



Ergonomics is the study of the relationship between us and our work area, equipment or tasks. More importantly ergonomic guidelines can assist us in avoiding injuries to the upper extremities, back and other parts of the body.

Computer Workstations

1. Work Area

The work area should be large enough to accommodate you, allow the full range of motions involved in performing required tasks, and provide room for the equipment and materials that make up the workstation.

- Use a headset for lengthy or frequent telephone work.
- Place the items you use most frequently directly in front of you.
- Avoid overcrowding computer work areas.

2. Desk/Work-Stations

Standard furniture cannot accommodate everyone's needs. A taller person may need a one-time adjustment to have his or her work surface raised somewhat; a shorter person may need a footrest or other accessories. Adjustable furniture may be needed in situations where people share or use the same workstation.

- The desktop should be organized so that frequently used objects are close to the user to avoid excessive extended reaching.
- The work surface should have a matte finish to minimize glare or reflections.
- The area underneath the desk should always be clean and uncluttered to accommodate the user's legs and allow for stretching.
- If a fixed-height desk is used, add a keyboard tray that adjusts vertically to provide added adjustability.
- A footrest should be used if, after adjusting the height of the chair, feet do not rest flat on the floor.
- Use a headset or speaker phone to avoid neck and shoulder discomfort if you use a phone frequently throughout the day.
- Place the phone on the side of your non-dominant hand (i.e., left side if right-handed, right side if left-handed)
- Position your desk lamp (if you use one) so that it illuminates source documents without causing either glare on the computer screen or direct illumination to your eyes.
- A document holder should be used if documents are referred to during keying. The document holder should:
 - Be stable and adjustable (height, position, distance, and angle of view).
 - Support your document on either side of the monitor.



- Be at the same distance from your eyes as the display screen to avoid frequent changes of focus and you should be able you to look from one to the other without moving your neck or back.

3. Chair Adjustments

Contrary to popular belief, sitting, which most people believe is relaxing, is hard on the back. Sitting for long periods of time can cause increased pressure on the inter-vertebral discs (the spongy discs between the vertebrae). Sitting is also hard on the feet and legs. Gravity tends to pool blood in the legs and feet and create a sluggish return to the heart.

The following recommendations can help increase comfort for computer users:

- "Dynamic sitting", don't stay in one static position for extended periods of time.
- When performing daily tasks, alternate between sitting and standing or take small walking breaks throughout the day.
- The chair back should have a lumbar support
- Adjust height of backrest to support the natural inward curve of the lower back.
- It may be useful to use a rolled towel, lumbar roll or cushion to support the low back.
- The angle of the back rest is subjective but the trunk and upper legs should form an angle between 90 to 115 degrees.
- Adjust height of chair so feet rest flat on floor
 - Sit upright in the chair with the low back against the backrest and the shoulders touching the backrest.
 - Thighs should be parallel to the floor and knees at about the same level as the hips.
 - Back of knees should not come in direct contact with the edge of the seat pan. There should be 2-4 inches between the edge of the seat and the back of the knee
- Arm rests should be removable and the distance between the arm rests should be adjustable.
 - Adjust height and/or width of armrests so they allow the user to rest arms at their sides and relax/drop their shoulders while keyboarding.
 - Don't use armrests to slouch. Also, chair arms should not noticeably elevate your shoulders or force you to move your arms away from your body to use them.
 - Elbows and lower arms should rest lightly on armrests so as not to cause circulatory or nerve problems.
- Use a footrest when attempts to adjust your chair and the rest of the workstation fail to keep your feet on the ground.
- Ensure that you have some space (2-3") between the top of your thighs and the underside of your workstation.
- Have enough space under your work surface so that you can pull yourself all the way up to the edge of the desk with room for your legs and knees to fit comfortably



4. Monitor

Once the chair and work surface height are properly adjusted, the computer monitor should be placed so the top of the screen is at or just below eye level when seated in an upright position. The following suggestions can help prevent the development of eye strain, neck pain and shoulder fatigue while using your computer workstation:

- Make sure the surface of the viewing screen is clean.
- Adjust brightness and contrast to optimum comfort.
- Position the monitor directly in front of the user to avoid excessive twisting of the neck.
- User must position the monitor at a comfortable viewing distance, approximately 18-30 inches from the user.
- Position monitors at right angles from windows to reduce glare. Close window blinds as needed to reduce glare from sunlight.
- Position monitors away from direct lighting which creates excessive glare or use a glare filter over the monitor to reduce glare.
- Adjust the monitor tilt so that ceiling lights do not reflect on your screen.
- If a document holder is used, it should be placed at approximately the same height as the monitor and at the same distance from the eyes to prevent frequent eye shifts between the monitor screen and reference materials.
- Get regular eye check-ups.
- Adjust as needed for larger screens. You may need to sit farther away and increase the font size to take full advantage of the larger screen.

Bifocal and trifocal wearers have to pay particular attention to the placement of their monitor. Wearers of bifocals and trifocals often unknowingly tilt their heads backwards so they can read the screen through the lower portion of their glasses. This can sometimes lead to neck, shoulder, and back discomfort. Potential solutions include either lowering the computer monitor or purchasing glasses designed specifically for working at the computer.

5. Keyboard

Many ergonomic problems associated with computer workstations occur in the shoulder, elbow, forearm, wrist, and hand. Continuous work on the computer may expose soft tissues in these areas to repetition, awkward postures, and forceful exertions, especially if the workstation is not set up properly.

The following adjustments should be made to your workstation to help prevent the development of an ergonomic problem in the upper extremities:

- First adjust your chair as mentioned above, then with your arms resting comfortably at your side, raise your forearms to form a 90 degree angle with your upper arms.



- Adjust keyboard height so shoulders can relax and allow arms to rest at sides. An articulating keyboard tray is often necessary to accommodate proper height and distance.
- Position the keyboard directly in front and close to the user to avoid excessive extended reaching.
- Forearms should be parallel to the floor (approximately 90 degree angle at elbow).
- Mouse should be placed adjacent to keyboard and at the same height as the keyboard. Avoid extended and elevated reaching for keyboard and mouse. The back of the wrist should be kept flat (in a neutral position). Do not rest the hand on the mouse when not using it. Rest hands in your lap when not entering data.
- A padded wrist rest will help to keep your wrist in a straight and neutral position while typing and keep your arms off the sharp edges of the work surface.
- Do not rest your wrists or hands on a palm or wrist rest when you are keying. These rests are designed to provide support only during breaks from keying.
- The slope of the keyboard may need to be adjusted so that it is flat in order that your wrists are straight and not bent back while you are typing.
- Press the keys gently; do not bang them or hold them down for long periods. Keep your shoulders, arms, hands, and fingers relaxed.

If your work surface is too high and not adjustable, adjust your chair to bring your arms to the proper position. If you raise your chair make sure your feet are properly supported.

6. Mouse, Trackball, or other Input Device

- The mouse is present in virtually every office environment. They are designed specifically to the contours of either the right or left hand.
- Placing the mouse, trackball, or other input device too far away, too low, or too much on one side can cause shoulder, wrist, elbow, and forearm discomfort. Placing the input device directly in your immediate reach zone offers natural comfort and maximum hand-to-eye coordination.
- Do not bend your wrist upward. Make sure you are sitting high enough for the workstation to be slightly below elbow height so that your hand rests naturally on the mouse.
- Mousing demands a certain level of surface stability; if used on a keyboard tray, the tray should not wobble or tip.
- A trackball has an exposed ball that you manipulate with your fingers. It requires the use of different muscle and tendon groups than does a mouse, and can add variety to your manipulation of computer information. Some trackball designs, however, may cause discomfort and possible injury to the area around your thumb, which stretches and reaches to maneuver the trackball.
- Test different models of mouse devices, trackball or other input devices. Consider the shape and size of the devices, how comfortably it fits into your hand, ease of operation, and any special features that might make your job easier.

7. Lighting

Lighting not suited to working with a computer is a major contributing factor in visual discomforts including eyestrain, burning or itching eyes, and blurred or double vision.



The lighting in most office environments is too bright for optimal VDT screen viewing. The illumination may be reduced by removing 2 bulbs in a 4-bulb fluorescent fixture, removing the bulbs in every other fixture, or turning off overhead lights altogether. Supplemental desk lighting is better than overhead lighting for reading or printed copy.

Use the following recommendations to reduce eyestrain and eye fatigue:

- Close drapes/blinds to reduce glare.
- Adjust lighting to avoid glare on screen (light source should come at a 90 degree angle, with low watt lights rather than high).
- Avoid intense or uneven lighting in your field of vision.
- Place monitor at 90 degree angle to windows (where possible).
- Reduce overhead lighting (where possible).
- Use indirect or shielded lighting where possible.
- Walls should not be painted with a reflective finish.
- Use a glare screen or monitor shield to reduce glare from overhead lighting.

8. Work Habits

- Repetitious static work (working at the computer) is very fatiguing on your upper extremities as well as your eyes. It is important that breaks from working at the computer be taken every 20 to 40 minutes in order for your body to rest and recover. Taking a short break (3 to 5 minutes) does not mean you have to stop working, other activities such as talking to a co-worker, making copies, filing, etc. could be done during breaks from typing.
- It is also important to change positions periodically. Sitting in one position or leaning on your arms for an extended period of time can interfere with circulation.

9. Laptop Computers

NOTE: LAPTOP COMPUTERS ARE NOT RECOMMENDED AS PRIMARY COMPUTERS. IN THE OFFICE OR WHILE AT HOME, A DOCKING STATION IS RECOMMENDED TO PROVIDE ADJUSTABILITY WHICH WILL ENHANCE NEUTRAL POSTURES.

Computing

Maintaining neutral postures will reduce stress and strain to the musculoskeletal system.

- Incorporate mini-breaks every 20 to 30 minutes to break up repetition and static postures.
- Maintain a comfortable viewing distance from your screen; about 18-30 inches.



- Keep your head and neck in a neutral posture; avoid excessive neck flexion (i.e., bending the head down) or neck rotation.
- Angle the screen so that it is perpendicular to your line of sight, if lighting permits.
- Position the keyboard at elbow height, and keep your wrists straight while keying. Experiment with table height, chair height and keyboard angle to maintain neutral wrist postures.
- Remember: if you raise your chair use a footrest to support your feet. When seated your hips should be slightly higher than your knees.
- If you are seated in a side chair or couch, use a pillow to support your arms while keying. This will help you maintain neutral arm, wrist, and hand postures.
- Attach an external mouse instead of using the small constricted touchpad or trackball.
- Clean the screen regularly using appropriate antistatic cleaning materials.
- The hands and wrists should be kept in a straight wrist posture when typing and should not be resting on a palm rest, table, or lap while typing. Wrist and palm rests are designed to provide support during breaks from typing.

Transporting the Computer

Keep these ideas in mind while carrying your laptop from place to place:

- Eliminate unnecessary baggage from your briefcase; the less demand placed on the body the better.
- Carry your laptop in a case with a padded shoulder strap and handle. Frequently shift hands or shoulders to balance the load.
- Use a wheeled luggage cart when possible.