly all Latin-based alphabets, including the International Phonetic Alphabet,[55] the Vietnamese language and some African languages.[56]

Neo Layout, layer 1

The positions of the letters are not only optimized for German letter frequency, but also for typical groups of two or three letters. English is considered a major target as well. The design tries to enforce the alternating usage of both hands to increase typing speed. It is based on ideas from de-ergo and other ergonomic layouts. The high frequency keys are placed in the home row. The current layout, Neo 2.0, has unique features not present in other layouts, making it suited for many target groups such as programmers, mathematicians, scientists or LaTeX authors.[57] Neo is grouped in different layers, each designed for a special purpose.

Most special characters inherit the meaning of the lower layers—the ⟨¿⟩ character is one layer above the ⟨?⟩, or the Greek ⟨α⟩ is above the ⟨a⟩ character. Neo uses a total of six layers with the following general use:[58][59]

Neo Layout, layer 3

1. Lowercase characters
2. Uppercase characters, typographical characters
3. Special characters for programming, etc.
4. WASD-like movement keys and number block
5. Greek characters
6. Mathematical symbols and Greek uppercase characters

BÉPO

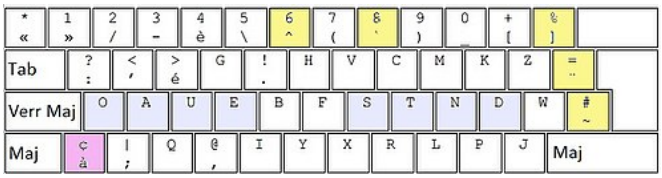
Main article: BÉPO

The BÉPO layout is an optimized French keyboard layout developed by the BÉPO community,[60] supporting all Latin-based alphabets of the European Union, Greek and Esperanto.[61] It is also designed to ease programming. It is based on ideas from the Dvorak and other ergonomic layouts. Typing with it is usually easier due to the high frequency keys being in the home row. Typing tutors exist to ease the transition.[62]

BÉPO layout

In 2019, a slightly modified version of the BÉPO layout is featured in a French standard developed by AFNOR, along with an improved version of the traditional AZERTY layout.[63]

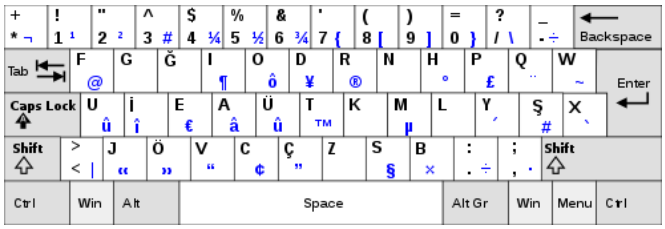
Dvorak-fr



Dvorak-fr

The Dvorak-fr layout is a Dvorak like layout specific to the French language, without concession to the use of programming languages, and published in 2002 by Francis Leboutte. Version 2 was released in June 2020. Its design meets the need to maximize comfort and prevent risks when typing in French. Unlike AZERTY, the characters needed for good French typography are easily accessible: for example, the quotation marks (« ») and the curved apostrophe are available directly. More than 150 additional characters are available via dead keys.

Turkish (F-keyboard)

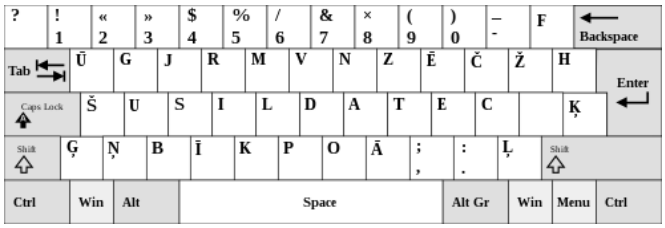


Turkish F-keyboard layout

The Turkish language uses the Turkish Latin alphabet, and a dedicated keyboard layout was designed in 1955 by İhsan Sıtkı Yener[64] (tr). During its design, letter frequencies in the Turkish language were investigated with the aid of Turkish Language Association. These statistics were then combined with studies on bone and muscle anatomy of the fingers to design the Turkish F-keyboard (Turkish: *F klavye*). The keyboard provides a balanced distribution of typing effort between the hands: 49% for the left hand and 51% for the right. With this scientific preparation, Turkey has broken 14 world records in typewriting championships between 1957 and 1995.[65] In 2009, Recep Ertaş and in 2011, Hakan Kurt from Turkey came in first in the text production event of the 47th (Beijing) and 48th (Paris) Intersteno congresses respectively.[66][67] Despite the greater efficiency of the Turkish F-keyboard however, the modified QWERTY keyboard ("Q-keyboard") is the one that is used on most computers in Turkey. The reason for the popularity of QWERTY in Turkey is that they were overwhelmingly imported since the beginning of the 1990s.[68]

ŪGJRMV

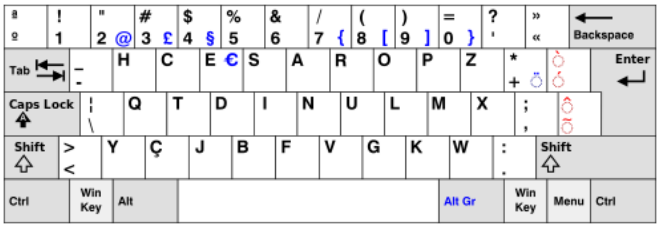
The ŪGJRMV layout is specifically designed for the Latvian language.[29]



Latvian Keyboard Layout

HCESAR

The HCESAR layout was a layout created in 1937 for typewriters during Portugal's Estado Novo. It was specifically designed for the Portuguese language. It is no longer used.



HCESAR keyboard layout

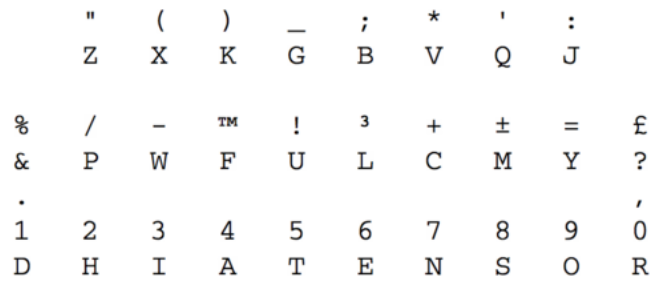
Malt

The Malt layout—named for its inventor, South African-born Lilian Malt—is best known for its use on molded, ergonomic Maltron keyboards. Nevertheless, it has been adapted as well for flat keyboards, with a compromise involved: a flat keyboard has a single, wide space-bar, rather than a space button as on Maltron keyboards, so the E key was moved to the bottom row.

Archived September 22, 2010, at the Wayback Machine

Modified Blickensderfer

The Blickensderfer typewriter, designed by George Canfield Blickensderfer in 1892, was known for its novel keyboard layout, its interchangeable font, and its suitability for travel. The Blickensderfer keyboard had three banks (rows of keys), with special characters being entered using a separate Shift key; the home row was, uniquely, the bottom one (i.e., the typist kept her hands on the bottom row). A computer or standard typewriter keyboard, on the other hand, has four banks of keys, with home row being second from bottom.



Original Blickensderfer keyboard

Blick keyboard for computers

To fit on a Sholes-patterned (typewriter or computer) keyboard, the Blickensderfer layout was modified by Nick Matavka in 2012, and released for both Mac OS X and Windows. To accommodate the differences between Blickensderfer and Sholes keyboards (*not* the layouts, but the keyboards themselves), the order of the rows was changed and special characters were given their own keys.

The keyboard drivers created by Nick Matavka for the modified Blickensderfer layout (nicknamed the 'Blick') have several variations, including one that includes the option of switching between Blick and another keyboard layout and one that is internationalised, allowing the entry of diacritics.

Hexagon

Main article: Typewise

The honeycomb layout has hexagon keys and was invented by Typewise in cooperation with the ETH Zurich[69] in 2015 for smartphones.[70][71] It exists for 40+ languages

including English, German, Spanish, French and Afrikaans. The keys are arranged like those of the respective traditional keyboard with a few changes. Instead of the Space bar there are two smaller space bars in the middle of the keyboard. The ⇧ Shift is replaced by swiping up on keys and ← Backspace by swiping to the left on the keyboard. Diacritic characters can be accessed by holding on a key.[72][73]

Hexagon keyboard layout

Alphabetical layout

A few companies offer "ABC" (alphabetical) layout keyboards.[74][75]

The layout can also be useful for people who do not type often or where using both hands is not practical, such as touchscreens.

Chorded keyboards and mobile devices

Main article: Chorded keyboard

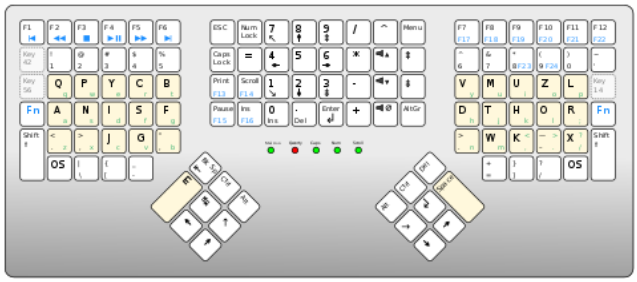
Chorded keyboards, such as the Stenotype and Velotype, allow letters and words to be entered using combinations of keys in a single stroke. Users of stenotype machines regularly reach rates of 225 words per minute.[76] These systems are commonly used for real-time transcription by court reporters and in live closed captioning systems. Ordinary keyboards may be adapted for this purpose using Plover. However, due to hardware constraints, chording three or more keys may not work as expected. Many high-end keyboards support *n*-key rollover and so do not have this limitation.

The multi-touch screens of mobile devices allow implementation of virtual on-screen chorded keyboards. Buttons are fewer, so they can be made larger. Symbols on the keys can be changed dynamically depending on what other keys are pressed, thus eliminating the need to memorize combos for characters and functions before use. For example, in the chorded GKOS keyboard which has been adapted for the Google Android, Apple iPhone, MS Windows Phone, and Intel MeeGo/Harmattan platforms, thumbs are used for chording by pressing one or two keys at the same time. The layout divides the keys into two separate pads which are positioned near the sides of the screen, while text appears in the middle. The most frequent letters have dedicated keys and do not require chording.

Some other layouts have also been designed specifically for use with mobile devices. The FITALY layout is optimized for use with a stylus by placing the most commonly used letters closest to the centre and thus minimizing the distance travelled when entering words. A similar concept was followed to research and develop the MessagEase keyboard layout for fast text entry with stylus or finger. The ATOMIK layout, designed for stylus use, was developed by IBM using the Metropolis Algorithm to mathematically minimize the movement necessary to spell words in English.[77] The ATOMIK keyboard layout is an alternative to QWERTY in ShapeWriter's WritingPad software.[78] ASETNIOP is a keyboard layout designed for tablet computers that uses 10 input points, eight of them on the home row.[79]

Other original layouts and layout design software

Several other alternative keyboard layouts have been designed either for use with specialist commercial keyboards (e.g. Maltron and PLUM) or by hobbyists (e.g.



United-States Maltron 3D keyboard layout

Asset,[80] Arensito,[81] Minimak,[82] Norman,[83] Qwpr,[84] Workman[85] as well as symmetric typing[86] layouts Niro[87] and Soul[88]); however, none of them are in widespread use, and many of them are merely proofs of concept. Principles commonly used in their design include maximizing use of the home row, minimizing finger movement, maximizing hand alternation or inward rolls (where successive letters are typed moving towards the center of the keyboard), minimizing changes from QWERTY to ease the learning curve, and so on.

Maltron also has a single-handed keyboard layout.[89]

Programs such as the Microsoft Keyboard Layout Creator[90] (basic editor, free, for use on MS Windows), SIL Ukelele[91] (advanced editor, free, for use on Apple's Mac OS X), KbdEdit[92] (commercial editor, for Windows) and Keyman Developer[93] (free, open source editor for Windows, macOS, iOS, Android, or for sites on the web as virtual keyboards) make it easy to create custom keyboard layouts for regular keyboards;[94] users may satisfy their own typing patterns or specific needs by creating new ones from scratch (like the IPA[95] or pan-Iberian[96] layouts) or modify existing ones (for example, the Latin American Extended[97] or Gaelic[98] layouts). Such editors can also construct complex key sequences using dead keys or the AltGr key.

Certain virtual keyboards and keyboard layouts are accessible online.[99] With no hardware limitations, those online keyboards can display custom layouts, or allow the user to pre-configure or try out different language layouts. Resulting text can then be pasted into other websites or applications flexibly with no need to reprogram keyboard mappings at all.

Some high-end keyboards allow users flexibility to reprogram keyboard mappings at the hardware level. For example, the Kinesis Advantage contoured keyboard allows for reprogramming single keys (not key combinations), as well as creating macros for remapping combinations of keys (this however includes more processing from the keyboard hardware, and can therefore be slightly slower, with a lag that may be noticed in daily use).

Non-QWERTY layouts were also used with specialized machines such as the 90-key Linotype type setting machine.

Keyboard layouts for non-Latin alphabetic scripts

Some keyboard layouts for non-Latin alphabetic scripts, most notably the Greek layout, are based on the QWERTY layout, in that glyphs are assigned as far as possible to keys that bear similar-sounding or appearing glyphs in QWERTY. This saves learning time for those familiar with QWERTY, and eases entry of Latin characters (with QWERTY) as well for Greek users.

This is not a general rule, and many non-Latin keyboard layouts have been invented from scratch.

All non-Latin computer keyboard layouts can also input Latin letters as well as the script of the language, for example, when typing in URLs or names. This may be done through a special key on the keyboard devoted to this task, or through some special combination of keys, or through software programs that do not interact with the keyboard much.

Abugidas

Main article: Abugida

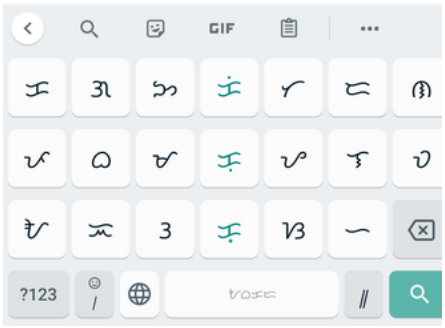
Brahmic scripts

- Media related to Brahmic keyboard layouts at Wikimedia Commons

Baybayin

Main article: Baybayin

It is possible to type *baybayin* directly from one's keyboard without the need to use web applications which implement an input method. The Philippines Unicode Keyboard Layout[100] includes different sets of *baybayin* layout for different keyboard users: QWERTY, Capewell-Dvorak, Capewell-QWERF 2006, Colemak, and Dvorak, all of which work in both Microsoft Windows and Linux.

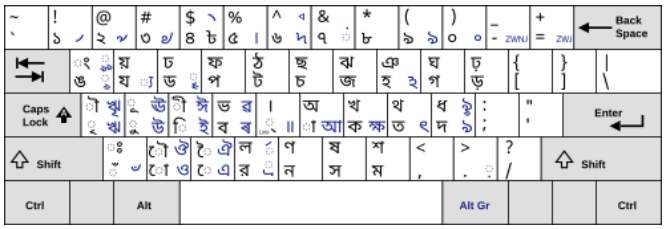


A screenshot image of the *baybayin* keyboard on Gboard

Bengali

Main article: Bengali input methods

There are many different systems developed to type Bengali language characters using a typewriter or a computer keyboard and mobile device. There were efforts taken to standardize the input system for Bengali in Bangladesh (জাতীয় Jatiyo layout), but still no input method has still been effectively adopted widely.



Bangla National (Jatiyo) Keyboard by Bangladesh Computer Council

Dhivehi

Dhivehi Keyboards have two layouts. Both are supported by Microsoft Windows (Windows XP and later only).[29]

InScript

Main article: InScript

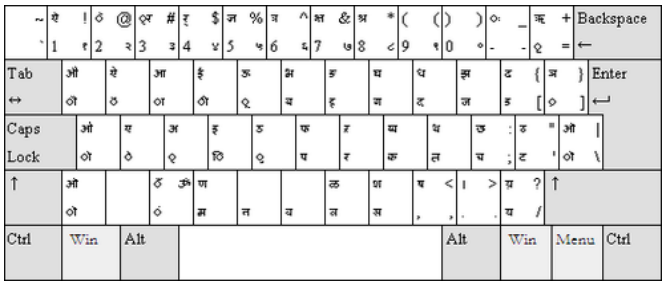
See also: Devanagari § Devanagari keyboard layouts

InScript is the standard keyboard for 12 Indian scripts including Devanagari, Bengali, Gujarati, Gurmukhi, Kannada, Malayalam, Oriya, Tamil, and Telugu etc.

Most Indian scripts are derived from Brahmi, therefore their alphabetic order is identical. On the basis of this property, the InScript keyboard layout scheme was prepared. So a person who knows

InScript typing in one language can type in other scripts using dictation even without knowledge of that script.

An InScript keyboard is inbuilt in most modern operating systems including Windows, Linux, and Mac OS. It is also available in some mobile phones.



InScript keyboard layout for Sanskrit

A Devanagari InScript bilingual keyboard

Khmer

Main article: Khmer keyboard

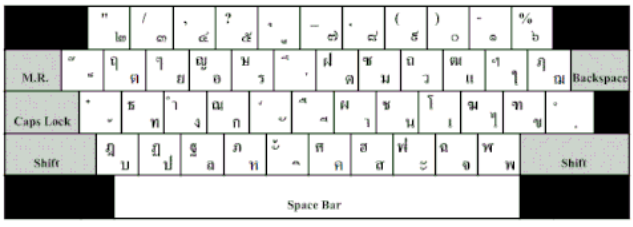
Khmer uses its own layout designed to correspond, to the extent practicable, to its QWERTY counterpart, thus easing the learning curve in either direction. For example, the letter ฦ [lɔː] is typed on the same key as the letter **L** on the English-based QWERTY. It also has many specifics due to its record number of vowels, consonants and punctuation signs as well as its cluster structure which bundles letters together in one.

Khmer keyboard layout

Thai

The Thai Kedmanee keyboard layout predominates. The Thai Pattachote keyboard layout is also used, though it is much less common. Infrequently used characters are accessed via the Shift key. Despite their wide usage in Thai, Arabic numerals are not present on the main section of the keyboard. Instead they are accessed via the numeric keypad or by switching to the Latin character set on keyboards without dedicated numeric keys.

Thai Kedmanee keyboard layout



Thai Pattachote keyboard layout

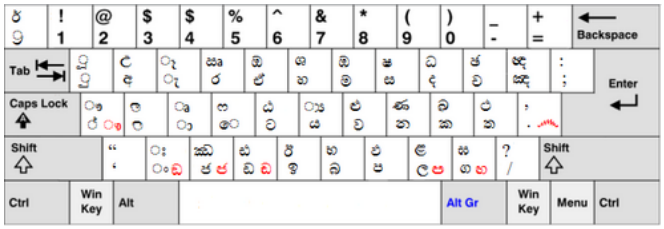
Lao

The keyboard layout used for Lao language.

Lao keyboard layout

Sinhala

The Sinhala keyboard layout is based on the Wijesekara typewriter for Sinhala script.



Windows Sinhala layout

Wijesekara layout

Tibetan

Tibetan (China)

The Chinese National Standard on Tibetan Keyboard Layout standardizes a layout for the Tibetan language in China.[101]

The first version of Microsoft Windows to support the Tibetan keyboard layout is MS Windows Vista. The layout has been available in Linux since September 2007.

Tibetan keyboard layout

Tibetan (International)

Mac OS-X introduced Tibetan Unicode support with OS-X version 10.5 and later, now with three different keyboard layouts available: Tibetan-Wylie, Tibetan QWERTY and Tibetan-Otani.

Dzongkha (Bhutan)

Main article: Dzongkha keyboard layout

The Bhutanese Standard for a Dzongkha keyboard layout standardizes the layout for typing Dzongkha, and other languages using the Tibetan script, in Bhutan. This standard layout was formulated by the Dzongkha Development Commission and Department of Information Technology in Bhutan. The Dzongkha keyboard layout is very easy to learn as the key sequence essentially

follows the order of letters in the Dzongkha and Tibetan alphabet. The layout has been available in Linux since 2004.

Dzongkha keyboard layout

Inuktitut

Inuktitut has two similar, though not identical, commonly available keyboard layouts for Windows. Both contain a basic Latin layout in its base and shift states, with a few Latin characters in the AltGr shift states. The Canadian Aboriginal syllabics can be found in the Capslock and AltGr shift states in both layouts as well.

Latin keyboard layout for Inuktitut

The difference between the two layouts lies in the use of] as an alternate to AltGr to create the dotted, long vowel syllables, and the mapping of the small plain consonants to the Caps + number keys in the "Naqittaut" layout, while the "Latin" layout does not have access to the plain consonants, and can only access the long vowel syllables through the AltGr shift states.

Naqittaut keyboard layout for Inuktitut

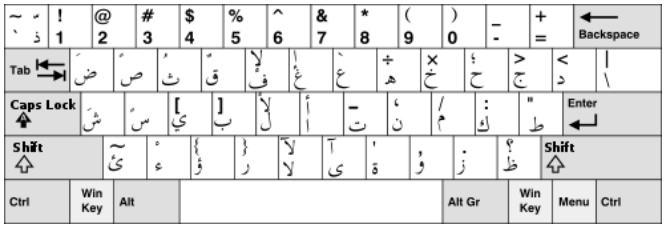
Abjads

Main article: Abjad

Arabic

Main article: Arabic keyboard

This layout was developed by Microsoft from the classic Arabic typewriter layout and is used by IBM PCs. There is also a 102-key variant and a 102-key phonetic variant that maps to AZERTY.[29]



Arabic Windows keyboard layout

For Apple keyboards there is a different layout.

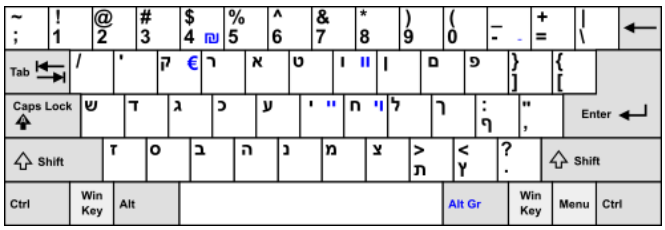
Arabic Mac keyboard layout

For Chrome a 1:1 layout also exists.[102]

Hebrew

Main article: Hebrew keyboard

All keyboards in Israel are fitted with both Latin and Hebrew letters. Trilingual editions including either Arabic or Cyrillic also exist.



Hebrew keyboard

In the standard layout (but not all keyboards), paired delimiters—parentheses (), brackets [], and braces {}, as well as less/greater than <>—are in the opposite order from the standard in other left-to-right languages. This results in "open"/"close" being consistent with right-to-left languages (Shift-9 always gives "close parenthesis" U+0029, which visually looks like "open parenthesis" in left-to-right languages). This is shared with Arabic keyboards.

Certain Hebrew layouts are extended with niqqud symbols (vowel points),[103] which require Alt+Shift or similar key combination in order to be typed.

Tifinagh

The Royal institute of the Amazigh culture (IRCAM) developed a national standard Tifinagh layout for Tamazight (Berber) in Morocco. It is included in Linux and Windows 8, and is available for the Mac and older versions of Windows.

Moroccan (IRCAM) Tamazight (Berber) keyboard layout for Tifinagh script

A compatible, international version of this layout, called "Tifinagh (International)" exists for typing a wide range of Tamazight (Berber) language variants, and includes support for Tuareg variants. It was designed by the Universal Amazigh Keyboard Project and is available from its page on SourceForge.[104]

Urdu

Urdu has a standardized layout present, developed by the National Authority Language. More commonly, however, the phonetic keyboard is used on smartphones and desktops which align the Urdu letters with their Latin counterparts (for example, pressing Q will write ق)

The standard layout

Another version of the keyboard, developed by Designer and Engineer Zeerak Ahmed, has witnessed an increase in usage among the younger generations.

The phonetic keyboard layout on Windows 7

Alphabetic

Main article: Alphabet

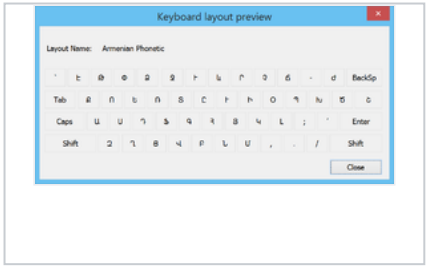
Armenian

The Armenian language keyboard is similar to the Greek in that in most (but not all) cases, a given Armenian letter is at the same location as the corresponding Latin letter on the QWERTY keyboard. The illustrated keyboard layout can be enabled on Linux with: `setxkbmap am -variant phonetic`. Western and Eastern Armenian have different layouts.

In the pre-computer times, Armenian keyboards had quite a different layout, more suitable for producing letter combinations inherent to the language.

Several attempts have been made to create innovative ergonomic layouts, some of them inspired by Dvorak.

Armenian keyboard layouts



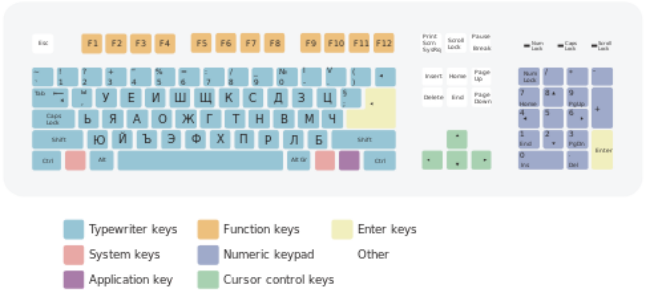
Armenian computer keyboard layout

Armenian typewriter keyboard layout

Armenian keyboard layout inspired by Dvorak

Cyrillic

Bulgarian



Bulgarian keyboard layout (BDS 5237:1978)

The current official Bulgarian keyboard layout for both typewriters and computer keyboards is described in BDS (Bulgarian State/National Standard) 5237:1978.[105] It superseded the old standard, BDS 5237:1968, on 1 January 1978.[105] Like the Dvorak layout, it has been designed to optimize typing speed and efficiency, placing the most common letters in the Bulgarian language—О, Н, Т, and А—under the strongest fingers. In addition to the standard 30 letters of the Bulgarian alphabet, the layout includes the non-Bulgarian Cyrillic symbols Э and ы and

the Roman numerals I and V (the X is supposed to be represented by the Cyrillic capital X, which is acceptable in typewriters but problematic in computers).

There is also a second, informal layout in widespread use—the so-called "phonetic" layout, in which Cyrillic letters are mapped to the QWERTY keys for Latin letters that "sound" or "look" the same, with several exceptions (Я is mapped to Q, Ж is mapped to V, etc.—see the layout and compare it to the standard QWERTY layout). This layout is available as an alternative to the BDS one in some operating systems, including Microsoft Windows, Apple Mac OS X and Ubuntu Linux. Normally, the layouts are set up so that the user can switch between Latin and Cyrillic script by pressing *Shift* + *Alt*, and between BDS and Phonetic by pressing *Shift* + *Ctrl*.

In 2006, Prof. Dimiter Skordev from the Faculty of Mathematics and Informatics of Sofia University and Dimitar Dobrev from the Bulgarian Academy of Sciences proposed a new standard, prBDS 5237:2006, including a revised version of the old BDS layout, which includes the letter Ѝ and the capital Ы and replaces the letters I and V with the currency symbols of $ and € respectively, and a standardization of the informal "phonetic" layout. After some controversy and a public discussion in 2008, *the proposal was not accepted*,[106] although it had been already used in several places—the "Bulgarian Phonetic" layout in MS Windows Vista is based on it. There is a new "Bulgarian Phonetic" layout in MS Windows 7.[29]

Macedonian

The Macedonian keyboard layout is phonetic. The Latin letters that have a phonetic equivalent in Macedonian are used for the corresponding Cyrillic letters. The letters in the Macedonian alphabet and characters used in the Macedonian orthography that do not have any phonetic equivalent are Љ, Њ, Ѕ, Ш, Ѓ, Ж, Ч, Ќ, Ѝ, Ѐ.

Macedonian keyboard layout

Even though they are not part of the Macedonian alphabet, and are not used in the Macedonian language, the first Macedonian keyboard layout supported by Windows uses Alt Gr to type the glyphs Ћ and Ђ, where their capital forms are next to the small forms. This keyboard does not include the glyphs Ѝ and Ѐ.[29]

A new revised standard version of the layout was supported with Windows Vista. This version includes the glyphs Ѝ and Ѐ and uses Alt Gr to add an acute accent, which is not included in the original Macedonian layout.[29]

Russian

JCUKEN

See also: JCUKEN and Keyboard layout § JCUKEN (Latin)

> This section needs additional citations for verification. *(March 2016)*
> Learn more

The most common keyboard layout in modern Russia is the so-called *Windows* layout, which is the default Russian layout used in the MS Windows operating system. The layout was designed to be compatible with the hardware standard in many other countries, but introduced compromises to

accommodate the larger alphabet. The full stop and comma symbols share a key, requiring the shift key to be held to produce a comma, despite the high relative frequency of comma in the language.[53]

Russian Windows keyboard layout

There are some other Russian keyboard layouts in use: in particular, the traditional Russian Typewriter layout (punctuation symbols are placed on numerical keys, one needs to press Shift to enter numbers) and the Russian *DOS* layout (similar to the Russian Typewriter layout with common punctuation symbols on numerical keys, but numbers are entered without Shift). The Russian Typewriter layout can be found on many Russian typewriters produced before the 1990s, and it is the default Russian keyboard layout in the OpenSolaris operating system.[107][*better source needed*]

Keyboards in Russia always have Cyrillic letters on the keytops as well as Latin letters. Usually Cyrillic and Latin letters are labeled with different colors.

Russian QWERTY/QWERTZ-based phonetic layouts

The Russian phonetic keyboard layout (also called homophonic or transliterated) is widely used *outside* Russia, where normally there are no Russian letters drawn on keyboard buttons. This layout is made for typists who are more familiar with other layouts, like the common English QWERTY keyboard, and follows the Greek and Armenian layouts in placing most letters at the corresponding Latin letter locations. It is famous among both native speakers and people who use, teach, or are learning Russian, and is recommended—along with the Standard Layout—by the linguists, translators, teachers and students of AATSEEL.org. The earliest known implementation of the Cyrillic-to-QWERTY homophonic keyboard was by former AATSEEL officer Constance Curtin between 1972 and 1976, for the PLATO education system's Russian Language curriculum developed at the University of Illinois at Urbana-Champaign.[108] Curtin's design sought to map phonetically related Russian sounds to QWERTY keys, to map proximate phonetic and visual cues nearby one another, as well as to map unused positions in a mnemonically ideal way. Peter Zelchenko worked under Curtin at UIUC, and his later modifications to the number row for Windows and Macintosh keyboards follow Curtin's original design intent.[109]

Russian phonetic keyboard layout

There are several different Russian phonetic layouts, for example YaZhERT (яжерт), YaWERT (яверт), and YaShERT (яшерт) suggested by AATSEEL.org and called "Student" layout. They are named after the first several letters that take over the 'QWERTY' row on the Latin keyboard. They differ by where a few of the letters are placed. For example, some have Cyrillic 'В' (which is pronounced 'V') on the Latin 'W' key (after the German transliteration of В), while others have it on the Latin 'V' key.

There are also variations within these variations; for example the Mac OS X Phonetic Russian layout is YaShERT but differs in placement of ж and э.[110][111]

Windows 10 includes its own implementation of a mnemonic QWERTY-based input method for Russian, which does not fully rely on assigning a key to every Russian letter, but uses the sh, sc, ch, ya (ja), yu (ju), ye (je), yo (jo) combinations to input ш, щ, ч, я, ю, э, and ё respectively.

Virtual (on-screen) keyboards allow entering Cyrillic directly in a browser without activating the system layout.

Serbian (Cyrillic)

Apart from a set of characters common to most Cyrillic alphabets, the Serbian Cyrillic layout uses six additional special characters unique or nearly unique to the Serbian Cyrillic alphabet: Љ, Њ, Ћ, Ђ, Џ, and Ј. The Macedonian S is on this keyboard despite not being used in Serbian Cyrillic.

Serbian Cyrillic keyboard layout

Due to the bialphabetic nature of the language, actual physical keyboards with the Serbian Cyrillic layout printed on the keys are uncommon today. Typical keyboards sold in Serbian-speaking markets are marked with Serbian Latin characters and used with both the Latin (QWERTZ) and Cyrillic layout configured in the software. What makes the two layouts this readily interchangeable is that the non-alphabetic keys are identical between them, and alphabetic keys always correspond directly to their counterparts (except the Latin letters Q, W, X, and Y that have no Cyrillic equivalents, and the Cyrillic letters Љ, Њ and Џ whose Latin counterparts are digraphs LJ, NJ and DŽ). This also makes the Serbian Cyrillic layout a rare example of a non-Latin layout based on QWERTZ.

Ukrainian

Ukrainian keyboards, based on a slight modification of Russian Standard Layout, often also have the Russian Standard ("Windows") layout marked on them, making it easy to switch from one language to another. This keyboard layout had several problems, one of which was the omission of the letter Ґ, which does not exist in Russian. The other long-standing problem was the omission of the apostrophe, which is used in Ukrainian almost as commonly as in English (though with a different meaning), but which also does not exist in Russian. Both of these problems were resolved with the "improved Ukrainian" keyboard layout for Windows available with Vista and subsequent Windows versions.

Ukrainian keyboard layout

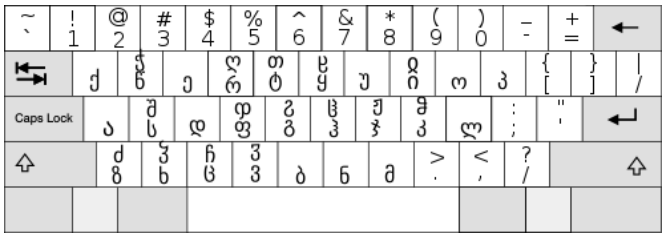
There also exists an adapted keyboard for Westerners learning Ukrainian (mostly in the diaspora) which closely matches the QWERTY keyboard, so that the letters either have the same sound or same shape, for example pressing the "v" on the Latin QWERTY produces the Cyrillic в (which makes roughly the same sound) and pressing the QWERTY "w" key gives the Cyrillic ш (based on the similar shape). This is usually called a homophonic or phonetic layout.

Georgian

Main article: Georgian keyboard layout

All keyboards in Georgia are fitted with both Latin and Georgian letters.[*dubious – discuss*] As with the Armenian, Greek, and phonetic Russian layouts, most Georgian letters are on the same keys as their Latin equivalents. During the Soviet era, the Georgian alphabet was adapted to the Russian JCUKEN layout, mainly for typewriters. Soviet computers did not support Georgian keyboards. After the dissolution of the Soviet Union a large variety of computers were introduced to post-Soviet

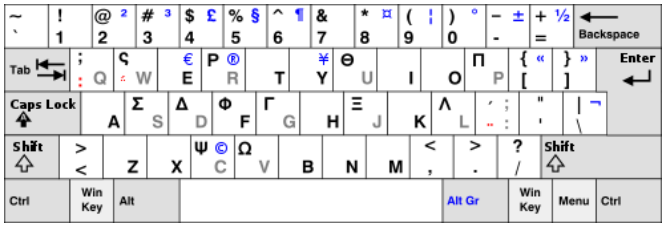
countries. The keyboards had QWERTY layout for Latin alphabet and JCUKEN for Cyrillic both printed on keys. Georgia started to adopt the QWERTY pattern. In both cases the letters which did not exist in the Cyrillic or Latin alphabets were substituted by letters that did not exist in Georgian alphabet. Today the most commonly used layout follows the QWERTY pattern with some changes.



Georgian keyboard

Greek

The usual Greek layout follows the US layout for letters related to Latin letters (ABDEHIKLMNOPRSTXYZ, ΑΒΔΕΗΙΚΛΜΝΟΠΡΣΤΧΥΖ, respectively), substitutes phonetically similar letters (Φ at F; Γ at G) and uses the remaining slots for the remaining Greek letters: Ξ at J; Ψ at C; Ω at V; Θ at U).



Greek keyboard layout in comparison to US layout

Greek has two fewer letters than English, but has two diacritic marks which, because of their frequency, are placed on the home row at the U.K. ";" position; they are dead keys. Word-final sigma has its own position as well, replacing W, and semicolon (which is used as a question mark in Greek) and colon move to the position of Q.

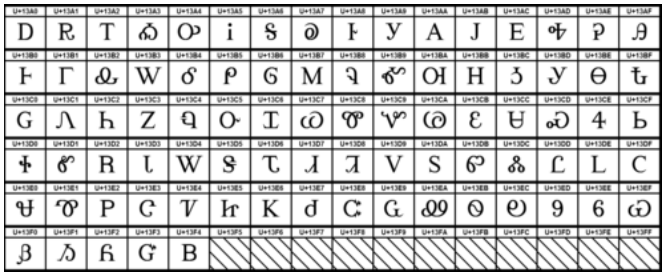
The **Greek Polytonic** layout has various dead keys to input the accented letters. There is also the **Greek 220** layout and the Greek **319** layout.[29]

Syllabic

Main article: Syllabary

Cherokee

The Cherokee language uses an 86-character syllabary. The keyboard is available for the iPhone and iPad and is supported by Google.[112]



East Asian languages

This section does not cite any sources. *(June 2013)*
Learn more

Further information: Input method editor, Chinese input methods for computers, Japanese input methods, Korean language and computers, and language input keys

The orthography used for Chinese, Japanese, and Korean ("CJK characters") require special input methods, due to the thousands of possible characters in these languages. Various methods have been invented to fit every possibility into a QWERTY keyboard, so East Asian keyboards are essentially the same as those in other countries. However, their input methods are considerably more complex, without one-to-one mappings between keys and characters.

In general, the range of possibilities is first narrowed down (often by entering the desired character's pronunciation). Then, if there remains more than one possibility, the desired ideogram is selected, either by typing the number before the character, or using a graphical menu to select it. The computer assists the typist by using heuristics to guess which character is most likely desired. Although this may seem painstaking, East Asian input methods are today sufficient in that, even for beginners, typing in these languages is only slightly slower than typing an alphabetic language like English (where each phoneme is represented by one grapheme).

In Japanese, the QWERTY-based JIS keyboard layout is used, and the pronunciation of each character is entered using various approximations to Hepburn romanization or Kunrei-shiki romanization. There are several kana-based typing methods. .

Of the three, Chinese has the most varied input options. Characters can either be entered by pronunciation (like Japanese and Hanja in Korean), or by structure. Most of the structural methods are very difficult to learn but extremely efficient for experienced typists, as there is no need to select characters from a menu.

There exist a variety of other, slower methods in which a character may be entered. If the pronunciation of a character is not known, the selection can be narrowed down by giving its component shapes, radicals, and stroke count. Also, many input systems include a "drawing pad" permitting "handwriting" of a character using a mouse. Finally, if the computer does not have CJK software installed, it may be possible to enter a character directly through its encoding number (e.g., Unicode).

In contrast to Chinese and Japanese, Korean is typed similarly to Western languages. There exist two major forms of keyboard layouts: Dubeolsik (두벌식), and Sebeolsik (세벌식). Dubeolsik, which shares its symbol layout with the QWERTY keyboard, is much more commonly used. While Korean consonants and vowels (*jamo*) are grouped together into syllabic grids when written, the script is essentially alphabetical, and therefore typing in Korean is quite simple for those who understand the Korean alphabet Hangul. Each *jamo* is assigned to a single key. As the user types letters, the computer automatically groups them into syllabic characters. Given a sequence of *jamo*, there is only one unambiguous way letters can be validly grouped into syllables, so the computer groups them together as the user types.

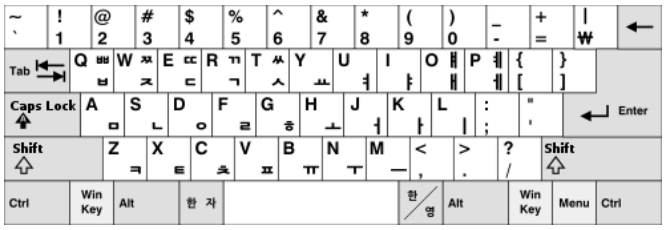
Hangul (for Korean)

> *See also: Korean language and computers, Hangul, and Korean language*

Pressing the Han/Eng (한/영) key once switches between Hangul as shown, and QWERTY (US layout). There is another key to the left of the space bar for Hanja (한자 or 漢字) input. If using an ordinary keyboard without the two extra keys, the right Alt key will become the Ha/En key, and the right Ctrl key will become the Hanja key. Apple Keyboards do not have the two extra keys.

Dubeolsik

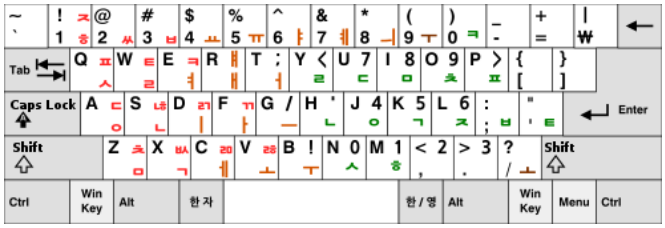
Dubeolsik (두벌식; 2-set) is by far the most common and the sole national standard of Hangul keyboard layout in use in South Korea since 1969. Consonants occupy the left side of the layout, while vowels are on the right.



Dubeolsik Hangul keyboard layout

Sebeolsik 390

Sebeolsik 390 (세벌식 390; 3-set 390) was released in 1990. It is based on Kong Byung Woo's earlier work. This layout is notable for its compatibility with the QWERTY layout; almost all QWERTY symbols that are not alphanumeric are available in Hangul mode. Numbers are placed in three rows. Syllable-initial consonants are on the right (shown green in the picture), and syllable-final consonants and consonant clusters are on the left (shown red). Some consonant clusters are not printed on the keyboard; the user has to press multiple consonant keys to input some consonant clusters, unlike Sebeolsik Final. It is more ergonomic than the dubeolsik, but is not in wide use.



Sebeolsik 390 Hangul keyboard layout

Sebeolsik Final

Sebeolsik Final (세벌식 최종; 3-set Final) is another Hangul keyboard layout in use in South Korea. It is the final Sebulsik layout designed by Kong Byung Woo, hence the name. Numbers are placed on two rows. Syllable-initial consonants are on the right, and syllable-final consonants and consonant clusters are on the left. Vowels are in the middle. All consonant clusters are available on the keyboard, unlike the Sebeolsik 390 which does not include all of them. It is more ergonomic than the dubeolsik, but is not in wide use.

Sebeolsik Final Hangul keyboard layout

Sebeolsik Noshift

Sebeolsik Noshift is a variant of sebeolsik which can be used without pressing the shift key. Its advantage is that people with disabilities who cannot press two keys at the same time will still be able to use it to type in Hangul.

Sebeolsik Noshift Hangul keyboard layout

Chinese

Further information: Chinese input methods for computers

Chinese keyboards are usually in US layout with/without Chinese input method labels printed on keys. Without an input method handler activated, these keyboards would simply respond to Latin characters as physically labelled, provided that the US keyboard layout is selected correctly in

the operating system. Most modern input methods allow input of both simplified and traditional characters, and will simply default to one or the other based on the locale setting.

People's Republic of China

Further information: Standard Chinese and Simplified Chinese characters

Keyboards used in the People's Republic of China are standard or slightly modified English US (QWERTY) ones without extra labelling, while various IMEs are employed to input Chinese characters. The most common IMEs are Hanyu pinyin-based, representing the pronunciation of characters using Latin letters. However, keyboards with labels for alternative structural input methods such as Wubi method can also be found, although those are usually very old products and are extremely rare, as of 2015.

Taiwan

Further information: Taiwanese Mandarin and Traditional Chinese characters

Chinese (Taiwan) keyboard layout, a US keyboard with Zhuyin, Cangjie, and Dayi key labels

Computers in Taiwan often use Zhuyin (bopomofo) style keyboards (US keyboards with bopomofo labels), many also with Cangjie method key labels, as Cangjie is a popular method for typing in traditional Chinese characters. The bopomofo style keyboards are in lexicographical order, top-to-bottom left-to-right. The codes of three input methods are typically printed on the Chinese (traditional) keyboard: Zhuyin (upper right); Cangjie (lower left); and Dayi (lower right).

Hong Kong and Macau

> This section needs additional citations for verification. *(January 2017)*
> Learn more

In Hong Kong, both Chinese (Taiwan) and US keyboards are found. Japanese keyboards are occasionally found, and UK keyboards are rare.

For Chinese input, Shape-based input methods such as Cangjie (pronounced *cong1 kit3* in Cantonese) or Chinese handwriting recognition are the most common input method. The use of phonetic-based input method is uncommon due to the lack of official standard for Cantonese romanisation and people in Hong Kong almost never learn any romanisation schemes in schools. An advantage of phonetic-based input method is that most Cantonese speakers are able to input Traditional Chinese characters with no particular training at all where they spell out the Cantonese sound of each character without tone marks, e.g. 'heung gong' for 香港 (Cantonese Yale: *Hēung góng*; Hong Kong) and to choose the characters from a list. However, Microsoft Windows, which is the most popular operating system used in desktops, does not provide any Cantonese phonetic input method, requiring users to find and install third-party input method software. Also, most people find the process of picking characters from a list being too slow due to homonyms so the Cangjie method is generally preferred.

Although thorough training and practice are required to use Cangjie, many Cantonese speakers have taken Cangjie input courses because of the fast typing speed availed by the input method. This

method is the fastest because it has the capability to fetch the exact, unambiguous Chinese character which the user has in mind to input, pinpointing to only one character in most cases. This is also the reason why no provision for an input of phonetic accent is needed to complement this Input Method. The Cangjie character feature is available on both Mac OS X and Windows. On Mac OS X, handwriting recognition input method is bundled with the OS.

Macau utilizes the same layouts as Hong Kong, with the addition of the Portuguese layout used in Portugal.

See also: British and American keyboards and Technical standards in Hong Kong

Malaysia and Singapore

In Malaysia and Singapore, US layout keyboards are found to input Chinese language.

Japanese

> This section does not cite any sources. *(February 2019)*
> Learn more

Further information: Japanese language and computers

Japanese (OADG 109A) keyboard layout with Hiragana keys

The JIS standard layout includes Japanese kana in addition to a QWERTY style layout. The shifted values of many keys (digits, together with :* ; + - =) are a legacy of bit-paired keyboards, dating to ASCII telex machines and terminals of the 1960s and 1970s.

Japanese Apple keyboard layout with Hiragana keys

For entering Japanese, the most common method is entering text phonetically, as romanized (transliterated) kana, which are then converted to kanji as appropriate by an input method editor. It is also possible to type kana directly, depending on the mode used. To type たかはし, "Takahashi", a Japanese name, one could type either T A K A H A S (H) I in Romanized (Rōmaji) input mode, or Q T F D in kana input mode. Then the user can proceed to the conversion step to convert the input into the appropriate kanji.

The extra keys in the bottom row (muhenkan, henkan, and the Hiragana/Katakana switch key), and the special keys in the leftmost column (the hankaku/zenkaku key at the upper left corner, and the eisū key at the Caps Lock position), control various aspects of the conversion process and select different modes of input.

The Oyayubi Shifuto (Thumb Shift) layout is based on kana input, but uses two modifying keys replacing the space bar. When a key is pressed simultaneously with one of the keys, it yields another letter. Letters with the "dakuten" diacritic are typed with the opposite side "thumb shift". Letters with "handakuten" are either typed while the conventional pinky-operated shift key is pressed (that

is, each key corresponds to a maximum of 4 letters), or, on the "NICOLA" variation, on a key which does not have a dakuten counterpart.

The H key in the QWERTY layout individually yields は, but with the 変換 (R Thumb Shift) key, yields み. Simultaneous input with 無変換 (L Thumb Shift) yields ば, which is the individually mapped letter with the aforementioned dakuten. While the pinky-operated ⇧ Shift key is pressed, the same key yields ぱ. (This same letter must be typed with 無変換 (L Thumb Shift) + Y on the NICOLA variant.)

The "Thumb-shift" layout. There are multiple legends and the two modifying keys. "シフト" means L/R Thumb Shift, "後退" means ← Backspace, "取消" means Delete, and "空白" means Space keys.

In Japan, 106-key Japanese keyboards and 101-key English (US layout) keyboards are usually found.