

Some Thoughts on Laptop Computers

The term *laptop computer* refers to a portable computer about the size of a notebook or slightly smaller. Newer models weigh as little as 2.5 lbs, about 3 - 7 lbs is more typical. Low-end units may be purchased for as little as \$1,200. Prices for more versatile machines with active matrix liquid crystal displays start at about \$1,900. High-end units may sell for \$3,500 or more.

Ergonomic Issues

Designers of portable computers (including laptop computers) often strive to make these devices as small and light in weight as possible. This may adversely affect ergonomics and user productivity. While some progress has been made in resolving these conflicts, much work still remains to be done.

Displays

Liquid crystal displays (LCDs) for laptop computers have been significantly improved in the past few years. The quality of the images displayed on newer active matrix LCDs is nearly as good as those displayed on CRTs. Some people actually prefer active matrix LCDs because image contrast is usually higher.

Image quality for the less expensive dual-scan passive LCDs found on low-end laptop computers is usually poor. Laptop computers with passive LCDs cannot be recommended for any applications where productivity or image quality is important.

The viewing distance for a laptop computer's display is determined to a large extent by the computer's design because the display cannot be detached from the base. Although the viewing angle can be varied, the range of adjustment may be small if optimum image quality is to be maintained.

Keyboards

Keyboards for laptop computers are noticeably inferior to keyboards for desktop computers. This is due primarily to their compact design and force/ displacement relationship for the keys (key feel and key travel). Other factors that may reduce the



usability of a laptop computer keyboard include the physical relationship between the keyboard and palmrest, lack of a tilt mechanism, and placement of the pointing device. Attempts to address these problems have not been very successful. One vendor briefly offered a full-size keyboard that deploys when the computer is opened. Another offered a split keyboard (sometimes referred to as an *ergonomic keyboard*). Although both keyboards are easier to use than traditional laptop keyboards, neither is currently available.

Since keyboards for laptop computers are not likely to improve very much in the near future, owners should consider attaching a standard computer keyboard whenever the laptop unit is to be used in an office or other location for a prolonged period. This includes extended business trips where the computer will be used at one location. A standard computer keyboard can be purchased for a little as \$15.

Pointing Devices

The most popular pointing devices for laptop computers are eraser-size isometric joysticks (sometimes referred to as *trackpoints*) and touchpads (sometimes referred to as *trackpads*). The usability of these devices depends to a large extent on the driver software. Productivity decrements are typically 30% or more when compared with a mouse. The best solution to this problem is to use a mouse and mouse pad whenever a suitable table or desk is available. A good mouse can be purchased for about \$30.

Hot Surfaces

The bottom surface of a laptop computer (and sometimes the bezel of its display) may become hot when the computer has been used continuously for an hour or more. In extreme cases, the heat is sufficient to melt some types of plastic. The surface temperatures depend upon the placement of the heat producing components within the base and display enclosures and the design of those enclosures (including materials). Take steps to avoid touching any very hot surfaces.

Do not be too concerned about floppy diskettes that feel warm or even hot after being ejected. They will not be damaged.





Biomechanical Stress

Using laptop computers may be stressful. Discomfort and visual fatigue are common when these computers are not used sensibly. The potential for injury, however, is low.

The most common stress-related problems are associated with the use of a laptop computer that is on a surface that is too high, too close to the user, or too far away. Good posture is the key to achieving comfort. Visual discomfort may be minimized by using a laptop computer with an active matrix LCD, appropriately adjusting the viewing angle for the display, and eliminating glare.

A carrying case is recommended when carrying a laptop computer for any significant distance. If a carrying case is not used, the computer should be carried under the arm with a hook grip rather than at the side with a pinch grip.

Other Issues

Several other issues are discussed in the next three sections -- carrying cases, anti-theft strategies, and data security.

Carrying Cases

A carrying case makes it easier to transport a laptop computer and its accessories. The case should have a sufficient number of compartments to carry all of the accessories that will be needed. The handle should be at least five inches in length with sufficient clearance for the hand when the user is wearing heavy winter gloves. The case must be well padded to protect the computer if it is accidentally dropped.

Anti-Theft Strategies

About 350,000 laptop computers were stolen during 1998. Most were stolen from offices or while unattended at airports. Owners may reduce the likelihood of theft in a number of ways including the following:

- Use an anti-theft device for laptop computers. These devices include stainless steel cables with locks and locking cradles. The former may be used to attach a





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