Environmental Factors and General Guidelines for VDT Users

I. Illumination

Illumination presents many unique problems for the VDT user. Illuminance should be in the range of 200 to 500 LUX (20 to 50 foot candles) measured at the work surface. These levels are normally sufficient. However, each application will have varying requirements. For example, work involving use of a VDT and no hard copy requires less light and should be kept on the lower side of this range. Tasks involving use of hard copy of poor quality may require lighting in the upper ranges, i.e. 500 LUX (50 candles) or higher. In most cases, a combination of tasks is in order in establishing a compromise in lighting levels.

A. 200 LUX is considered desirable for VDT work without hard copy.
B. If task lighting is not feasible, lighting levels of 300-400 LUX are desirable for combined hard copy and VDT tasks.
C. Task lighting should be considered where feasible to accommodate hard copy.
D. Indirect lighting is better for VDT use as it creates even light levels by using reflected light.
E. Use of dimmers, removal of light bulbs and/or a combination can be used to reduce illumination levels.
F. Diffusers on overhead lights will result in little or no light reaching the screen at an angle that will cause reflections.

II. Glare & Reflections

Glare and reflection problems present another opportunity for VDT workstation enhancement. Sources of glare typically range from location in relationship to lights, windows, light levels, user clothing selection, to wall and furniture finishes. A variety of anti-glare screens are available, but each has its advantages as well as limitations. The best method to control glare is at the source.

A. Terminals should have tilt and swivel rotation allowing full user adjustment. Terminal positioning can have a significant impact on reducing glare, providing the equipment has the capability to allow such adjustments.
B. VDT placement should be perpendicular to windows and parallel to light fixtures. Systems should be placed between rows of lights.
C. Windows should also have curtains and/or blinds, with preferably vertical louvers.
D. Walls, furniture and surrounding surfaces should be low reflecting. High reflective walls could be covered with a flat finished paint or wall covering.
E. Hood attachments are also available which attach to the screen to block out reflections.
F. A variety of screen treatments can be applied to the VDT. As with any treatment, advantages and disadvantages exist. The advantages range from reducing mirror reflections to increasing contrast. Disadvantages include character fuzziness, scratching or marring, to decreases in character luminance. The best control method is to control glare at the source.
G. Clothing selection by the VDT user can impact VDT glare. Wearing of dark clothing over light is preferred.

III. Workstations

Much has been written on the subject of workstation design and equipment layout. Since VDTs are used in a variety of work environments, some solutions are being offered to enhance existing work areas. These principles are useful as a means of providing basic guidelines for future alterations or layout.

Accommodations should be made to entertain the 5 percentile female through the 95 percentile male. This will enhance worker comfort and posture.
Ideally, adjustability designed into the work station can have a significant impact on worker fatigue and stress. This includes various aspects such as tables/desks, terminal and keyboards to dimmers for lights and blinds. However, not all workstations require wholesale changes nor should all existing equipment be discarded. Conventional office furniture can be used with VDTs. A close evaluation of certain factors may be necessary. Some items to consider are:

- Number of users
- Duration of tasks
- Type of tasks performed
- Costs
- Long-range projection for increases in these areas.

A. Tables

1. Table surfaces should be non-reflective or matte finish.
2. Adjustability with controls easily reached. Separate features to allow user positioning of the screen and keyboard are most desirable.
3. Ample leg room and work surface area should be provided for source documents and other task-related equipment (i.e., staplers, drawings, forms, phones, etc.).
4. Rounded edges and corners reduce the tendency to cut into the wrist. Such direct mechanical compression results in a reduction in circulation to the muscles and tendons in the wrist region and direct compression onto the median nerve.

B. Chairs

There are a number of factors to consider when seating principles are reviewed. No one set of factors applies for all situations.

1. Chairs should be easily adjustable with adjustments capable of being made from the seated position.
2. Lumbar support should be provided. Some individuals prefer partial back rest versus full.
3. The back should have moderate angle (10° to 30° from vertical).
4. A waterfall or rounded front edge maintains circulation to the lower legs.
5. The seat pan should slope back slightly.
6. A moderately contoured seat pan will reduce weight over the entire buttocks area.
7. The angle between the seat pan and back should be between 95° and 120°.
8. Caster selection can result in continuous muscular effort to keep the chair in the desired position.
9. Adjustable arm rests are a feature which can relieve or prevent muscle fatigue in the upper body region – mainly the neck, shoulder and upper arms.
10. For most multi-purpose chairs, the seat should be set for small workers and the seat width for large workers.

C. Keyboard

1. Keyboards should be detachable and equipped with a nonskid base.
2. Desirable keyboard angle should be between 5° and 15°.
3. Key tops should be concave to help finger position and have a matte finish to reduce glare.
4. Keys should have tactile feedback.
5. The use of a wrist rest for working on the keyboard should be considered to reduce stress on the wrists and hands.

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IV. General Guidelines

Eye fatigue and discomfort are the most commonly reported problems of VDT users. Things like light, glare, screen contrast and the monotony of a particular task all affect a user’s vision. Therefore, it is important for workers to correct eye problems before using VDT’s.

Using eyeglasses or contact lenses should not affect a person’s ability to use a VDT. However, people who have difficulty changing the focus of their eyes may require glasses which match the viewing distances of their VDT. This is especially common with people who need bifocals or trifocals. It is important to tell the eye doctor or optician the viewing distance and angle of the VDT, as well as information about the job’s visual demands. Some VDT users may need a correction different from one needed for reading or driving.

VDT users should take regular rest breaks. Rest breaks can help ease the muscle aches, eye strain and mental stress that often accompany VDT work. Research shows that short, frequent breaks taken before you get tired are more effective than longer, less frequent breaks taken after you get tired. When practical, VDT users should also have non-VDT tasks, such as filing or answering the phone. These give users built-in breaks. Users should also stretch and change their posture from time to time to help reduce muscle fatigue and stress.

NIOSH recommends:
“Continuous work with VDT’s should be interrupted periodically by rest breaks or other work activities that do not produce visual fatigue or muscular tension. As a minimum, a break should be taken after two hours of continuous VDT work, and breaks should be more frequent as visual, mental and muscular burdens increase.”

Solutions to these or other related topics presented are as follows:
A. Workers should have a comprehensive vision test before starting VDT work. Follow-up testing will identify vision changes and ensure the use of proper eyeglasses or contact lenses.
B. Rest breaks are essential in providing an opportunity to reduce stressors associated with VDT use. This can be in the form of job share, other assigned duties and job rotation. The frequency and duration of the breaks will depend on the task and task duration.
C. Document holders with a matte finish, and adjustable height and tilt are a desirable feature, especially for data entry on text processing tasks.
D. Foot rests need to be available when chair and/or table height do not allow the user to place feet flat on the floor. Foot rest size will depend on table, chair and keyboard adjustments. An anti-slip surface with the top of the rest being about the size of the chair is most desirable.
E. Employee training and input are important aspects that are frequently overlooked. The worker knows the job, job demands, and fatigue associated with a given task. Therefore, their ideas and opinions are invaluable.
F. Regular surveys of the workforce should be conducted in high VDT use areas to develop data and determine early injury detection. These surveys can result in early intervention and detection.
G. A comprehensive training program on equipment use, adjustments and general VDT guidelines is necessary. Frequently, employees don’t know how to adjust tables, chairs, terminals, keyboards, etc. They also need to understand what “proper screen placement” is.