

# Mechanical-switch keyboards vs. membrane-keyboards

## Get a better “feel” on differences between the two!

**BY Jeffery Bausch**  
**Contributing Editor**

There are a variety of considerations that must be taken into account when purchasing a new keyboard, including price, performance, durability and more. To help simplify your decision, let's first break down all of the different keyboards out there into two main categories: the Mechanical-Switch Keyboard and Membrane-Based Keyboard.

### Mechanical-switch keyboards

These “clicky” keyboards are quite intricate and remarkably durable. They also offer a high degree of tactility and responsiveness. The one downside is because they're comprised of additional components, mechanical-switch keyboards are typically more expensive.

Each key has a switch below it. When the key is pushed down, the switch completes the circuit and notifies the computer of the keystroke command. There's an audible “click” when this happens and the key springs back into place. You only need to push the key down about halfway for the command to be activated, which is great for touch typists. Furthermore, the audible and tactile responses help improve typing speed and accuracy.

Mechanical-switch keys spring back consistently and quickly after being depressed, and their performance doesn't decline with age. They're resistant to debris and spills because the keyswitch mechanism is protected, sealed, or can otherwise be easily cleaned. The rate for a mechanical-switch keyboard is anywhere from 20 to 50 million strokes. If a key goes bad, the switch can be replaced, and the keyboard returned to normal operation.

There are several types of mechanical-switch keyboards, generally separated by the type of switch technology. Among them:

**Linear:** Offers no feedback, audible or tactile, of when the key has been activated, to provide the typist with constant force throughout.

**Light tactile:** Features a lower level of tactility and slight audible feedback – just enough to let the typist know that the keystroke has been activated.

**Tactile:** Presents normal level of tactility and audible feedback when keystroke is generated. They're popular because they provide conscious feedback, yet are still low in force.

**High audible:** As the name suggests, this type of keyboard provides a very loud “click” sound when the keystroke is activated, but without any increase in force.

High force/high audible: Features a buckling spring design where the typist needs to fully depress the key in order to activate the keystroke. There's a high level of tactility and audible feedback, but these benefits are now available in modern day mechanical-switch keyboards without the associated muscle fatigue that comes with using this mechanism.

### Membrane-based keyboards

The membrane-based keyboard is the most popular form of keyboard today. They are inexpensive because they are easy to manufacture and do not necessitate the aforementioned extra components found in mechanical-switch keyboards.

Keys assemblies, including key caps and in some cases, rubber domes, are positioned above a three-layer plastic membrane that spreads across the entire keyboard. When the typist pushes the key down, a conductive point on the top layer of the membrane pushes through a hole in the middle "buffer" layer to contact conductive material on the bottom layer. This creates a short circuit and generates the keystroke. When released, the key returns to its regular "up" position.

Membrane-based keyboards have a softer feel than their "clicky" counterparts. They're also less durable. Over time, keys will either lose their elasticity or otherwise become overly elastic (the rubber domes have the greatest impact on this occurrence). This creates a discrepancy on how much force is needed throughout the keyboard, which can slow down one's typing speed.

Change in the key's performance can be caused by a variety of factors, including built-up debris, rubber dome fatigue, manufacturing imperfections and ultraviolet radiation. The keys cannot be cleaned or repaired easily. As such, they're rated at approximately 10 million keystrokes, though performance can be affected after just a few months.

Of the many forms of membrane-based keyboards, there are three main styles:

**Full-travel:** Reliable and economical, this keyboard features a key assembly mounted above a three-layer membrane. When the key is pressed, the top film layer is pushed through a hole in the middle "separation" layer so that conductive material on the top material comes in contact with conductive material on the bottom layer. A short circuit is created and the keystroke registered.

**Scissor-switch:** Keys include a scissor-like mechanism below that link the keycap to a plunger. The plunger depresses a rubber dome when the key is touched, which helps reduce keystroke travel distance and also extends the lifespan of the membrane. Additionally, it makes the keyboard feel more solid than a regular, membrane-based keyboard. They're typically found on laptop computers and other desktop keyboards.

**Flat-panel:** There are three layers to the flat-panel membrane-based keyboard. The top layer is the key, with its labels printed on the front and conductive stripes on the back. Underneath is a space layer, which holds the top layer apart from the bottom layer. When

the typist touches the key, it pushes the conductive strips through the space layer and contacts conductive strips on the bottom layer. When the stripes touch, they form a perpendicular grid. When an intersection is created, the circuit is complete and the keystroke generated. There's not much tactile feedback so, to compensate for this shortcoming, some machines let out a "beep" or flash of light to indicate that the key has been touched (for example, on a touch-panel microwave oven).

### Summary

<b>Mechanical-Switch Keyboard</b>	<b>Membrane-Based Keyboard</b>
Expensive (each key has a switch)	Economical (one membrane = less parts)
Greater tactility *	Less tactility
Audible click when typing*	Quiet
20 to 50 million strokes	1 to 10 million strokes
*Does not apply to the "Light Tactile Mechanical-Switch Keyboard."	

Despite their durability shortcomings, membrane-based keyboards aptly serve the needs of the general user. Professional typists, on the other hand, might be more inclined to use mechanical-switch keyboards since they offer a better user experience, enhanced performance and have a significantly longer life expectancy. †