



Loss Control TIPS

Technical Information Paper Series

Innovative Safety and Health SolutionsSM

Evaluating Alternative Keyboards

Introduction

The proliferation of publicity on what are referred to as "ergonomic keyboards" has been astounding. Journals, newspapers, and sales brochures are marketing keyboards conforming to a variety of shapes and sizes. Some of the new keyboards assimilate what has come to be considered the "standard" keyboard layout. Others vary significantly from the conventional design. Some are even configured in sections which separate and move to allow individual adjustment. Another approach incorporates programmability into standard and ergonomic keyboards. We have begun to review some of the new products on the market, but have not yet found "the perfect keyboard." Each design meets a different combination of ergonomic criteria, and each one presents its own set of pros and cons. Use of the term "ergonomic", as it relates to keyboards (as well as other products) seems to have become a common marketing strategy. Perhaps the more appropriate terminology is "alternative keyboards" rather than "ergonomic keyboards."

Products with Split, Non-Adjustable Keypads

Several alternative keyboard designs feature split, non-adjustable keypads. The key layout mimics that of the standard keyboard but two main sections (one for the right hand, one for the left hand) are angled to encourage a straight, not deviated, wrist position. The Natural Keyboard by Microsoft features a curved base and wrist rest, and a hinged rail for height adjustability. The Ergo Kare Natural keyboard looks more angular and does not provide a wrist rest. The Fountain Hills System also provides "ports" on both the right and left sides of the keyboard offering a choice of numeric keypad location. The MyKey keyboard incorporates a trackball which is located centrally in the wrist rest portion of the product. The Marquardt-MiniErgo offers a detached optional numeric keypad. The separated keypad sections of the Kinesis Keyboard are concave to minimize finger stretching. Kinesis also offers an optional foot pedal for keystroke assignment and an optional numeric keypad is under development.

Products with Split, Adjustable Keypads

Other alternative keyboard designs feature split, adjustable keypads. The Apple Adjustable Keyboard is an articulating modular model with split left and right handed sections that swivel out and move horizontally. It also features detachable palm rests. Ergologic's tetrahedral design allows the user to reposition two keypad sections which are mounted on a single base. It also accommodates a non-adjustable numeric keypad on the right and removable, one-touch adjustable hand rests. The TONY! keyboard is hinged in the middle and allows the user to position the two keypad sections into a tent shape. The numeric keypad can also be adjusted. The Comfort Keyboard System also consists of three independently adjustable keypad sections mounted on a base.



Truly Innovative Designs

The most unusual keyboard designs vary significantly from the standard keyboard layout. The Data Hand System features two molded hand pods with magnetic switches clustered in three-dimensional "wells" around each finger. Typing is performed by moving the fingers very slightly in one of five directions (north, south, east, west, or straight down). The Bat is a chord keyboard that, according to its producers, does away with finger travel and helps prevent awkward pronation. It comes with a palm rest. The Twiddler is another chord keyboard, weighing just slightly over 3 ounces. It works with either left or right hands and the built-in mouse is manipulated by tipping the hand and tilting the keyboard.

How Valid Are Manufacturers' Claims?

Only a portion of the alternative keyboards currently in production are referenced above. As you can see, there is a range of similarity and differences. The cost of these products ranges widely as well (\$89.00 to \$2095.00) What is common to all of these new products is that they have been designed with the intention of improving the comfort of users. We can all readily accept and, in fact, we welcome design changes to improve comfort. However, some manufacturers profess that their keyboards provide relief to the many who "suffer through grueling keyboard aerobics" day after day. Some even go so far as to say that their keyboards will prevent keyboard related injuries. There is no doubt that, given the opportunity and choice, an individual operator may be more comfortable using a specific type of keyboard. But this will happen only when the design meets that users particular need(s). We must use caution and avoid considering keyboard design, or any product design, as an easy, perhaps generic, solution to a very complex problem.

The Role of the Keyboard in CTDs

Discomfort or symptoms of cumulative trauma disorders related to keyboard use are very likely caused by a combination of factors, including posture, workstation design, work practices, and how the workstation is used. The keyboard itself is only one component of a complex series of factors that may be responsible for exposure. Nevertheless, the potential role of the keyboard in the development of cumulative trauma disorders has been singled out in the many lawsuits that have been brought by injured users against manufacturers of keyboards and other computer equipment. The plaintiffs intend to show that the companies that manufacture conventional keyboards have known for many years that these keyboards are responsible for exposures that can lead to such disorders, that the manufacturers deliberately did not warn users of the danger, and that alternative keyboard designs existed that could have prevented users' injuries.

Can Alternative Keyboards "Fix" CTDs?

The implication of both the plaintiff's position and of some manufacturers is that alternative keyboard designs, specifically those referred to as "ergonomics keyboards", will "fix" the CTD-related problems caused by traditional keyboards. This implication is misleading and inaccurate. Little data exists to support the use of alternative keyboards as a means to correct physiological problems. In fact, keyboard risk factors are not clearly understood, and even the experts cannot, with certainty and specificity, make a direct and indisputable connection between keyboard and injury. Even so, some manufacturers have decided to put warning labels on keyboards to ward off product liability lawsuits. Compaq Computer Corporation will put warning labels on computer keyboards, directing users to read a safety guide with tips on avoiding hand and wrist injuries. Microsoft will place warning labels on a specially designed keyboard that has just been introduced. There continues to be much controversy on the subject and other manufacturers, including IBM, have no plans for warning labels.

Keyboards Are Only One Part of the VDT System

It is clear that the visual display terminal workstation must be considered as a system. In order to prevent and to eliminate exposures known to cause cumulative trauma disorders, many job related factors must be studied, including furniture, equipment (keyboards included), workstation design, the general work environment, work organization and practices, and performance pressures. More definitive research is necessary to determine the true effect of the new keyboard designs.

Full Workstation Assessments Needed

In the meantime, a full workstation assessment is the best tool to identify risk factors and exposures. Alternative keyboards may be an effective solution in select situations and can be considered in the problem solving process. As with all "ergonomic accessories," the need must be determined through the individual workstation assessment process. Subsequently, the implementation of the solution must be carefully monitored for effectiveness.

Information on at least twenty alternative keyboards is being gathered into a database. The manufacturer/source, features, compatibility, and cost are documented for each keyboard. This information will be available from Judy Sehnal (Home Office Loss Control, x6766).

Other Areas of Concern

While keyboards have been implicated in playing a role in the development of cumulative disorders, they cannot be held exclusively responsible for another reason. Other devices are gaining ground as primary input tools. The mouse is probably our biggest concern right now, however trackballs, pens, and voice activation are also in the picture. It is encouraging to know that we have a variety of tools that can be employed as alternatives when needed. But further study on how these tools are used and their potential impact on the health and safety of users is necessary. Look for more information on alternative input devices in a future issue of this publication.

References

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Meier, Christine. "Keyboard Design Examined". *Job Safety and Health* No. 433, July 5, 1994, pp.1-2. (Originally published under the title "Alternative Keyboards Lessen Cumulative Trauma Risk" in Clayton Environmental Consultants Inc. *Technical Newsletter*, May 1994.)

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