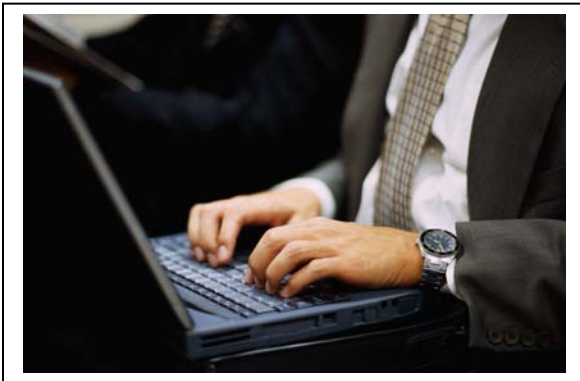


A fact sheet prepared by the Ergonomic Committee of the National Telecommunications Safety Panel



For many computer users, the laptop has replaced the traditional desktop personal computer due to its compact design and ease of portability. However, the very characteristics and benefits that make a laptop so convenient can also create certain limitations. These limitations may result in worker discomfort especially when the application of ergonomic principles and external peripheral equipment are missing.

The very characteristics and benefits that make a laptop so convenient also make it difficult use. The amount of time spent using a laptop as well as the environment, varies widely depending on the individual and his or her job responsibilities. Laptops present some additional, unique challenges and those will be the focus of this fact sheet.

## What are the Risk Factors?

### Awkward Posture

Users are unable to position the laptop's monitor, keyboard and mouse independently. Therefore, achieving the correct arm/hand position can result in poor neck posture and vice versa.

Attempting to use the laptop in cramped spaces such as mobile offices or airplanes may result in discomfort due to the muscles and joints of the upper extremity being in awkward postures for extended periods of time.

Sitting on surfaces that are inappropriate for computer use such as a bench, stool, in bed or on the floor for prolonged periods of time may lead to discomfort due to awkward posture.

### Force

The smaller keyboard design and integrated input device (a touch pad, trackball, pointer or some type of mouse)

may force the user to type in a more constricted manner. This position creates the possibility for the muscles of the hand to be continuously contracted.

The laptop's integrated input device may require more effort than the traditional external mouse which may result in more hand and finger tension.

### Repetition

The design, size, configuration and sensitivity of the integrated keyboard and input device typically require more movements to complete the same task than would otherwise be necessary on a traditional desktop computer.

### Contact Pressure

Allowing the palm, wrist and underside of the forearm to come into contact with either the front edge of the laptop or the work surface while typing or mousing has the potential to compress soft tissues in the forearm. The soft tissues and nerves of the forearm, hand and wrist can come into contact with either the hard front edge of the laptop.

Utilizing chairs with improper lumbar support, seat depth and seat height, may result in lower back pain or compression of the soft tissues in the back of the leg or underside of the knee.

### Lifting/Carrying

Repeated lifting and carrying of the laptop and all of its components from one place to another in shoulder bags or backpacks can contribute to uneven loading and force on the spine and compressive force on the shoulder from straps.

### Eyestrain

It can be difficult to find the correct distance for the monitor because the screen is in a fixed position relative to the keyboard.

### What are recommended short term strategies to address these Risk Factors?

It can be difficult to develop a good work posture when working in a remote location such as a car or hotel. It's important to monitor yourself for signs and symptoms of Cumulative Trauma Disorders. For more information about signs and symptoms go to <http://www.osha.gov/>.

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## When traveling or away from the office, utilize the following strategies:

- Use a pillow, folded blanket or towel to raise the seat high enough so that your elbows are bent at about 90 degrees and hands and wrists are in a neutral posture. If the chair is not high enough or the work surface is not low enough, place the laptop on your lap, but make sure your knees are level with your hips.
- Reduce pressure on your neck by tucking in your chin to view the monitor rather than bending your neck down. If possible, lower your eyes instead of bending your head forward to see the screen.
- Make sure the screen is adjusted to minimize glare.
- Take frequent mini breaks and change your work posture often. For example, place the laptop in your lap to achieve better wrist position for approximately 30 minutes. Then, switch and place the laptop on a table to achieve better neck position.
- The arm support and padding of work surfaces is also important when working at a table or desk with hard leading edges. Use a pillow or folded towel as a wrist rest or arm support while typing.
- If seated in a chair that does not provide adequate lumbar support, use a rolled up towel or small pillow as a lumbar support device.
- Reduce the weight of the laptop bag as much as possible by ensuring only the most needed items are included. Ensure the shoulder straps and handles have adequate padding. Switch shoulders and hands often while carrying the laptop bag or try using a backpack or other bag which has two straps or wheels.
- If using a laptop as the primary computer in a traditional office environment, the external peripherals outlined in long term strategies are strongly recommended.
- Ergonomic exercises can be helpful for end users. See the NTSP Ergonomic Guidelines for more detailed information on Exercises.  
<http://www.telsafe.org/ntsp/publications>

## What are recommended long term strategies to address these Risks Factors?

Consider obtaining a rolling carrying case for transporting the computer from place to place. If a laptop is only used for checking email while traveling, consider obtaining a wireless PDA. It's much lighter and easier to carry.

It is strongly recommended that a process be established to provide workers that use a lap top as their primary computer with the following peripheral equipment:

**External keyboard:** If using a laptop as your primary computer in a fixed work location, a full-size keyboard is recommended.

**External mouse:** Installing a mouse that is separate from the internal input device provided with your laptop will help increase adjustability and comfort. Mice are small and light enough that they can be carried in the laptop case when traveling.

**Docking station:** A docking station is equipped with enough ports to allow a user to add an external keyboard, mouse and monitor quickly and easily. In this scenario, the laptop merely acts as the CPU and the added peripherals allow the user to adjust all three components independently to the correct height and distance. This is the optimum set-up for those using a laptop as their primary computer at a fixed work location.

### Laptop stand:

A laptop stand, when used in combination with an external keyboard and mouse, allows the monitor to be positioned at the correct height. Many of these devices are actually height adjustable and provide tilt and swivel capabilities, and some are compact enough to take on the road.



For additional resources, see the NTSP Ergonomic Guidelines at <http://www.telsafe.org/ntsp/Publications>