

# Working Safely with Video Display Terminals



U.S. Department of Labor  
Occupational Safety and Health Administration

OSHA 3092  
1997 (Revised)



---

Material contained in this publication is in the public domain and may be reproduced, fully or partially, without permission of the Federal Government. Source credit is requested but not required.

---

This information will be made available to sensory impaired individuals upon request.

Voice phone: (202) 219-8615;  
Telecommunications Device for the Deaf (TDD) message referral phone: 1-800-326-2577.

# Working Safely with Video Display Terminals

---



U.S. Department of Labor  
Alexis M. Herman, Secretary

Occupational Safety and Health Administration  
Gregory R. Watchman, Acting Assistant Secretary

OSHA 3092  
1997 (Revised)

---

---

	<b>Page</b>
<b>Introduction</b> .....	1
<b>VDT Components</b> .....	2
<b>Health Effects</b> .....	3
Visual Problems .....	3
Fatigue and Musculoskeletal Problems .....	4
Radiation .....	4
<b>Interventions</b> .....	6
Lighting .....	6
Work Station Design .....	8
VDT Design .....	12
Work Practices Job Organization .....	13
<b>Other Sources of OSHA Assistance</b> .....	14
Safety and Health Program Management	
Guidelines .....	14
State Programs .....	15
Consultation Services .....	15
Voluntary Protection Programs .....	16
Training and Education .....	16
Electronic Information .....	17
Emergencies .....	17
<b>Appendix</b> .....	18
<b>Selected Bibliography</b> .....	21
<b>OSHA Related Publications</b> .....	22
<b>States with Approved Plans</b> .....	23
<b>OSHA Consultation Project Directory</b> .....	24
<b>OSHA Area Offices</b> .....	26
<b>OSHA Regional Offices</b> .....	28

---

---

The applications of computer technology and the accompanying use of video display terminals (VDTs) are revolutionizing the workplaces of America, and their use will continue to grow in the future.

For example, in 1984 only 25 percent of the U.S. population used computers at work; in 1993, more than 45 percent of the population used computers at work and the number continues to grow. Also, more than 18 million workers are in jobs that often require intensive keying.

Along with this expanding use of VDTs have come reports about adverse health effects for VDT operators. To help inform employers and employees, this booklet briefly examines the potential hazards and interventions employers can use to prevent or reduce the potential harmful effects of working with VDTs.

Some of the most common stressors, their related health effects, and their means of prevention are discussed. A checklist to assess workstations also is included. (See Appendix.)



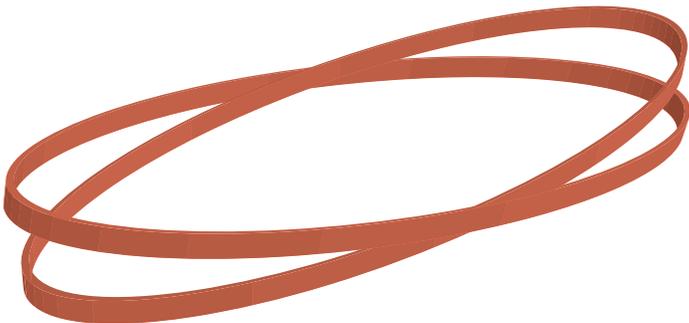
VDTs—comprised of a display screen, a keyboard, and a central processing unit—have rapidly replaced the use of typewriters and other office machines.

The display screen is the output device that shows what the computer is processing. Display screens can be monochrome (green, white, or orange on a black background), or full color.

The keyboard is the input device that allows the user to send information to the “brains” of the computer. Keyboards are commonly used for data entry and inquiry. The keyboard is similar to a standard typewriter keyboard but with additional special keys and functions.

The central processing unit is referred to as the “brains” of the computer. It is the center of operation for all the computer processing and performs calculations and organizes the flow of information into and out of the system.

The VDT operates at high voltages, but the power supplies generating these voltages produce very little current. All data processing equipment, including VDTs, must meet stringent international safety standards in this regard.



---

In the wake of the expanding use of VDTs, concerns have been expressed about their potential health effects. Complaints include excessive fatigue, eye strain and irritation, blurred vision, headaches, stress, and neck, back, arm, and muscle pain. Research has shown that these symptoms can result from problems with the equipment, work stations, office environment or job design, or from a combination of these. Concerns about potential exposure to electromagnetic fields also have been raised.

---

### Visual Problems

Visual problems such as eyestrain and irritation are among the most frequently reported complaints by VDT operators. These visual symptoms can result from improper lighting, glare from the screen, poor positioning to the screen itself, or copy material that is difficult to read. These problems usually can be corrected by adjusting the physical and environmental setting where the VDT users work. For example, work stations and lighting can and should be arranged to avoid direct and reflected glare anywhere in the field of sight, from the display screen, or surrounding surfaces. Many VDT jobs require long sessions in front of a display screen. Consequently, some people may need corrective lens to avoid eye strain and headaches. Vision examinations should, therefore, be conducted to ensure early detection and correction of poor vision. Eyecare specialists should be informed of computer use by VDT operators.

VDT operators also can reduce eyestrain by taking rest breaks, after each hour or so of operating a VDT.\*

---

\*The National Institute for Occupational Safety and Health (NIOSH) recommends a 10-minute rest break after 2 hours of continuous VDT work for operators under moderate visual demands; and a 15-minute rest break after 1 hour of continuous VDT work where there is a high visual demand or repetitive work task.

---

Changing focus is another way to give eye muscles a chance to relax. The employee needs only to glance across the room or out the window from time to time and look at an object at least 20 feet (6.096 centimeters) away.

---

### **Fatigue and Musculoskeletal Problems**

Work performed at VDTs may require sitting still for considerable time and usually involves small frequent movements of the eyes, head, arms, and fingers. Retaining a fixed posture over long periods of time causes muscle fatigue and, if this practice is consistent, can eventually lead to muscle pain and injury.

VDT operators also are subject to a potential risk of developing various musculoskeletal disorders such as carpal tunnel syndrome, and tendonitis. Musculoskeletal disorders are injuries to the muscles, joints, tendons, or nerves that are caused or made worse by work related risk factors. Early symptoms of musculoskeletal disorders include pain and swelling, numbness and tingling (hands falling asleep), loss of strength, and reduced range of motion.

If workers have any of these symptoms, they should report them to their employers as soon as possible. If these symptoms are not treated early, they can result in loss of strength in affected area, chronic pain, or permanent disability.

---

### **Radiation**

Another issue of concern for the VDT operator is whether the emissions from radiation, such as X-ray or electromagnetic fields in the radiofrequency and extreme low frequency ranges, pose a health risk. Some workers, including pregnant women, are concerned that their health could be affected by electromagnetic fields emitted from VDTs. The threat from X-ray expo-

---

sure is largely discounted because of the very low emission levels. The radio frequency and extreme low-frequency electromagnetic fields are still at issue despite the low emission levels. To date, however, there is no conclusive evidence that the low levels of radiation emitted from VDTs pose a health risk to VDT operators. Some workplace designs, however, have incorporated changes—such as increasing the distance between the operator and the terminal and between work stations—to reduce potential exposures to electromagnetic fields.

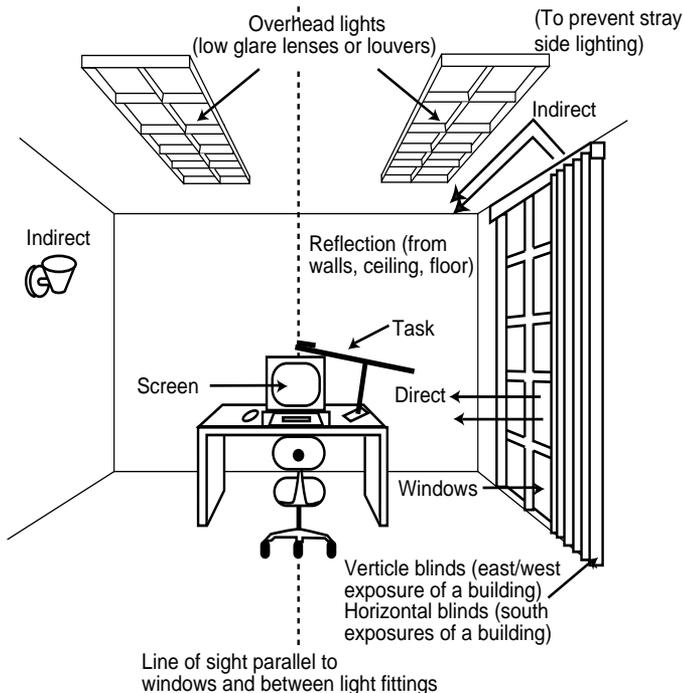
Because the possible effects of radiation from VDTs continue to concern operators, the issue is still being researched and studied. NIOSH has a resource booklet entitled, *NIOSH Publications on Video Display Terminals* and continues to study the question of VDT operator risk from exposure to electromagnetic fields.

There are a variety of interventions that employers can implement to reduce or prevent harmful effects associated with VDT use.

## Lighting

Light should be directed so that it does not shine into the operator's eyes when the operator is looking at the display screen. Further, lighting should be adequate for the operator to see the text and the screen, but not so bright as to cause glare or discomfort (see Figure 1).

There are four basic lighting factors that must be controlled to provide suitable office illumination and avoid eyestrain: quantity, contrast, and direct and reflected glare.



**Figure 1. Position of light source relative to the VDT.**

---

**Quantity.** In most offices, light fixtures and daylight provide illumination for work surfaces (e.g., 50-100 foot-candles). High illumination “washes out” images on the display screen; therefore, if possible, where VDTs are used, illumination levels should be somewhat lower (i.e., 28-50 foot-candles are often satisfactory).

**Contrast.** Contrast is the difference in luminance or brightness between two areas. To prevent the visual load caused by alternate light and dark areas, the difference in illuminance between the VDT display screen, horizontal work surface, and surrounding areas should be minimized.

Most of the tasks associated with VDTs do not require precise visual acuity, and diffuse (indirect) lighting is appropriate. The advantages of diffuse lighting are twofold: There tend to be fewer hot spots, or glare sources, in the visual field; and the contrasts created by the shape of objects tend to be “softer.” The result, in terms of luminous intensities, is a more uniform visual field. Where indirect lighting is not used, parabolic louvers on overhead lights are probably the next best way to ensure that light is diffused.

**Glare.** Glare is usually defined as a harsh, uncomfortably bright, light. Glare is dependent upon the intensity, size, angle of incidence, luminance, and proximity of the source to the line of sight. Glare may be the result of direct light sources in the visual field (e.g., windows), or reflected light from polished surfaces (e.g., keyboards) or from more diffuse reflections which may reduce contrast (e.g., improper task lighting). Glare may cause annoyance, discomfort, or loss in visual performance and visibility.

To limit reflection from walls and work surfaces visible around the screen, these areas should be painted a medium color and have a nonreflective finish. Work stations and lighting should be arranged to avoid reflected glare on the display screen or surrounding surfaces.

---

In many cases, the reorientation of work stations may help remove sources of glare out of the line of sight. The face of the display screen should be at right angles to windows and light sources. Care should be taken, particularly when terminals are installed within 20 feet (6.096 meters) of windows, to ensure that there is some method of blocking the sun's light, such as blinds or curtains.

The proper "treatment" for window glare includes baffles, venetian blinds, draperies, shades, or filters.

Screen glare filters that attach directly to the surface of a VDT screen can help reduce glare. Two types of filters are available: natural density filters, which scatter and diffuse some of the light reflected off the glass display screen, and micromesh filters, which not only scatter the light but also absorb most of the light reflected from the surface of the screen by means of an imbedded interwoven grid of dyed nylon fibers. These should be used as a last resort since filters can reduce visibility and legibility of screen. Filters should be cleaned regularly.

---

## Work Station Design

Proper work station design will reduce visual and musculoskeletal discomfort associated with VDT use when the following work practices are observed:

- Ensure that the operator has a comfortable sitting position sufficiently flexible to reach, use, and observe the display screen, keyboard, and document.
- Provide posture support for the back, arms, legs, and feet as well as adjustable display screens and keyboards.
- Ensure that VDT tables or desks are vertically adjustable to allow for operator adjustment of the screen and keyboard.
- Ensure proper chair height and support to the lower region of the back.

- 
- Ensure that document holders are used to allow the operator to position and view material without straining the eyes or neck, shoulder, and back muscles.

The type of task performed at the VDT may also influence the development of fatigue. In designing a work station, the type of tasks involved should be considered when determining the placement of the display screen and keyboard. For example, if the job requires the operator to look mainly at the source document than the display screen, the source document should be in front of the operator and the screen may be to the side. (See Figure 2.)

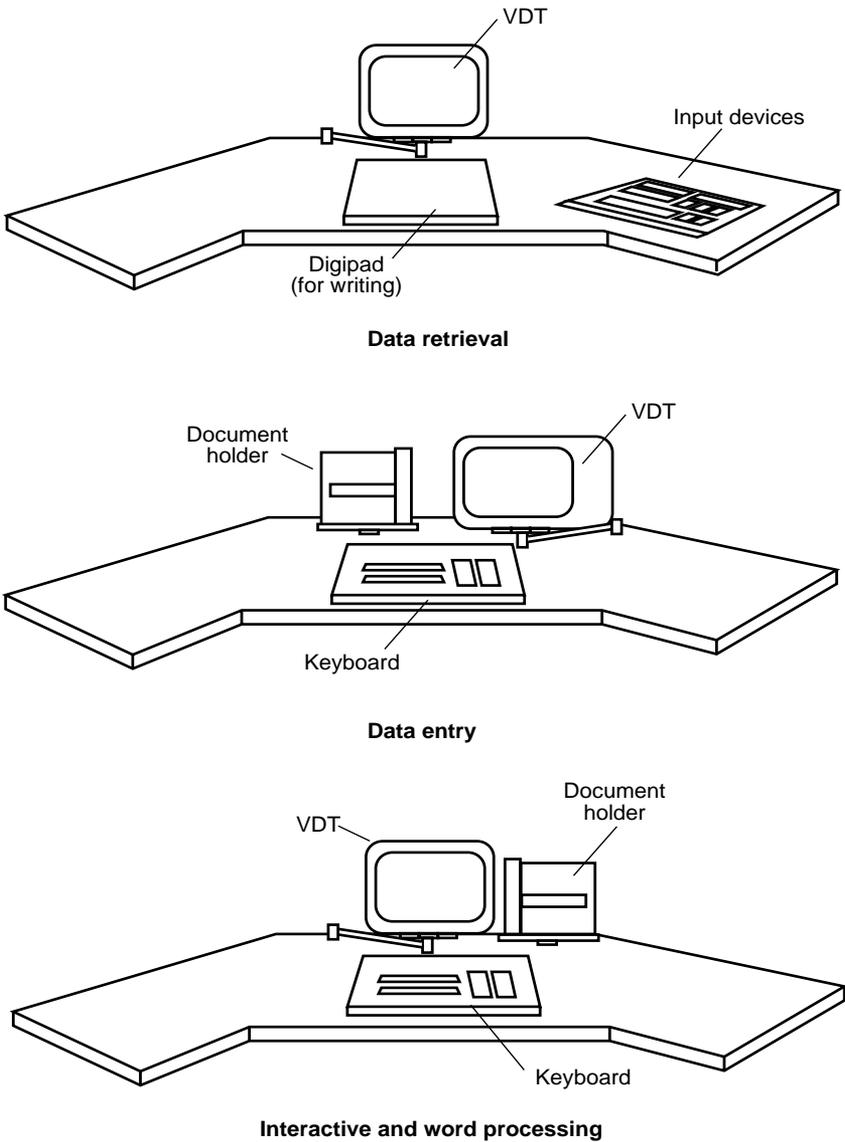
The employee must have adequate work space to perform each of the tasks required by the job. Individual body size must be considered and will influence the design of the work station and access to various accessories.

In general, VDT work stations should provide as many adjustable features as possible. Also, adequate legroom should be provided for the employee to stretch out and relieve some of the static load that results from sitting with the legs in a fixed position for long periods.

In the office environment, the work station consists primarily of a work surface, a chair, VDT equipment, and other related accessories (see Figure 3).

**Chairs.** The chair can be a crucial factor in preventing back pain as well as in improving employee performance in office work. As the majority of office workers spend most of their time sitting, a properly designed and adjustable chair for comfort, efficiency, and for the task being performed is critical. All adjustments should easily be made from the seated position. Specific chair criteria are discussed in the following paragraphs.

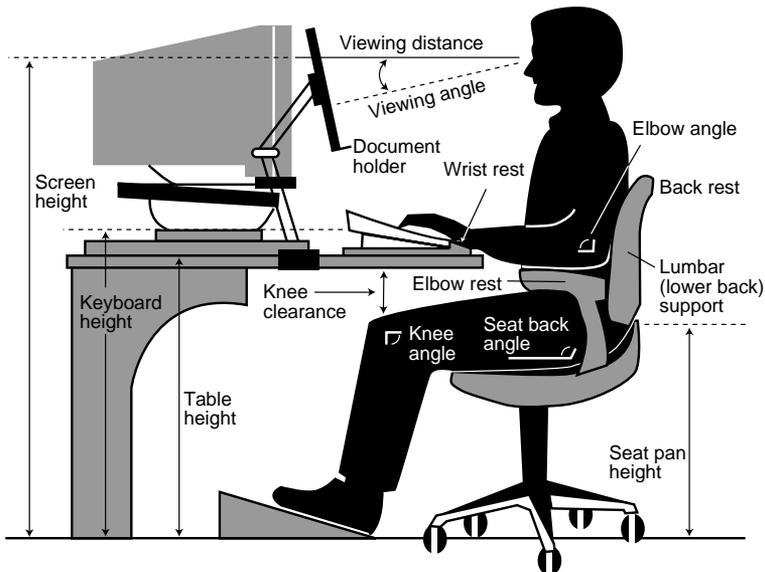
**Chair Height.** When an employee spends from 6 to 8 hours in the chair, the height of the chair and the work surface are



**Figure 2.**  
**Alternative VDT arrangements (depending on job task).**

critical. The human body dimension that provides a starting point for determining correct chair height is the “popliteal” height. This is the height from the floor to the point at the crease behind the knee. The chair height is correct when the entire sole of the foot can rest on the floor or footrest and the back of the knee is slightly higher than the seat of the chair. This allows the blood to circulate freely in the legs and feet.

**Seatpan Design.** Size and shape are two factors to consider in the design of the seatpan of the chair. The seatpan should be slightly concave with a softly padded, rounded, or “waterfall” edge. This will help distribute the weight and may also prevent sliding forward in the chair. The angle of the seatpan should also be considered. Some options include a seatpan that slopes slightly down at the back or one that has a forward tilt that produces less stress on the lower region.



**Figure 3. Proper user position and support.**

---

**Armrests.** Armrests should be low and short enough to fit under work surfaces to allow users to get close enough to the work surface. Chairs can be purchased with adjustable armrests.

**Backrest.** A proper backrest should support the entire back including the lower region. The seat and backrest of the chair should support a comfortable posture that permits frequent variations in the sitting position. The backrest angle and chair height should be easily adjustable.

---

## VDT Design

**Display Screen.** Most new VDTs have separate, adjustable keyboards and display screens that allow both the keyboard and display screen to be positioned appropriately for the employee. This is important because VDT operators may spend a considerable amount of time looking at the display. Screens should have user controls for character brightness. Screens that swivel horizontally and tilt or elevate vertically enable the operator to select the optimum viewing angle.

The topmost line of the screen should not be higher than the user's eyes. The screen and document holder should be the same distance from the eye (to avoid constant changes in focus) and close enough together so the operator can look from one to the other without excessive movement of the neck or back. People who wear bifocals often have to tilt their head back to read through the bottom portion of their lenses. They should avoid tilting their head back by lowering the display or using single-lens glasses while using the VDT.

The preferred viewing distance for VDTs ranges between 18 and 24 inches (45.72 and 60.96 centimeters, respectively). To this distance must be added the depth of the display itself. Some displays are as much as 20 inches deep (50.80 centimeters). The best way to deal with this, other than increasing table depth, is to install a keyboard extender or tray underneath the desk.

---

Legibility is also a primary consideration in selecting a display screen. Legibility factors to be considered include symbol size and design, contrast, and sharpness.

**Keyboard.** The keyboard should be detachable and adjustable to ensure proper position, angle, and comfort for the operator. A lower-than-normal work surface may be required to keep the operator's arms in a comfortable position. This can be achieved by installing a keyboard extender or tray. The thickness and the slope of the keyboard are critical in determining the preferred height.

The preferred working position for most keyboard operators is with the forearms parallel to the floor and elbows at the sides, which allows the hands to move easily over the keyboard. The wrist should be in line with the forearm. A padded and detachable wrist rest for the keyboard can help keep the operator's wrists and hands in a straight position while keying.

**Mouse.** The mouse should be positioned at the operator's side with his or her arm close to the body for support, while maintaining a straight line between the hand and forearm. The upper arm should not be elevated or extended while using the mouse. The top surface of the wrist should also be flat, not angled. A mouse pad or rest can be used to help maintain straight wrists.

---

## Work Practices Job Organization

Operating a VDT, like any form of sustained physical or mental work, may lead to visual, muscular, or mental fatigue. Rest pauses, as recommended by NIOSH to alleviate or delay the onset of fatigue, are necessary. Jobs should be designed so that the employees can vary VDT tasks with non-VDT tasks. In addition, open and positive working relationships between the worker and manager as well as involving employees in workplace decisions and practices can be factors in reducing muscle tension and musculoskeletal disorders.

---

## **Safety and Health Program Management Guidelines**

Effective management of worker safety and health protection is a decisive factor in reducing the extent and severity of work-related injuries and illnesses and their related costs. To assist employers and employees in developing effective safety and health programs, OSHA published recommended *Safety and Health Program Management Guidelines (Federal Register 54 (18): 3908-3916, January 26, 1989)*. These voluntary guidelines apply to all places of employment covered by OSHA.

The guidelines identify four general elements that are critical to the development of a successful safety and health management program:

- management commitment and employee involvement,
- worksite analysis,
- hazard prevention and control, and
- safety and health training.

The guidelines recommend specific actions under each of these general elements to achieve an effective safety and health program. A single free copy of the guidelines can be obtained from the U.S. Department of Labor, OSHA Publications, P.O. Box 37535, Washington, DC 20013-7535, by sending a self-addressed mail label with your request.

---

## State Programs

The *Occupational Safety and Health Act of 1970* encourages states to develop and operate their own job safety and health plans. States with plans approved under section 18(b) of the Act must adopt standards and enforce requirements that are at least as effective as federal requirements. There are currently 25 state plan states: 23 of these states administer plans covering both private and public (state and local government) employees; the other 2 states, Connecticut and New York, cover public employees only. Plan states must adopt standards comparable to federal requirements within 6 months of a federal standard's promulgation. Until such time as a state standard is promulgated, federal OSHA provides interim enforcement assistance, as appropriate, in these states. A listing of approved state plans appears at the end of this publication.

---

## Consultation Services

Consultation assistance is available on request to employers who want help in establishing and maintaining a safe and healthful workplace. Largely funded by OSHA, the service is provided at no cost to the employer. Primarily developed for smaller employers with more hazardous operations, the consultation service is delivered by state government agencies or universities employing professional safety consultants and health consultants. Comprehensive assistance includes an appraisal of all mechanical, physical work practices and environmental hazards of the workplace and all aspects of the employer's present job safety and health program.

The program is separate from OSHA's inspection efforts. No penalties are proposed or citations issued for any safety or health problems identified by the consultant. The service is confidential.

For more information concerning consultation assistance, see the list of consultation projects at the end of this publication.

---

## Voluntary Protection Programs (VPPs)

Voluntary Protection Programs (VPPs) and onsite consultation services, when coupled with an effective enforcement program, expand worker protection to help meet the goals of the OSH Act. The three VPPs—Star, Merit, and Demonstration—are designed to recognize outstanding achievement by companies that have successfully incorporated comprehensive safety and health programs into their total management system. They motivate others to achieve excellent safety and health results in the same outstanding way as they establish a cooperative relationship among employers, employees, and OSHA.

For additional information on VPPs and how to apply, contact the OSHA area or regional offices listed at the end of this publication.

---

## Training and Education

OSHA's area offices offer a variety of informational services, such as publications, audiovisual aids, technical advice, and speakers for special engagements. OSHA's Training Institute in Des Plaines, IL, provides basic and advanced courses in safety and health for federal and state compliance officers, state consultants, federal agency personnel, and private sector employers, employees, and their representatives.

OSHA also provides funds to nonprofit organizations, through grants, to conduct workplace training and education in subjects where OSHA believes there is a lack of workplace training. Grants are awarded annually and grant recipients are expected to contribute 20 percent of the total grant cost.

For more information on grants, training and education, contact the OSHA Training Institute, Office of Training and Education, 1555 Times Drive, Des Plaines, IL 60018, (847) 297-4810; (847) 297-4874 fax.

For further information on any OSHA program, contact your nearest OSHA area or regional office listed at the end of this publication.

---

## Electronic Information

**Internet**—OSHA standards, interpretations, directives, and additional information are now on the World Wide Web at <http://www.osha.gov>.

**CD-ROM**—A wide variety of OSHA materials including standards, interpretations, directives, and more can be purchased on CD-ROM from the Government Printing Office. To order, write to Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954. Specify OSHA Regulations, Documents and Technical Information on CD-ROM, (ORDT), S/N 729-1300000-5. The price is \$38 per year (\$47.50 foreign); \$15 per single copy (\$18.75 foreign).

---

## Emergencies

To report life-threatening situations, fatalities, or catastrophes, call (800) 321-OSHA. Complaints will go immediately to the nearest OSHA area or state office for help.

For further information on any OSHA program, contact your nearest OSHA area or regional office listed at the end of this publication.

For further information on VDTs, please consult the following sources:

Occupational Safety and Health Administration (OSHA)  
U.S. Department of Labor  
Technical Data Center, Room N2439  
200 Constitution Avenue, N.W.  
Washington, D.C. 20210

U.S. Department of Health and Human Services  
Public Health Service  
Center for Disease Control  
National Institute for Occupational Safety and Health (NIOSH)  
Robert A. Taft Laboratories  
4676 Columbia Parkway  
Cincinnati, OH 45226-1998

---

## Video Display Terminal (VDT) Checklist

*Can the work station be adjusted to ensure proper posture by*

- |   | <b>Yes</b>               | <b>No</b>                |
|---|--------------------------|--------------------------|
| • adjusting knee and hip angles to achieve comfort and variability,         | <input type="checkbox"/> | <input type="checkbox"/> |
| • supporting heels and toes on the floor or on a footrest,                  | <input type="checkbox"/> | <input type="checkbox"/> |
| • placing arms comfortably at the side and hands parallel to the floor, and | <input type="checkbox"/> | <input type="checkbox"/> |
| • supporting wrist (nearly straight) on a padded surface?                   | <input type="checkbox"/> | <input type="checkbox"/> |

*Does the work area*

- |   |                          |                          |
|---|--------------------------|--------------------------|
| • provide enough clearance for the feet, knees, and legs relative to the edge of the work surface;                                  | <input type="checkbox"/> | <input type="checkbox"/> |
| • provide sufficient space for the thighs between the work surface and the seat;  | <input type="checkbox"/> | <input type="checkbox"/> |
| • include arm rests for intensive or long duration keying jobs; and   | <input type="checkbox"/> | <input type="checkbox"/> |
| • include headsets for use when frequent telephone work is combined with hand tasks such as typing, using a calculator, or writing? | <input type="checkbox"/> | <input type="checkbox"/> |

*Does the chair*

- |   |                          |                          |
|---|--------------------------|--------------------------|
| • adjust easily from the seated position,                                       | <input type="checkbox"/> | <input type="checkbox"/> |
| • have a padded seat pan,   | <input type="checkbox"/> | <input type="checkbox"/> |
| • have a seat that is approximately 18 inches wide (45.72 centimeters),         | <input type="checkbox"/> | <input type="checkbox"/> |
| • have a back rest that provides lumbar support that can be used while working, | <input type="checkbox"/> | <input type="checkbox"/> |
| • have a stable base with casters that are suited to the type of flooring,      | <input type="checkbox"/> | <input type="checkbox"/> |

	Yes	No
<ul style="list-style-type: none"> <li>• have different seat pan lengths (15 to 17 inches or 38.10 and 43.18 centimeters) with a waterfall design available, and</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>
<ul style="list-style-type: none"> <li>• allow the seat pan to adjust for both height (minimum of 4 1/2 inches or 10.16-1.27 centimeters) and angle (plus or minus 5 degrees)?</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Is the keyboard</i>		
<ul style="list-style-type: none"> <li>• height from the floor and the slope of the keyboard surface adjustable,</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>
<ul style="list-style-type: none"> <li>• prevented from slipping when in use, and</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>
<ul style="list-style-type: none"> <li>• detachable?</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Are other inputs/devices (mouse, pointer, calculator)</i>		
<ul style="list-style-type: none"> <li>• at keyboard height?</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Is the display screen</i>		
<ul style="list-style-type: none"> <li>• clean and free from flickering, and</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>
<ul style="list-style-type: none"> <li>• able to swivel horizontally and tilt or elevate vertically?</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Is the monitor situated so that</i>		
<ul style="list-style-type: none"> <li>• the work can be performed with the head in a neutral posture for most of the workshift,</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>
<ul style="list-style-type: none"> <li>• it is between 18 and 30 inches (45.72 and 76.20 centimeters, respectively) away from the operator,</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>
<ul style="list-style-type: none"> <li>• the top line of text is at or slightly below eye height, and</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>

---

	Yes	No
<ul style="list-style-type: none"><li>• there is sufficient lighting without glare on the screen from lights, windows, or surfaces?</li></ul>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Does the monitor</i>		
<ul style="list-style-type: none"><li>• have brightness and contrast controls?</li></ul>	<input type="checkbox"/>	<input type="checkbox"/>
<i>Is the job organized so that</i>		
<ul style="list-style-type: none"><li>• workers can change postures frequently,</li></ul>	<input type="checkbox"/>	<input type="checkbox"/>
<ul style="list-style-type: none"><li>• workers can perform different job tasks to reduce intensive keying,</li></ul>	<input type="checkbox"/>	<input type="checkbox"/>
<ul style="list-style-type: none"><li>• workers can leave their workstations for at least 10 minutes after each hour of intensive keying and for at least 15 minutes after every 2 hours of intermittent keying, and</li></ul>	<input type="checkbox"/>	<input type="checkbox"/>
<ul style="list-style-type: none"><li>• the workers have received training in ergonomics and know how to make adjustments to their work stations, chairs, and other accessories?</li></ul>	<input type="checkbox"/>	<input type="checkbox"/>

---

Arnt, R. "Working Posture and Musculoskeletal Problems of Video Display Terminal Operators: Review and Reappraisal." *Am Ind Hyg Assoc J* 44: 437-446, 1983.

Carter, J.B. and Banister, E.W. "Musculoskeletal Problems in VDT Work: A Review." *Ergonomics* 37(10):1623-1648, 1994.

Clift, Elayne. "Personal Computers—User Friendly?" *Gov Exe* 21 (8):38-40. August 1989.

Grandjean, Etienne. *Ergonomics in Computerized Offices*. New York: Taylor & Francis, 1987. 227 Pp.

Kroemer, K.H.E. "Avoiding Cumulative Trauma Disorders in Shops and Offices." *Am Ind Hyg Assoc J* 53(9):596-604, 1992.

Murray, W.E.; Mass, C.E.; Parr, W.H.; and Cox, C. "A Radiation and Industrial Hygiene Survey of Video Display Terminal Operations." *Hum Factors* 23:413-420, 1981.

Pascarella, E. and Quilter, Deborah. *Repetitive Strain Injury—A Computer User's Guide*. John Wiley and Sons, Inc., New York, 1994.

Peterson, John E. "RMI: The Hazard of the 90s." Science/Health Section. *Marin Indep J*:F6. July 30, 1989.

U.S. Department of Health and Human Services. National Institute for Occupational Safety and Health (NIOSH), Public Health Service. *NIOSH Publications on Video Display Terminals* (Revised). NIOSH, Cincinnati, OH, 1991.

---

A single free copy of the following materials may be obtained from the OSHA Publications Office, U. S. Department of Labor, 200 Constitution Avenue, N.W., Room N3101, Washington, DC 20210, (202) 219-4667; (202) 219-9266 (fax), or from the nearest OSHA regional or area offices listed at the end of this booklet. Please send a self-addressed label with your written request.

***All About OSHA*** – OSHA 2056

***Consultation Services for the Employer*** – OSHA 3047

***Employee Workplace Rights*** – OSHA 3021

***Ergonomics Program Management Guidelines for Meatpacking Plants*** – OSHA 3123

***How to Prepare for Workplace Emergencies*** – OSHA 3088

***OSHA Publications and Audiovisual Programs*** –  
OSHA 2019

***Personal Protective Equipment*** – OSHA 3077

The following publications are available from the U.S. Government Printing Office, Superintendent of Documents, Washington, DC 20402, (202) 512-1800. Include GPO Order No. and make checks payable to Superintendent of Documents.

***Ergonomics: The Study of Work***

Order No. 029-016-00124-7. Cost: \$1.00

***Job Safety & Health Quarterly***

Order No. JSH. Cost: \$9.50/year (Foreign \$11.90)

---

Albany, NY .....	(518) 457-2741
Baltimore, MD .....	(410) 767-2999
Carson City, NV .....	(702) 687-3032
Cheyenne, WY .....	(307) 777-7786
Columbia, SC .....	(803) 734-9594
Des Moines, IA .....	(515) 281-3447
Frankfort, KY .....	(502) 564-3070
Hato Rey, PR .....	(809) 754-2119
Honolulu, HI .....	(808) 586-8844
Indianapolis, IN .....	(317) 232-2378
Juneau, AK .....	(907) 465-2700
Lansing, MI .....	(517) 373-7230
Montpelier, VT .....	(802) 828-2288
Nashville, TN .....	(615) 741-2582
Olympia, WA .....	(360) 902-4200
Phoenix, AZ .....	(602) 542-5795
Raleigh, NC .....	(919) 662-4585
Richmond, VA .....	(804) 786-2377
Salem, OR .....	(503) 378-3272
Salt Lake City, UT .....	(801) 530-6898
San Francisco, CA .....	(415) 972-8835
Santa Fe, NM .....	(505) 827-2850
St. Croix, VI .....	(809) 773-1994
St. Paul, MN .....	(612) 296-2342
Wethersfield, CT .....	(860) 566-5123

State	Telephone
Alabama .....	(205) 348-7136
Alaska .....	(907) 269-4957
Arizona .....	(602) 542-5795
Arkansas .....	(501) 682-4522
California .....	(415) 972-8515
Colorado .....	(970) 491-6151
Connecticut .....	(860) 566-4550
Delaware .....	(302) 761-8219
District of Columbia .....	(202) 576-6339
Florida .....	(904) 488-3044
Georgia .....	(404) 894-2646
Guam .....	(671) 475-0136
Hawaii .....	(808) 586-9100
Idaho .....	(208) 385-3283
Illinois .....	(312) 814-2337
Indiana .....	(317) 232-2688
Iowa .....	(515) 281-5352
Kansas .....	(913) 296-7476
Kentucky .....	(502) 564-6895
Louisiana .....	(504) 342-9601
Maine .....	(207) 624-6460
Maryland .....	(410) 333-4210
Massachusetts .....	(617) 727-3982
Michigan .....	(517) 332-8250(H)
.....	(517) 322-1809(S)
Minnesota .....	(612) 297-2393
Mississippi .....	(601) 987-3981
Missouri .....	(573) 751-3403
Montana .....	(406) 444-6418
Nebraska .....	(402) 471-4717
Nevada .....	(702) 486-5016
New Hampshire .....	(603) 271-2024
New Jersey .....	(609) 292-2424
New Mexico .....	(505) 827-4230
New York .....	(518) 457-2481
North Carolina .....	(919) 662-4644
North Dakota .....	(701) 328-5188
Ohio .....	(614) 644-2246
Oklahoma .....	(405) 528-1500
Oregon .....	(503) 378-3272
Pennsylvania .....	(412) 357-2561

---

Puerto Rico .....	(809) 754-2188
Rhode Island .....	(401) 277-2438
South Carolina .....	(803) 734-9614
South Dakota .....	(605) 688-4101
Tennessee .....	(615) 741-7036
Texas .....	(512) 440-3834
Utah .....	(801) 530-6868
Vermont .....	(802) 828-2765
Virginia .....	(804) 786-6359
Virgin Islands .....	(809) 772-1315
Washington .....	(360) 902-5638
West Virginia .....	(304) 558-7890
Wisconsin .....	(608) 266-8579(H)
.....	(414) 521-5063(S)
Wyoming .....	(307) 777-7700

(H) - Health

(S) - Safety

Area	Telephone
Albany, NY .....	(518) 464-4338
Albuquerque, NM .....	(505) 248-5302
Allentown, PA .....	(610) 776-0592
Anchorage, AK .....	(907) 271-5152
Appleton, WI .....	(414) 734-4521
Austin, TX .....	(512) 916-5783
Avenel, NJ .....	(908) 750-3270
Baltimore, MD .....	(410) 962-2840
Bangor, ME .....	(207) 941-8177
Baton Rouge, LA .....	(504) 389-0474
Bayside, NY .....	(718) 279-9060
Bellevue, WA .....	(206) 553-7520
Billings, MT .....	(406) 247-7494
Birmingham, AL .....	(205) 731-1534
Bismarck, ND .....	(701) 250-4521
Boise, ID .....	(208) 334-1867
Bowmansville, NY .....	(716) 684-3891
Braintree, MA .....	(617) 565-6924
Bridgeport, CT .....	(203) 579-5581
Calumet City, IL .....	(708) 891-3800
Carson City, NV .....	(702) 885-6963
Charleston, WV .....	(304) 347-5937
Cincinnati, OH .....	(513) 841-4132
Cleveland, OH .....	(216) 522-3818
Columbia, SC .....	(803) 765-5904
Columbus, OH .....	(614) 469-5582
Concord, NH .....	(603) 225-1629
Corpus Christi, TX .....	(512) 888-3420
Dallas, TX .....	(214) 320-2400
Denver, CO .....	(303) 844-5285
Des Plaines, IL .....	(847) 803-4800
Des Moines, IA .....	(515) 284-4794
Englewood, CO .....	(303) 843-4500
Erie, PA .....	(814) 833-5758
Fort Lauderdale, FL .....	(954) 424-0242
Fort Worth, TX .....	(817) 428-2470
Frankfort, KY .....	(502) 227-7024
Harrisburg, PA .....	(717) 782-3902
Hartford, CT .....	(860) 240-3152
Hasbrouck Heights, NJ .....	(201) 288-1700
Guaynabo, PR .....	(787) 277-1560
Honolulu, HI .....	(808) 541-2685
Houston, TX .....	(281) 286-0583

---

Houston, TX .....	(281) 591-2438
Indianapolis, IN .....	(317) 226-7290
Jackson, MS .....	(601) 965-4606
Jacksonville, FL .....	(904) 232-2895
Kansas City, MO .....	(816) 483-9531
Lansing, MI .....	(517) 377-1892
Little Rock, AR .....	(501) 324-6291
Lubbock, TX .....	(806) 472-7681
Madison, WI .....	(608) 264-5388
Marlton, NJ .....	(609) 757-5181
Methuen, MA .....	(617) 565-8110
Milwaukee, WI .....	(414) 297-3315
Minneapolis, MN .....	(612) 348-1994
Mobile, AL .....	(334) 441-6131
Nashville, TN .....	(615) 781-5423
New York, NY .....	(212) 466-2482
Norfolk, VA .....	(804) 441-3820
North Aurora, IL .....	(630) 896-8700
North Syracuse, NY .....	(315) 451-0808
Oklahoma City, OK .....	(405) 231-5351
Omaha, NE .....	(402) 221-3182
Parsippany, NJ .....	(201) 263-1003
Peoria, IL .....	(309) 671-7033
Philadelphia, PA .....	(215) 597-4955
Phoenix, AZ .....	(602) 640-2007
Pittsburgh, PA .....	(412) 644-2903
Portland, OR .....	(503) 326-2251
Providence, RI .....	(401) 528-4669
Raleigh, NC .....	(919) 856-4770
Sacramento, CA .....	(916) 566-7470
Salt Lake City, UT .....	(801) 487-0073
San Diego, CA .....	(619) 557-2909
Savannah, GA .....	(912) 652-4393
Smyrna, GA .....	(770) 984-8700
Springfield, MA .....	(413) 785-0123
St. Louis, MO .....	(314) 425-4249
Tampa, FL .....	(813) 626-1177
Tarrytown, NY .....	(914) 524-7510
Toledo, OH .....	(419) 259-7542
Tucker, GA .....	(770) 493-6644
Westbury, NY .....	(516) 334-3344
Wichita, KS .....	(316) 269-6644
Wilkes-Barre, PA .....	(717) 826-6538
Wilmington, DE .....	(302) 573-6115

---

**Region I****(CT,\* MA, ME, NH, RI, VT\*)**

JFK Federal Building  
Room E-340  
Boston, MA 02203  
Telephone: (617) 565-9860

**Region II****(NJ, NY,\* PR,\* VI\*)**

201 Varick Street  
Room 670  
New York, NY 10014  
Telephone: (212) 337-2378

**Region III****(DC, DE, MD,\* PA, VA,\* WV)**

Gateway Building, Suite 2100  
3535 Market Street  
Philadelphia, PA 19104  
Telephone: (215) 596-1201

**Region IV****(AL, FL, GA, KY,\* MS, NC,  
SC,\* TN\*)**

Atlanta Federal Center  
61 Forsyth Street, S.W., Room  
6T50  
Atlanta, GA 30303  
Telephone: (404) 562-2300

**Region V****(IL, IN,\* MI,\* MN,\* OH, WI)**

230 South Dearborn Street  
Room 3244  
Chicago, IL 60604  
Telephone: (312) 353-2220

**Region VI****(AR, LA, NM,\* OK, TX)**

525 Griffin Street  
Room 602  
Dallas, TX 75202  
Telephone: (214) 767-4731

**Region VII****(IA,\* KS, MO, NE)**

City Center Square  
1100 Main Street, Suite 800  
Kansas City, MO 64105  
Telephone: (816) 426-5861

**Region VIII****(CO, MT, ND, SD, UT,\* WY\*)**

1999 Broadway, Suite 1690  
Denver, CO 80202-5716  
Telephone: (303) 844-1600

**Region IX****(American Samoa, AZ,\* CA,\*  
Guam, HI,\* NV,\* Trust Territo-  
ries of the Pacific)**

71 Stevenson Street  
Room 420  
San Francisco, CA 94105  
Telephone: (415) 975-4310

**Region X****(AK,\* ID, OR,\* WA\*)**

1111 Third Avenue  
Suite 715  
Seattle, WA 98101-3212  
Telephone: (206) 553-5930

---

\*These states and territories operate their own OSHA-approved job safety and health programs (Connecticut and New York plans cover public employees only). States with approved programs must have a standard that is identical to, or at least as effective as, the federal standard.

---

