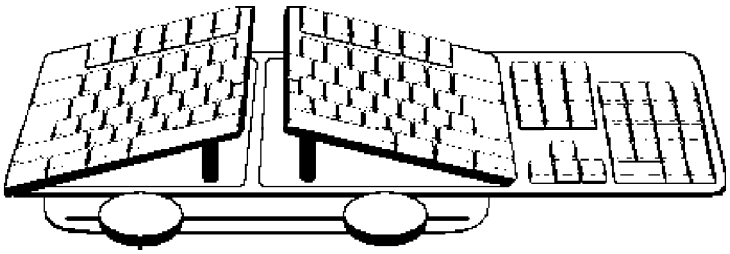
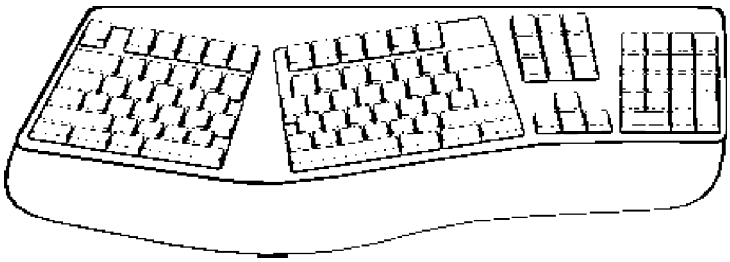
Alternative Keyboards





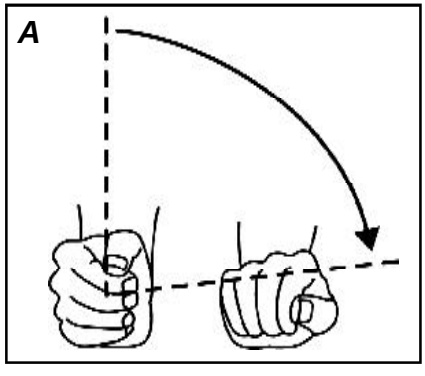
U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Centers for Disease Control and Prevention
National Institute for Occupational Safety and Health

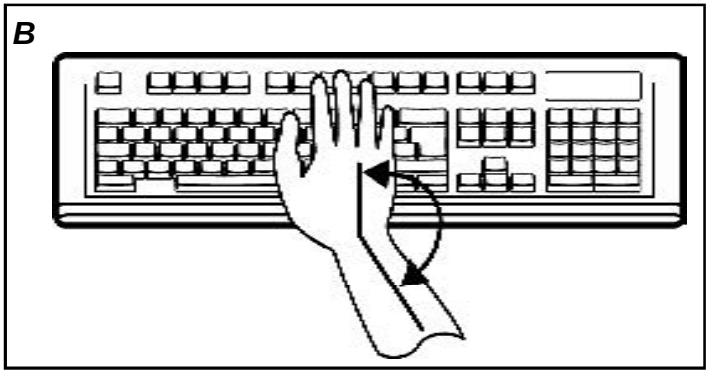
Purpose

To date, there is little information to assist people interested in purchasing alternative keyboards. While the scientific evidence about whether alternative keyboards prevent musculoskeletal disorders is inconclusive at this time, this document provides basic information about common alternative keyboard designs and their effects on work posture.

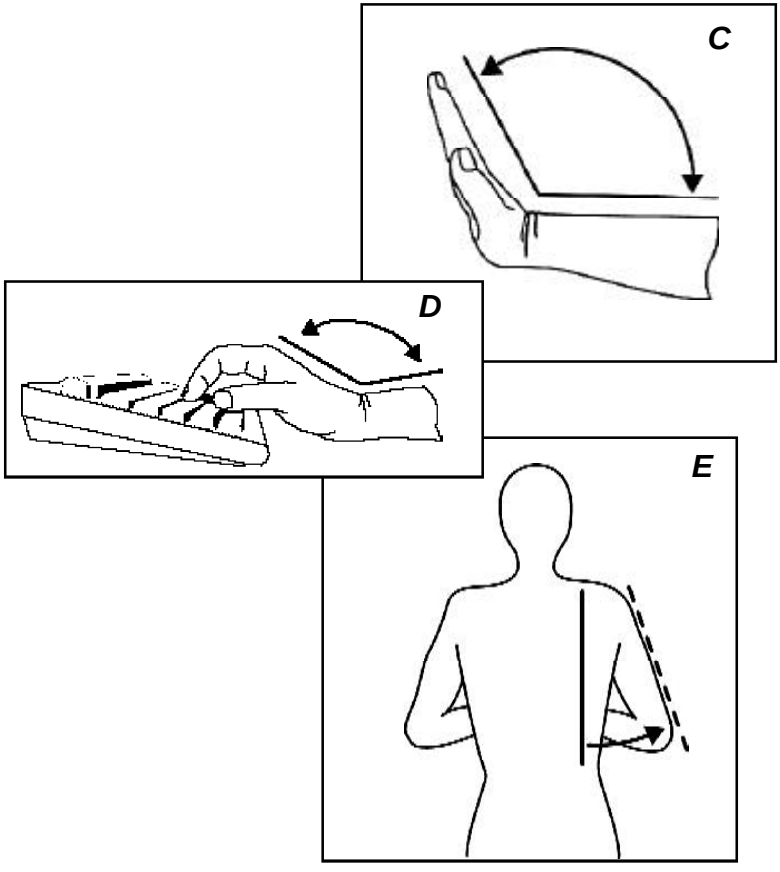
Why Redesign the Keyboard?

When typing, holding the hands and wrists in a neutral work posture--where the hands are extended straight without significant bending at the wrist-- is thought to reduce the risk of musculoskeletal problems. Computer users sometimes use awkward or non-neutral work postures when working on the traditional keyboard. They rotate their forearms so that





their palms are facing the keyboard (A), and they often bend their hands outward (B) and upward (C & D). Sometimes, workers also hold their elbows slightly away from their bodies (E) while keying, particularly when the keyboard surface is too high. Alternative keyboards can help keep wrists straight as shown on the following pages.

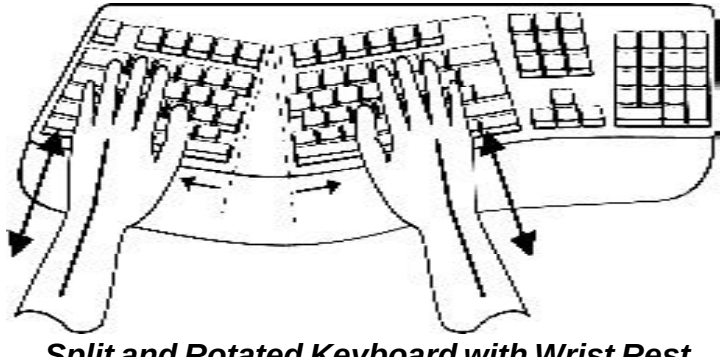


What's Different About Alternative Keyboards?

Alternative keyboards use different designs to attempt to change the user's posture. The following are some of the more common designs.

Split keyboards

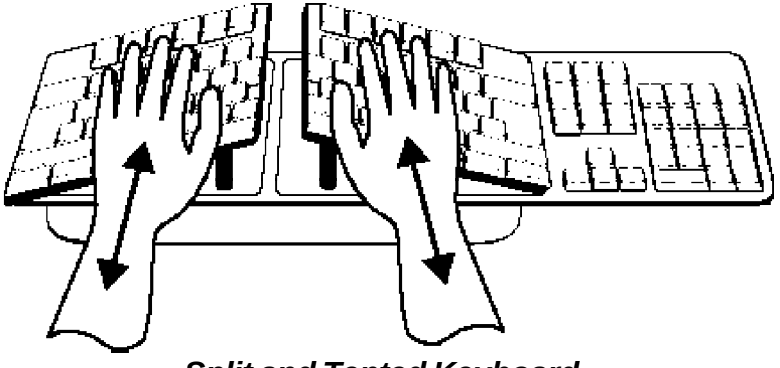
Split keyboards are designed to straighten the wrist. This can be done in two ways: by increasing the distance between the right and left sides of the keyboard or by rotating each half of the keyboard so that each half is aligned with the forearm. Some alternative keyboards combine these two methods.



Split and Rotated Keyboard with Wrist Rest

Tented keyboards

On tented keyboards, the two keyboard halves are tilted up like a tent. This feature is a variation of the split keyboard and reduces the rotation of the forearms.



Split and Tented Keyboard

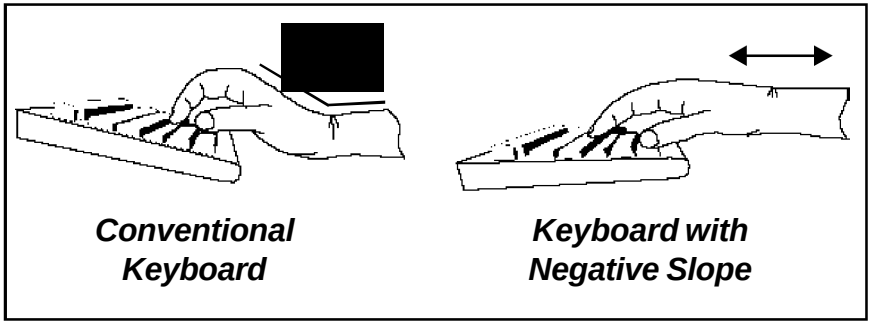
Built-in wrist or palm rests

Built-in wrist or palm rests help prevent bending the hands up by providing support that straightens the wrists. It should be noted that questions do remain about the usefulness of wrist or palm rests. For example, it is unclear whether they increase pressure on the wrists, relieve loads on shoulder and upper back muscles, or interfere with typing.

What's Different About Alternative Keyboards? (Continued)

Adjustable negative slope

Keyboards with a negative slope also help prevent bending the hand too far up by allowing the user to raise the front edge of the keyboard, or to slope the keyboard backward, thus straightening the wrist.



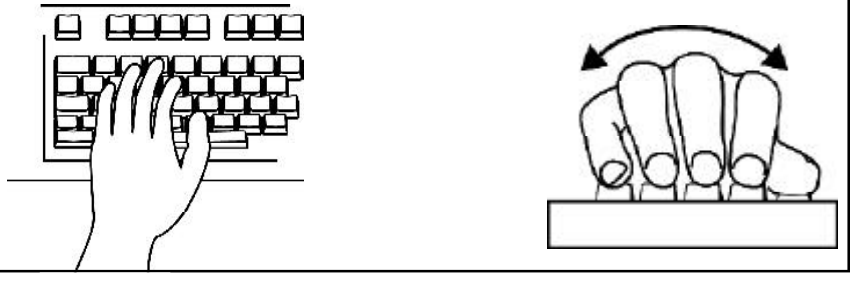
Conventional Keyboard

Keyboard with Negative Slope

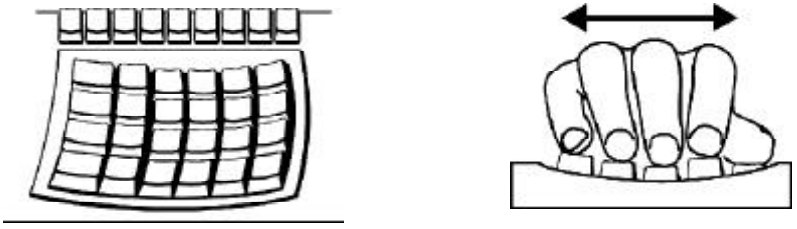
Key position

Some alternative keyboard designs have attempted to "fit" the different lengths of the fingers by curving the rows of keys or by placing the keys in concave wells. This is believed to allow the fingers to work in a more relaxed posture (see illustrations on next page).

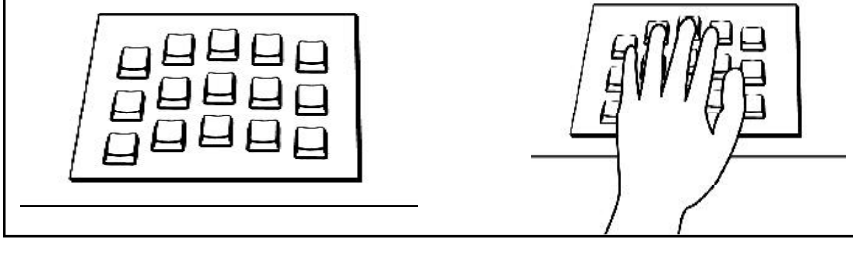
Straight Keyboard



Concave Well Keyboard



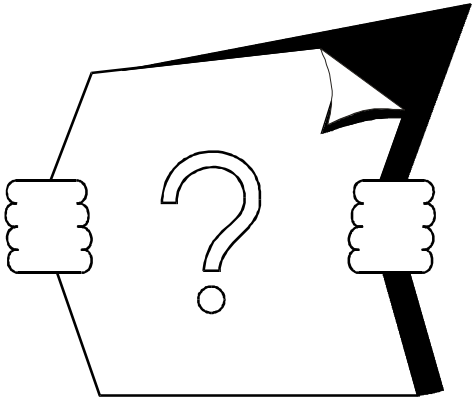
Curved Keyboard



Do Alternative Keyboards Prevent Injuries?

Alternative keyboards have been shown to promote neutral wrist posture. Yet, available research does not provide conclusive evidence that alternative keyboards reduce the risk of discomfort or injury.

Thus, further research is needed before specific keyboard features can be recommended with great confidence.



What if I Want to Use an Alternative Keyboard?

If alternative keyboards are to be used in the workplace, the following suggestions may be helpful in making purchasing decisions.

Determine whether the keyboard is compatible with existing hardware and software and whether the keyboard can accommodate other input devices, such as trackballs and mice.

Assess how the keyboard will fit with the workstation. Some alternative keyboards are extra wide, long, or high and may not fit on standard keyboard trays. Such keyboards may also prevent the tray from retracting under the work surface. Additionally, some alternative keyboards, particularly tented versions, must be placed on surfaces that are lower than those required for the conventional keyboard to achieve proper working posture.

Evaluate whether the keyboard will affect the performance of the user. Some alternative keyboard designs and adjustments make it difficult to see the

keys. This is particularly important for users who rely on key visibility, such as "hunt and peck" typists. Also, check whether the job requires use of the numeric keypad and specialized keys, because some alternative keyboards eliminate or reconfigure these keys.

Allow users to try a keyboard on a trial basis before buying it. It would seem reasonable to try the keyboard for at least one to two weeks, since studies show that this amount of time is necessary to adapt to alternative keyboards.

Alternative keyboards are like other office equipment, furniture or accessories. Preferences will vary and one type will not "fit" everyone or every type of task. Allow users to try a number of different alternative keyboards before making decisions about which ones to buy. If a user wants to retain his or her conventional keyboard, respect that decision.

Expect frustration until users become familiar with the new keyboards. Frustration frequently results from diminished productivity as workers get used to new equipment.

Involve a specialist in the decision-making process. This specialist should have both knowledge and experience in office ergonomics. If a computer user has discomfort or musculoskeletal symptoms, a health professional should also be involved in making the decision to purchase an alternative keyboard.

Integrate a new alternative keyboard into the work process carefully. Make sure that users are trained in the appropriate use of the product, since many alternative keyboards can be used incorrectly. If the keyboard is adjustable, encourage users to change the adjustments gradually from the conventional (flat) configuration.

What Can Be Done to Prevent Musculoskeletal Injuries?

A keyboard is only one part of a computer workstation setup that may influence comfort. Other important factors include: workstation and chair adjustability; placement of equipment, accessories, and work materials; lighting; and the design and organization of work tasks.

Because computer work is highly repetitive and promotes static postures, it can cause discomfort over long periods of time. It is important to break up long sessions of keyboard work with frequent rest breaks or with other tasks that require movements different from those used to type or operate the mouse.

Keep in mind that it is essential to examine the entire work environment to determine all possible causes of discomfort. In other words, it is unlikely that changing only one workplace element, such as a keyboard, will eliminate all discomfort and disorders.

In addition, each workplace should have a comprehensive ergonomics program in place to protect all workers.

Call NIOSH at

1-800-35-NIOSH

(1-800-356-4674)

or visit the NIOSH Homepage at

http://www.cdc.gov/niosh/homepage.html

to receive:

- **A bibliography** on alternative keyboard research.
- Information on **implementing an ergonomics program** (request *Elements of Ergonomics Programs: A Primer Based on Workplace Evaluations of Musculoskeletal Disorders* DHHS (NIOSH) Publication No. 97-117).
- **More information** on workplace safety and health issues.

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The National Institute for Occupational Safety and Health (NIOSH) is the Federal agency responsible for conducting research and making recommendations for the prevention of work-related disease and injury. The Institute is part of the Centers for Disease Control and Prevention.

DHHS (NIOSH) Publication No. 97-148