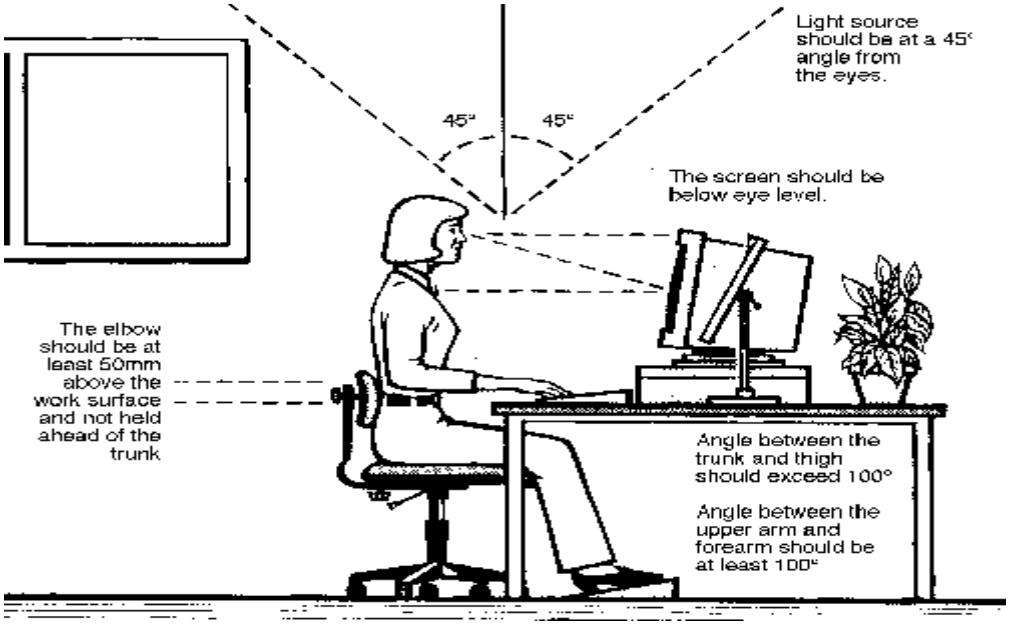
Computer Workstation Ergonomics

The following information assists to set up a workstation correctly.

All recommendations are based upon **Australian Standard AS 3590 - 1990 Screen based workstations, part 2**

To a large extent the above standard still applies but there have been significant advances in the field of ergonomics since 1990, as per the photograph below.



Consideration should be given to:

- The accessories required to operate properly
- The layout of equipment on the desk
- The location of furniture in the room

Work surface height

Adjust the height of the work surface and/or the height of the chair so that the work surface allows your elbows to be bent at 90 degrees, forearms parallel with the floor, wrist straight, shoulders relaxed.

Chair

Adjust the seat tilt so that you are comfortable when you are working on the keyboard. Usually, this will be close to horizontal but some people prefer the seat tilted slightly forwards. Your knees should be bent at a comfortable angle and greater than 90 degrees flexion. If this places an uncomfortable strain on the leg muscles or if the feet do not reach the floor then a footrest should be used. The footrest height must allow your knees to be bent at 90 degrees. Therefore the height of the footrest may need to be adjustable. Adjust the backrest so that it supports the lower back when you are sitting upright.

Keyboard placement

Place the keyboard in a position that allows the forearms to be close to the horizontal and the wrists to be straight. That is, with the hand in line with the forearm. If this causes the elbows to be held far out from the side of the body then re-check the work surface height. Some people prefer to have their wrists supported on a wrist desk or the desk. Be careful not to have the wrist extended or bent in an up position.

Screen placement

Set the eye to screen distance at the distance that permits you to most easily focus on the screen. Usually this will be within an arm's length. Set the height of the monitor so that the top of the screen is below eye level and the bottom of the screen can be read without a marked inclination of the head. Usually this means that the centre of the screen will need to be near shoulder height. Eyes level with the tool bar. People who wear bifocal or multi focal lenses will need to get a balance between where they see out of their lenses and avoid too much neck flexion.

Desk-top layout

Place all controls and task materials within a comfortable reach of both hands so that there is no unnecessary twisting of any part of the body. Most people prefer the document holder to be between the keyboard and the monitor. There are many different types of document holders available.

Document holder

Place this close to the monitor screen in the position that causes the least twisting or inclination of the head.

Posture and environment

Change posture at frequent intervals to minimise fatigue. Avoid awkward postures at the extremes of the joint range, especially the wrists. Take frequent short rest breaks rather than infrequent longer ones. Avoid sharp increases in work rate. Changes should be gradual enough to ensure that the workload does not result in excessive fatigue. After prolonged absences from work the overall duration of periods of keyboard work should be increased gradually if conditions permit.

Lighting

Place the monitor to the side of the light source/s, not directly underneath. Try to site desks between rows of lights. If the lighting is fluorescent strip lighting, the sides of the desks should be parallel with the lights. Try not to put the screen near a window. If it is unavoidable ensure that neither the screen nor the operator faces the window.

If the monitor is well away from windows, there are no other sources of bright light and prolonged desk-work is the norm, use a low level of service light of 300 lux. If there are strongly contrasting light levels, then a moderate level of lighting of 400 - 500 lux may be desirable.

Glare and reflection

It is important to detect the presence of glare and reflection. To determine whether there is glare from overhead lights whilst seated worker should hold an object such as a book above the eyes at eyebrow level and establish whether the screen image becomes clearer in the absence of overhead glare. To detect whether there are reflections from the desk surface, the worker should hold the book above the surface and assess the change in reflected glare from the screen.

A number of ways are available to eliminate or reduce the influence of these reflections:

- Tilt the screen (top part forwards) so that the reflections are directed below eye level.
- Purchase an LCD screen.
- Cover the screen with a light diffusing surface or anti-glare screen.
- Negative contrast screen (dark characters on light background) will reduce the influence of these reflections.

If you experience eye discomfort when using a bright screen you should make the following adjustments:

- Turn the screen brightness down to a comfortable level.
- Look away into the distance in order to rest the eyes for a short while every ten minutes or so.
- Change the text and background colours. Recommended are black characters on white or yellow background, or yellow on black, white on black, white on blue and green on white. Avoid red and green and yellow on white.

Using a mouse

A well designed mouse should not cause undue pressure on the wrist and forearm muscles. A large bulky mouse may keep the wrist continuously bent at an uncomfortable angle. Pressure can be reduced by releasing the mouse at frequent intervals, by selecting a slim-line, low-profile mouse. Keep the mouse as close as possible to the keyboard, elbow bent and close to the body.

Keyboard equipment and radiation

Computer screens emit visible light which allows the characters on the screen to be seen. Weak electromagnetic fields and very low levels of other radiation, not visible to the human eye, can be detected by sensitive instruments. Similar emissions are produced by television receivers.

The levels of most radiations and electromagnetic fields emitted from computers are much less than those from natural sources, such as the sun or even the human body and are well below levels considered to be harmful by responsible expert bodies such as the International Radiation Protection Association (IRPA).

Keyboard and telephone operations

Avoid cradling the phone between your head and shoulder when answering calls. If needing to access the computer at the same time a headset is recommended. Hands free/speaker phone is another option if the environment is suitable.

Posture during keying

Good posture is essential for all users of computers. It comprises of a natural and relaxed position, providing opportunity for movement, and from which the operator can assume a number of alternative positions. **It is not a single, rigidly defined position.**

Typing technique

Typing is a physical activity, and using a keyboard requires skill, hence the need to learn correct typing technique. Unskilled ('hunt and peck') typists are particularly at risk of Occupational Overuse Injury because they:

- often use only one or two fingers which may overload the finger tendons;
- are constantly looking from keyboard to screen to keyboard, which may strain neck muscles;
- often adopt a tense posture (wrists bent back and fingers 'poised to strike').

The University acknowledges the importance of learning correct typing technique. Departments should ensure that untrained staff receive appropriate training.

Speed of keying

The efficiency and speed of modern computers makes it possible for a skilled operator to type extremely quickly. This capability, reinforced by workload pressures means the potential exists for operators to key at speeds which may cause or contribute to Occupational Overuse Syndrome.

The role of the repetitive movement in injury is not fully understood, but is believed to interfere with the lubrication capacity of tendons, and the ability of muscles to receive sufficient oxygen supplies.

10,000 - 12,000 keystrokes per hour is considered an acceptable standard.

Length of time on the keyboard

The maintenance of a fixed posture for long periods is tiring and increases the likelihood of muscular aches and pains. In addition, long periods of repetitive movement and sustained visual attention can also give rise to fatigue-related complaints.

It is recommended that operators avoid spending more than five hours a day on keyboard duties and no longer than 50 minutes per hour without a postural/stretching break.

Employees newly engaged in keyboard work, and staff returning from an absence of two or more weeks, need a period of adjustment. The adjustment may be achieved through reduced work rates, or provision of alternate duties with gradual re-introduction to keyboard work.

Jobs should be designed and organised so that either:

- Computer related tasks can be interspersed with non-computer related, or
- Computer based tasks can be rotated amongst several staff (task/job sharing).

It is not the change of task *per se*, but the change to **using different movements and postures** that is important. The whole purpose of task variety is to give the overloaded structures a necessary break.

Supervisors should ensure that workload controls are exercised using the following strategies:

- planning ahead to avoid peaks, and rushed jobs
- delegating fairly to all staff not just the best workers
- considering the total workload of the individual (often comes from a number of sources)
- clearly defining each operator's workload
- implementing systems of prioritisation e.g. work request forms, waiting lists

- using relief staff
- applying strict tests to the use of 'urgent' labels
- discouraging 'endless' drafts
- discouraging the use of typed internal minutes and memoranda
- encouraging authors to have realistic expectations
- teaching authors keyboard skills
- teaching operators how to be assertive, and how to prioritise
- supporting operators when authors impose unrealistic expectations