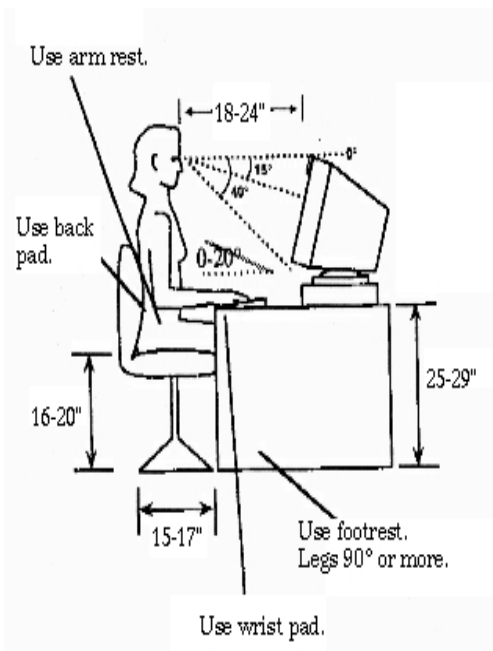


Tulane University's Office of Environmental Health & Safety

RECOMMENDATIONS FOR LAPTOP WORKSTATIONS

Laptops are increasingly being used as alternatives to desktop computers at workstations. Laptop users who enjoy the convenience of this smaller, portable computer technology should be aware, however, that laptop design is not as yet ergonomically sound; that the exchange for convenience can be poor neck/head, hand/wrist posture which may result in stress and/ or injury to the body. The good news is that there are ways to compensate for these shortcomings and reach the goal of any computer workstation: to provide a work environment that supports a neutral body posture that protects neck, back, wrist, and eyes from undue stress or strain. The **Centers for Disease Control**, for instance, has recommended that a *laptop not be used as a primary computer unless the user can maintain a neutral posture.*



Workstations for Full-Time Laptop Users

Recommendations for setting up a workstation for a full-time laptop user are much the same as those for a desktop computer workstation and include most components of a workstation environment such as chair, monitor, keyboard, mouse, lighting, etc.

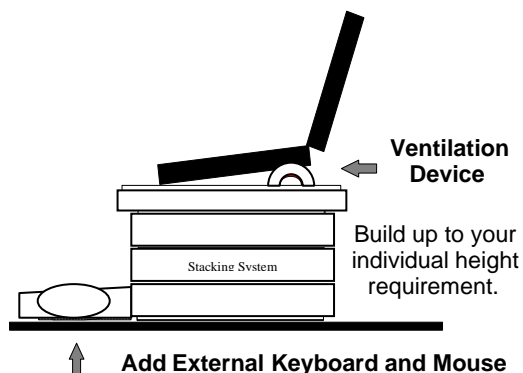
Chair

The "chair back" should provide lumbar support and should be fully adjustable to positions that support the lower back by following the natural curvature of the spine. The "chair seat" should be adjustable from a seated position and raised or lowered to achieve the proper position of arms and legs (see illustration, left). Armrest support is beneficial if an *exterior* keyboard is used. If the laptop keyboard is used, a chair *without* armrests provides more flexibility. Feet should be on the floor, or a foot rest should be used if seat adjustments make this impossible.

Monitor

The monitor should be placed directly before the user. The viewing screen should be at or

just below eye level, approximately 18" to 24" from user's face, and should be positioned to a 10 to 20 degree tilt back unless the angle causes glare. If glare is a problem, an anti-glare filter over the viewing screen can be helpful. To obtain optimal viewing comfort and to reduce neck strain, consider using a desktop (stationary) monitor in place of the laptop screen. If you use the laptop screen, add a stand or stacking system to elevate the screen for optimal viewing. **Warning:** Because laptop bases get hot, make certain the platform surface on which the laptop sits has a ventilation system, or you may simply use something from your desk (pencil erasers for example) to elevate the back of the laptop, creating an air space (see illustration, above right). Finally, a document holder placed at the same distance and height as the viewing screen will also help reduce eye and neck strain.



Keyboard and Mouse

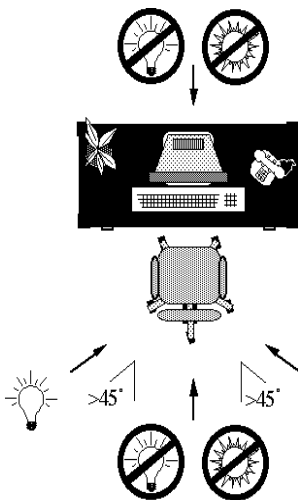
The laptop keyboard and screen create a *fixed design* that does not allow for separate adjustment: bringing the screen up to an optimal viewing height throws off proper keyboard placement, while proper placement of the keyboard throws off optimal screen height. Full-time laptop users especially should consider adding an external keyboard and mouse to their laptop stations to avoid injuries in the upper body extremities. Both items can be connected directly to the laptop or to a docking station. The keyboard should be positioned directly in front and close to your body to avoid over extended reaching. It should be placed approximately at elbow height so that your shoulders can relax and arms can rest at your sides. Arms should be at an 80° to 100° angle with the upper arm almost vertical. The mouse should be adjacent to the keyboard at the same height. The back of the wrist should be kept flat (in a neutral position) when using either the keyboard or the mouse.

Lighting

When lighting in the office is generally too bright for comfortable VDT screen viewing, you may consider lowering the general room lighting level and using a properly placed task light. Position the work area so that light sources such as windows are perpendicular to the monitor rather than directly behind or facing the monitor. If necessary, use shades or blinds to reduce the intensity of direct sunlight, and consider adding an anti-glare filter over the viewing screen.

Telephone

If your job requires heavy phone use, minimize neck strain by using a headset and shoulder rest. If possible, have the supplier provide you with several selections to try before purchase. Make certain that you are shown how to properly use and adjust the equipment chosen.



LAPTOP USERS - DON'T FORGET TO TAKE TASK BREAKS!! In depth information on ergonomic computer workstation set up can be found at the following websites: the **Occupational Safety and**

Health Administration (OSHA) at osha.gov/SLTC/computerworkstations_index.html, the ***Centers for Disease Control** website at cdc.gov/od/ohs/Ergonomics/compergo.htm, and the website for **Cornell University** at ergo.human.cornell.edu/culaptoptips.html. The lighting graphic on this page showing the complete workstation set up was provided by the University Information Technology Services at **Indiana University, indiana.edu**.

CONTINUE ON BACK



Workstations for Occasional Laptop Users

Occasional users should follow the same criteria as full-time users for monitor, keyboard and mouse. The chair should be comfortable and permit a neutral position of the spine. Occasional users should avoid the temptation to use stools, couches, or the like at their laptop stations. Have a document holder and footrest available for use when needed. (For further information, refer to websites listed on the reverse side of this page.)

Stations for Mobile Laptop Users

Mobile users should do what they can to simulate the criteria for obtaining a neutral body position and arm placement. Use a pillow, pad or folded towel to raise your chair high enough so that your elbows are level or slightly higher than the keyboard (see illustration on reverse side). Many hotels are computer user friendly and may have docking stations with additional keyboards and mice available. Make a point to find out what the hotel or conference sponsors have available for laptop users.

If you must use your lap, try to ensure that your knees and hips remain at the same level. To protect your neck, tuck your chin in as opposed to bending your entire neck down causing neck and shoulder strain. If the laptop is used frequently in the field, you may consider using a recorder or a handheld computer in place of the laptop to avoid the repetitive motion disorders associated with prolonged keying. (For further information, refer to websites listed on the reverse side of this page.)

Laptop Accessories

The following accessories and tips are recommended for laptop users who are interested in further reducing strain and trauma to the body while providing ergonomically designed tools to complete computer tasks.

Carrying Case with Wheels - A laptop carrying case should be constructed of lightweight materials to minimize total weight while being carried. It should also have an optional set of wheels and adjustable handle for longer hauls. Even if the case is being pulled, weight should be taken into consideration in packing. The rule of thumb is **ONLY CARRY WHAT YOU NEED**. For back protection while lifting, bend the knees and lift the case holding it close to your body, then bend your knees to lower or load it. If carrying the case, make adjustments to the straps that will allow you to stand and walk with correct posture. When pulling the case, adjust the handle to a length that will not compromise good posture.



Laptop Stand - To avoid neck and eye strain, laptops generally have to be elevated with a stand or stacking system. Make certain that there is ventilation between the platform surface of the stand or stacking system and the laptop (see illustration on the front page). There are a good variety of stands for laptop users, including portable stands for mobile users. Try several models before making your final choice.

External Monitor, Keyboard, and Mouse - The traditional monitor provides better viewing and can be connected directly to the laptop, or, preferably, to a docking station to avoid reattaching the monitor to the laptop for each use. The traditional keyboard and mouse provide better arm alignment and movement than does the stationary design of a laptop. There are a variety of portable keyboards available including cordless models. To defray costs, however, consider recycling components (monitors, keyboards, and mice) from desktop models that were used on older computers.



Docking Station - Docking stations provide connections for standard-size components such as keyboards, monitors, and mice. Arriving at your workstation, you can simply plug your laptop into the docking station and it's ready to interface with the components already plugged in. With a docking station, you have the ergonomic advantages of full-sized components (keyboard, monitor, mouse) while preserving the laptop's portability--when you're ready to leave, disconnect and go.



Document Holder - A variety of document holders are available in portable models or models that attach to a computer unit. Mobile users should make certain that they purchase a light weight holder that can be packed and made readily available.



Anti-Glare Filter - Workstation monitors should be positioned so that light sources such as windows are perpendicular to the monitor rather than directly behind or facing the monitor. If necessary apply an anti-glare filter.

Rest Pads - Rest pads include foot rests, keyboard wrist rests, mouse wrist rests, phone shoulder/neck rest pads, etc. These rest pads are particularly important for users who are at their computers for extended periods.

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Updated 6/09