

	Environmental Health and Safety Manual	
	Policy Number: EH&S 1-13	
Title: Video Display Terminals		
Effective Date: 1992	Revision: 2/97	Number of Pages: 10

PURPOSE: To establish guidelines for purchasing, placing, working with and maintaining video display terminals at SUNY at Stony Brook.

SCOPE: University wide.

DEFINITIONS:

Video Display Terminals (VDT'S): A cathode ray tube (CRT) display screen, a keyboard, and associated electronics.

VDT Operator: An employee whose job it is to work with a VDT for four or more hours a day, 5 days a week.

Neutral Position: At the keyboard and mouse, arms are comfortably at the sides, elbows bent at approximately 90 degrees, forearms parallel to the floor, knees slightly below hips, and wrists straight.

PROCEDURES:

I. Work Station Design

An acceptable work station will allow the operator to sit with good posture, see the screen clearly and reach the keyboard and/or document easily. Poorly designed work stations can lead to discomfort and disorders of the back, neck, shoulders, arms and hands. The best work station design will allow independent height adjustment of the screen, keyboard and chair. Most manufacturers now supply ergonomic work stations designed specifically for VDT's.

These aspects should be taken into account to prevent discomfort and/or injury:

- a. Neutral posture at the keyboard and mouse: arms comfortably at sides, elbows bent at approximately 90 degrees, forearms parallel to the floor, knees slightly below hips, and wrists straight.
- b. Chairs should be adjustable.
- c. The work surface should be large enough to support the keyboard, mouse, monitor,

- and documents.
- d. The top line of the screen should be just below eye level to keep the neck straight. Adjustable arms, tables or platforms can help bring the screen to the proper height. Screens that tilt vertically and swivel horizontally help the worker adjust the best viewing angle.
 - e. Monitors should be placed 18-30 inches away from the worker for viewing.
 - f. Keyboards and monitors should be detachable so the angle and position can be adjusted.
 - g. Keyboard and work surface edges should be rounded. Wrist/palm rests may be used to protect wrists and palms from hard or sharp edges and to help keep the wrists in a neutral position. However, resting wrists on a wrist/palm rest during keying can put pressure on nerves. Wrist/palm rests should be made of soft but supporting material and be the same height as the front edge of the keyboard.
 - h. Documents should be at the same height and distance as the screen.
 - i. The screen and document should be easily viewed so that the worker's head isn't turned to the side or tilted up or down regularly.
 - j. To prevent glare, the monitor and keyboard should be perpendicular to windows and between, not directly under, overhead lights.
 - k. Screen contrast and brightness should be easily adjustable.
 - l. Screen characters should be clearly displayed, neither wavy nor flickering.

A. Work Surface

The height of the work surface should be adjustable. The best design will allow the front (keyboard) section of the work surface to be independently adjustable from the back (screen) section of the work surface.

The width of the work surface should allow enough space for papers or hard copy. Document holders are recommended for ease in reading hard copy, while typing.

The depth of the work surface should be sufficient to allow an appropriate viewing distance between the eyes and the screen.

Center drawers or thick tables may raise the keyboard too high for comfortable, long-term typing.

B. Seating

An adjustable chair is recommended for every VDT work station. The recommended

adjustable components are seat height, seat size, seat slope, back rest height, back rest depth, and back rest tilt.

Sufficient room for the legs underneath the work surface must be provided for knee room height, knee room width, and knee room depth.

II. Video Display Terminal (VDT)

A good VDT will have a screen that is easily readable, and a detachable keyboard that can be used for extended periods of time, without discomfort.

A. Screen

The characters on the screen should be clear and well defined and have no perceptible flicker. The brightness (luminance) of the characters must be adjustable. It is imperative that it be possible to clearly distinguish between similar characters such as: X & K, O & Q, U & V, S & 5, I & L.

Scrolling is the movement of the characters up the screen as more lines are entered below. Smooth scrolling rather than jump scrolling is preferred. Page scrolling is also desirable.

B. Keyboard

The keyboard must have the capability of being detached from the screen console, especially for full-time operators. Detached keyboards can be placed closer to the operator and on a lower level. An acceptable keyboard is relatively thin, has an easy to use layout of keys and a non-reflective finish.

C. Mouse

The mouse shape and buttons should be comfortable and easy to operate. The user should not have to extend their arm for long duration to operate the mouse.

II. Installation and Maintenance

The terminal should be installed in accordance with the manufacturer's instructions, to prevent electrical hazards. Electrical cables should be secured and concealed, where possible. Operators need to know which cleaning products are recommended, so that the screen or other

components are not damaged. Access for maintenance is a factor to consider in the placement of equipment.

III. Work Environment

An acceptable VDT work environment is one which will allow for the reduction of eyestrain, fatigue and general discomfort.

A. Glare and Lighting

Glare on the screen is one of the most common complaints about the VDT work environment. Reflections or glare sources in the operator's field of vision make it difficult to read the screen. Sources of glare may be windows, shiny surfaces, unshielded lighting fixtures, etc.

Controlling glare may require eliminating the source or simply repositioning the terminal. Adjusting the horizontal and/or vertical axis of the screen will often remove a reflection.

Overhead fluorescent lights may need to be equipped with diffuser grids. Windows may have to be covered; curtains are usually better than venetian blinds, which may allow stripes of light to shine through.

In severe cases, screen filters may be used to reduce glare. Most types of filters, however, reduce character brightness and clarity as well. Filters can also be used to change the color of the display. A hood over the screen may also be used to shield glare. However, the operator should not have to sit in an awkward position in order to see the screen under the hood.

Office lighting should be sufficient for reading documents without interfering with display legibility. Illumination levels should be in accordance with applicable standards. If lighting from the ceiling and windows is reduced to prevent glare, it may be necessary to use a moveable task light. The task light should not shine on the screen.

B. Heat and Humidity

VDT's and associated equipment emit heat, approximately 100 to 400 watts per unit. Computer rooms are usually air-conditioned for the benefit of this type equipment. Relative humidity of 40 - 50 percent is recommended for comfort. Sufficient humidity is important to prevent static electricity which can disrupt electromagnetic display and memory functions.

IV. The VDT Operator

A full-time VDT operator is an employee whose function requires the use of a VDT for four (4) or more hours a day, five (5) days a week.

A. Visual Considerations

All VDT operators should have an initial eye exam. After the initial eye exam, a yearly eye exam should be given for all full-time VDT operators.

A VDT operator eye exam will consist of a visual acuity, depth perception and color blindness exam.

As a result of vision evaluations, some VDT operators may need special prescription lenses. For example, operators who normally wear bifocals have to look through the lower half of their lenses causing an awkward posture. Operators can avoid these awkward postures by using single-lens glasses with a focal length of 20 inches. (Eyeglasses normally have a 14-16 inch focal length for reading). Others may demonstrate a need for glasses or for a change in their current prescriptions.

B. Alternative Work Assignments

Alternative work assignments such as typing, filing, etc., will be given to VDT operators for approximately 15 minutes every two hours.

V. Risk Factors

The *Performance Oriented Checklist for VDT Computer Workstations* (Appendix A) can be used to evaluate individual workstations for ergonomic risk factors.

INQUIRIES/REQUESTS:

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RELATED FORMS:

RELATED DOCUMENTS:

ANSI/HFS 100-1988 *American National Standard for Human Factors Engineering of Visual Display Terminal Workstations*

ANSI/IESNA RP-1-1993 *American National Standard Practice for Office Lighting*

ANSI/ASHRAE 55-1992 *American National Standard Thermal Environmental Conditions for Human Occupancy*

Appendix A

Performance Oriented Checklist for VDT Computer Workstations

When using this checklist:

1. Ask whether the design of the workstation, task, and environment interfere with, obstruct, or otherwise inhibits a person from achieving them.
2. Remember that it is worded for use when reviewing one person and that person's VDT workstation, tasks, and working environment. If more than one person must use the same workstation, the checklist should be applied to each individual, and an easily adjustable workstation becomes even more important.
3. Remember that there is no "perfect posture", and that a dynamic posture (frequent changes in posture) is a good way to reduce stress and redistribute pressure related to long duration static postures.
4. Remember that it is not all inclusive, and may not cover topics important to your specific situation.
5. Remember that a good ergonomics approach will improve productivity and quality, as well as health and safety.

"NO" responses indicate conditions that may be associated with higher risk of illness/injury.

1. Posture

Lower Extremity

- a. Is the person able to rest their feet comfortably?
- b. Is the person able to sit with the knees in a comfortable position?
- c. Is the person free of uncomfortable pressure points, obstructions, or other interferences in the lower extremities?

Upper Extremity

- a. Is the person able to work with the head in a vertical orientation, such that the neck is

- not stressed by holding the head off balance from the neck and shoulders?
- b. Is the person able to work with the head facing forward of the plane of the upper body the majority of the time, such that repetitive or long duration head rotation is minimized?
 - c. Is extended reaching minimized, especially where the reaching is held for long durations, is repetitive, or requires trunk/torso deviations?
 - d. Is the person able to work with comfortable arm positions, or approximately neutral shoulder and wrist positions, and comfortable elbow positions that do not force shoulder or elbow positions from approximately neutral?

If you answered "NO" to any of the questions in the Posture section, worker posture may be contributing to ergonomic risk.

2. Force

Static Body Pressure

- a. Do the workstation design and job requirements cause body positions being held constant for extended periods of time?

If you answered "YES" to this question, the method of muscle use may be contributing to ergonomic risk.

3. Workstation Design

Seat Surface

- a. Is the height adjustable, such that the person is able to set it at an individually comfortable height in relation to the required work activities?
- b. Is the seat surface of appropriate size, such that it is deep and wide enough to comfortably accommodate the specific person?
- c. Is the seat slope adjustable, such that the person is able to achieve a comfortable angle, either forward or rearward sloping?
- d. Is it comfortable and is the front well rounded ("waterfall" front edge), such that the person does not experience excess pressure on the under side of the leg due to the forward edge?
- e. Overall, is it comfortable to the person that is required to use it?

Seat Backrest

- a. Can the person easily adjust its height to provide mid lumbar support (lower back region)?
- b. Can the person easily adjust its angle relative to the seat surface?
- c. Can the person easily adjust it to alter the depth of the seat?
- d. Overall, is it comfortable to the person that is required to use it?

Worksurface

- a. With the feet and lower limbs in comfortable positions, can the person achieve a comfortable worksurface height?
- b. Is the width of the worksurface appropriate, such that all required task accessories and duties can be located within comfortable reach and viewing distance?
- c. Is the depth of the worksurface appropriate, such that the computer, and keyboard if necessary, can be placed directly forward of the person with the work orientation parallel to the plane of the upper body?
- d. Is the area under the desk large enough to accommodate the legs and any accessories, such as footrests and arm rest?

Computer Monitor

- a. Is the person able to easily adjust the height of the monitor?
- b. Is the person able to easily adjust the fore-aft distance of the monitor?
- c. Is the person able to easily adjust the tilt (up/down) angle of the monitor?
- d. Is the person able to easily adjust the yaw (left/right rotation) angle of the monitor?

Keyboard

- a. Is the keyboard detachable from the display unit?
- b. Is the person able to easily adjust the angle of the keyboard?
- c. Is the person able to easily adjust the keyboard height?
- d. Is keystroke pressure comfortable for the person?

Mouse

- a. Is the shape and button activation comfortable and easy to operate for the person?
- b. Is the person able to reach and operate the mouse without extended, long duration, or

repetitive reaching?

Document Holder for Data Entry Tasks

- a. Is there a special holder or support for the source document?
- b. Is the person able to easily adjust the document holder height, distance and angle?
- c. Does the device prevent the document from vibrating?
- d. Is the device located such that the person is not required to rotate the head or neck extensively or for long duration?

Support for the Hands and Arms

- a. Are seat or other armrests available?
- b. Are armrests adjustable?
- c. Is keyboard palm support available?

Support for the Feet

- a. Is a footrest available if needed?
- b. Is the person able to easily adjust its height?
- c. Is the person able to easily adjust its tilt?

4. Environment

Lighting

- a. Are lighting levels in the monitor area comfortable to the person?
- b. Is the monitor screen placed such that light from windows and overhead lighting do not cause glare: If not, are glare screens or other glare reducing methods used?
- c. Are diffusers, cube louvers or parabolic louvers used on overhead lights where screen glare from that source is a problem?
- d. Are movable task or desk lights available?
- e. Do work surfaces have a matte finish to reduce light reflection?
- f. Do windows have curtains, drapes or blinds to block light where glare from that source is a problem?

Temperature

- a. Is the person comfortable with the ambient temperatures, particularly cooler ambient

temperatures?

- b. Is the person comfortable with the temperatures of any equipment or surfaces he/she must contact?

Vibration

- a. Has building vibration been eliminated?

Noise

- a. Are sound levels at comfortable levels, allowing conversation and other communications without significant effort?

Ventilation

- a. Is air circulation sufficient?

5. The Worker

Fatigue Control

- a. Is the person allowed to take rest pauses or breaks from tasks that require long duration or repetitive postures, forces, keying or mousing activities?
- b. Is there job rotation or substitution of tasks which require a different type of activity where posture, force and repetition hazards have not been addressed by design?

Vision

- a. Does the person wear bifocal glasses, causing him/her to tilt the head to see through the appropriate lens area?
- b. Are workers with symptoms of eye strain, burning sensation in the eyes, blurred vision, irritated eyes, or headache examined for vision problems?

Psycho-Social Issues

- a. Does the person have some involvement and control over the work process?
- b. Is there good communication between the person and supervisors?

- c. Has the person been adequately trained?
- d. Is the software "user-friendly"?

If you answered "NO" to any of the questions in the Worker section, administrative issues may be contributing to ergonomic risk. A review of training and other administrative policies is recommended.

Checklist from: University of Utah Research Foundation, 1995