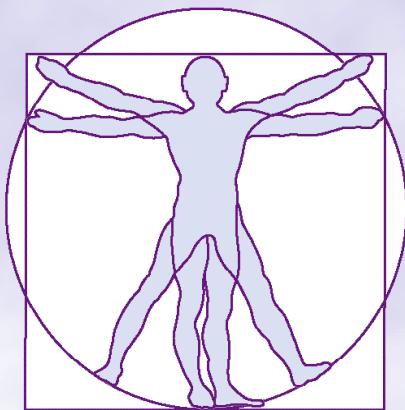


**COMMUNICATIONS
WORKERS
OF AMERICA**

Airlines
Reservations
Centers
Workplace
Ergonomics
Awareness
Training
Program



Airlines Reservations Centers Workplace Ergonomics Awareness Training Program



Communications Workers of America

This manual was prepared under grant number 46C1-HT08 from the Occupational Safety and Health Administration, U.S. Department of Labor. Within the manual, grant-developed materials are noted. Points of view or opinions stated in this document do not necessarily reflect the views of the U.S. Department of Labor, nor does mention of trade names, commercial products, or organizations imply endorsement by the United States Government.

CWA Safety and Health Department 2003

Airlines Reservations Centers Workplace Ergonomics Awareness Training Program

CHAPTER 1	
Airlines Reservations Centers Workplace Ergonomics Awareness Program	1
CHAPTER 2	
Human Anatomy and Physiology	3
CHAPTER 3	
Computers and Vision Problems: An Introduction	9
Fact Sheet: Lighting	10
Fact Sheet: Glare	11
Fact Sheet: Computer Monitor	12
Corrective Action Checklist: Visual Problems	13
Job Hazard Analysis—Computer Operation: Visual Problems	15
Take Home Questions: Vision and Visual Problems with Explanation	16
CHAPTER 4	
Computers and Musculoskeletal Health Problems: An Introduction	19
Fact Sheet: Keyboard/Keypad/Mouse Design	21
Fact Sheet: Chair	22
Fact Sheet: Workstation	24
Computer and Workstation Design Variables	26
Corrective Action Checklist: Musculoskeletal Health Problems	27
Job Hazard Analysis—Computer Operation: Musculoskeletal Health Problems.....	29
Take Home Questions: Musculoskeletal Health Problems with Explanation	31
CHAPTER 5	
Occupational Stress and the Workplace	36
APPENDICES	
1-Day Airlines Reservations Centers Workplace Ergonomics Training Evaluation	39
Grant-Developed Materials.....	40

Airlines Reservations Centers Workplace Ergonomics Awareness Program

Changing technology and work organization have affected CWA members greatly. In some instances, these changes have improved member working conditions, but in others, they have created several occupational safety and health hazards. One product of new technology—the computer—has, in part, resulted in increased worker productivity and efficiency, but often with a corresponding development of occupational safety and health problems.

CWA and its members have been in the forefront of experiencing and investigating the increased implementation and use of computers. Since the late 1970s, the number of members utilizing computers to perform their jobs has increased from a few thousand to more than 450,000. During that time, the Union's Occupational Safety and Health Department has been actively involved in developing computer workplace educational materials, conducting training sessions, drafting collective bargaining language, and conducting and sponsoring surveys and scientific research.

CWA's experience, supported by scientific research, has demonstrated that there are specific health symptoms and illnesses associated with computer use. These may be categorized as visual, musculoskeletal, and stress.

What Is Ergonomics?

Ergonomics is the relationship between human beings and the work process and environment. Simply put, ergonomics means fitting the workplace to the physical, psychological, and psychosocial characteristics of workers rather than having employees adapt to meet the design of workplace tools, equipment, and tasks. Ergonomics is a systematic approach to creating tools and equipment, work environments, and work organizations that are safe, comfortable, and productive. Failure to develop, introduce, and adhere to ergonomics principles often results in workers suffering cumulative trauma or repetitive motion musculoskeletal health symptoms and disorders.

The CWA Airlines Reservations Centers Workplace Ergonomics Awareness Training Program has been developed to assist the Union's leaders and members in the:

- n Identification and resolution of airlines reservations centers (computer) workplace ergonomic factors as well as related health hazards and member health problems, and
- n Prevention of cumulative trauma or repetitive motion musculoskeletal health symptoms and disorders in workers at airlines reservations centers (computer) workplaces.

AIRLINES RESERVATIONS CENTERS WORKPLACE ERGONOMICS AWARENESS PROGRAM

Identifying health hazards and problems is the first step toward resolving airlines reservations centers (computer) ergonomic problems. Airlines reservations centers (computer) ergonomic health hazards may be categorized as:

- n Visual,
- n Musculoskeletal, and
- n Stress.

By reviewing the "2001 CWA US Airways Reservations Centers Workplace Er-

gonomics Survey," we will be able to identify these health hazards and related airlines reservations centers (computer) workplace ergonomic risk factors.

After this we will discuss what is ergonomics as well as what is the worker's and Union's role in the identification, resolution, and prevention of airlines reservations centers (computer) workplace cumulative trauma or repetitive motion health symptoms and illnesses.

Human Anatomy and Physiology

In this chapter we'll review parts of the musculoskeletal system of the body and how they relate to ergonomics. Even a basic understanding of this system will help you understand the causes, signs and symptoms, and risk factors associated with the development of a number of important repetitive motion illnesses. We'll concentrate our review on the upper part of the human body (also referred to as the upper extremities) which includes the vertebral column (the spine), the neck and shoulders, the arms, and the hands. These body segments were selected since they are where most of the work-related disorders and injuries associated with poor ergonomics are likely to show up.

The Musculoskeletal System

The skeletal system (see figure on page 4) provides support and stability for the body, protects the organs of the body, allows movement and provides leverage for the body, and produces blood cells and stores calcium. The skeletal muscles are responsible for the body's movement and posture.

Muscular Activity: Dynamic and Static Work

All work can be broken down into dynamic or static work; all jobs have both

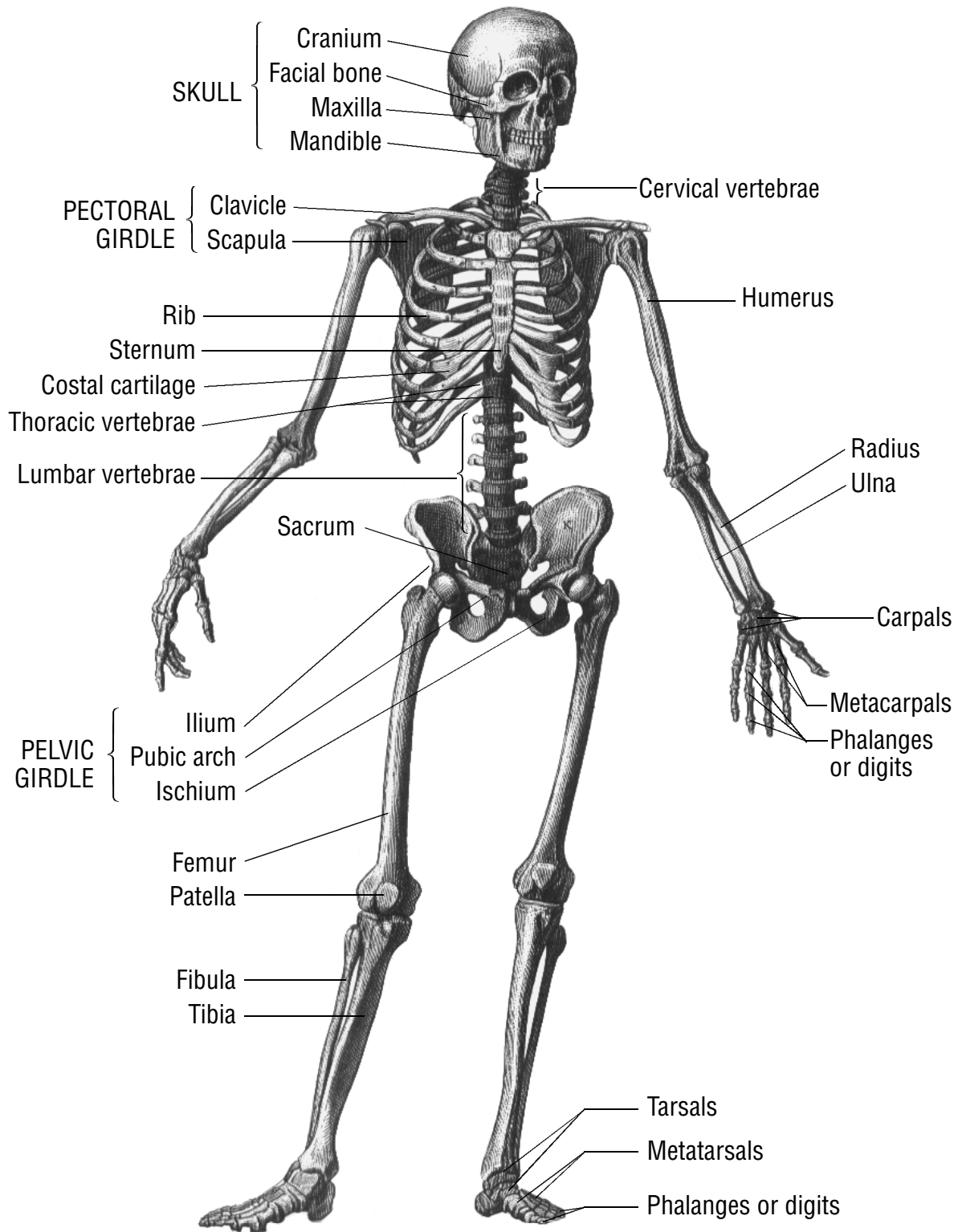
static and dynamic work elements. Static work involves holding a fixed posture for a lengthy period of time, like sitting or standing still. Static work can eventually lead to inflamed tendons or joints, lower back pain, as well as tendinitis, arthritis, and other musculoskeletal disorders.

Dynamic work involves body movement, holding and releasing tools, or material handling. Dynamic work may be linked to a variety of cumulative trauma disorders if it involves forceful, awkward, and repetitive movements without proper rest between them.

Cumulative Trauma Disorders

Cumulative Trauma Disorders (CTDs) go by a variety of different names, such as repetitive strain illnesses (RSIs) or repetitive motion illnesses (RMIs). Whatever term we use, CTDs are injuries associated with the gradual and repeated exposure to workplace risk factors that affect parts of the musculoskeletal, cardiovascular, and/or nervous systems. What makes CTDs different from other illnesses and injuries, such as lacerations, bruises, and broken bones, is that CTDs don't usually occur after a single exposure (trauma) to a risk factor like an unguarded saw blade, a slippery floor, or a flying object. CTDs develop after exposure

Skeletal System



to *repeated traumas*. Unfortunately for workers, there is no way to say exactly how long or how much exposure is required before these CTDs occur. The symptoms develop gradually over time spans that may vary from weeks to years.

The more common CTDs are strains, tendinitis, synovitis, tenosynovitis, bursitis, ganglionic cysts, or carpal tunnel syndrome. Details on each type of CTD and their causes are provided in this chapter.

Risk factors that are directly related to the development of work-related CTDs include:

- ☒ **Repetition:** Short work cycles and a high number of repetitions lead to increased muscular demand which can significantly increase the risk of a CTD, even under very small forces.
- ☒ **Posture:** Fixed or constrained postures are considered an important factor contributing to the development of CTDs. Jobs which require repeated stretching, reaching, extreme flexion of the elbow, reaching down and behind the body, and extreme rotation of the lower arm are also related to CTDs. These types of postures and movements are frequently required in many jobs in airlines reservations centers.
- ☒ **Force:** Force is another important risk factor. Job tasks requiring considerable force and static work (prolonged gripping of a hand or power tool) require longer and more frequent rest periods to recover from muscle fatigue. Insufficient recovery time may lead to repetitive motion illness.
- ☒ **Contact stressors:** Resting forearms or wrists on edges of work surfaces, tables, or equipment can cause stress for tendons and nerves.

- ☒ **Work organization/job design:** Work organization/job design risk factors are also important. Risk factors including work pace, workload, job security, and lack of control over work can contribute to the development of repetitive motion health symptoms and disorders. Health symptoms and disorders such as anxiousness, irritability, high blood pressure, ulcers, and headaches can be caused by poor work organization/job design.

There are also a number of non-work related risk factors, such as congenital (inherited) conditions, pregnancy, obesity, medication, diseases, overall fitness levels, and others.

Having reviewed the primary risk factors associated with the development of cumulative trauma disorders, let's now look at key parts of the musculoskeletal system and the types of CTDs associated with them.

Back Problems

Back disorders may result from several different sources, including congenital conditions, accidents, disease, and work-related activities. Overexertion of the vertebral column may lead to strains and sprains. But *repeated traumas* to the vertebral column may cause damage to the intervertebral disks, and in more extreme cases, damage to the vertebrae themselves.

While many cases of low back pain will resolve themselves on their own, a considerable number of cases will not fully heal and cause long-term discomfort, pain, and inability to carry on many work activities. There is no quick fix or even total cure for most back problems. To identify motions and/or tasks that can cause back problems, ergonomic job analysis should be con-

ducted. Ergonomic job analysis and workstation redesign are techniques for evaluating the sitting, reaching, stretching, lifting, pushing, pulling, and carrying done by workers.

Where possible, pushing, reaching, stretching, and pulling should be minimized. Sitting for lengthy periods of time in static, constrained postures should be minimized. Also, lifting should be minimized as much as possible, particularly lifting that involves twisting at the same time. Ideally, lifting should be done between the knuckles (when they are resting in a neutral position at the side of the torso) and the shoulders.

A Pain in the Neck

The neck is frequently involved in work-related discomfort and pain. Prolonged bending of the muscles of the neck is probably the most common cause of discomfort. In addition, psychological stress, which usually increases the muscular tension throughout the body, is particularly critical to the muscles of the neck.

Shoulder Problems

Work-related shoulder disorders are often associated with job tasks that require stretching, reaching, and where the elbow is kept in an elevated position. If your job requires you to keep your hands above your shoulder for significant periods day in and day out, you might develop a condition known as “frozen shoulder.”

Repeated motion of the arm away from the body can lead to a common shoulder disorder known as *rotator cuff tendinitis*. Baseball pitchers are prone to this condition, which is characterized by a persistent and dull pain in the shoulder region and discomfort in the arms.

Cumulative trauma disorders of the

hands and arms can be broken down into disorders of the tendons, nerves, and neurovascular (nerves and blood vessels) system.

☒ **Tendon disorders:** *Tendinitis* is a form of tendon inflammation resulting from frequent tensioning or overuse. The only way to prevent this inflammation is to provide time for rest and recovery

☒ **Nerve disorders:** Nerve disorders are associated with repeated exposure to contact stressors, such as sharp edges of tools or work surfaces, or even of other adjacent bones, ligaments, or tendons. Perhaps the best known CTD nerve disorder is *carpal tunnel syndrome*. Carpal tunnel syndrome victims may experience great pain and may be unable to grasp objects. Many of these symptoms will first occur away from work, often in bed.

☒ **Neurovascular disorders:** One of the most common neurovascular disorders is *cervical brachial syndrome*. Compression of blood vessels results from activities that pull the shoulders back and down and work that requires constant overhead motions. This condition produces numbness in the fingers and a weakening of the pulse.

Diagnosis and Treatment of CTDs

As with most illnesses, early detection greatly improves the chances of successful treatment. The first line of defense in early detection is **knowing the code**, which in this case means the warning signs.

The following are warning signs for carpal tunnel syndrome:

- n Do your hands or arms tingle or “burn”?
- n Do your hands feel numb?
- n Do you feel the need to massage your hands, neck, or arm to try to work out the

tightness and pain?

n Are you awakened at night with pain in your hands?

If you answered “Yes” to any of the above questions, you should seek medical advice. The table on page 8 contains warning signs for other CTDs. You are really the first line of defense, because only you can tell if any of these signs are showing up. If they are, you need to consult a doctor.

The treatment of CTDs will vary by in-

dividual; the process may be lengthy, and it may require restrictions in your work and non-work activities. It may also involve some modification in your work station, tools, or work methods. Generally, the treatment strategy utilizes a conservative approach, which may rely on one or more of four treatments: (1) *motion restriction* of the affected limb using braces or splints; (2) *application of heat or cold* to relieve pain and help the recovery process; (3) *use of anti-inflammatory medicine and pain-killers*; and (4) *specific physical exercises, massage, and stretching*.

COMMON CUMULATIVE TRAUMA DISORDERS

What Is It?	How's It Caused?	Who Gets It?
<p>Carpal tunnel syndrome: Feels like tingling in the fingertips, often followed by numbness and pain in the hands; can include vise-like pressure on wrists; pressure can send shocks of pain throughout the forearm and upper arm.</p>	<p>Repetitive motion of the wrist, especially fully extending the hand toward the forearm (flexion) or away from the forearm (extension); repeatedly bending the wrist to either side; pinch-gripping a tool or device.</p>	<p>Data-entry workers, journalists, cashiers, butchers, musicians, bricklayers, meat packers, assembly line workers, telecommunications workers, airlines reservations center workers.</p>
<p>Tendonitis of the wrist: Feels like pain in the wrist, especially on the outer edges of the hand rather than through the center of the hand.</p>	<p>Forceful bending of the wrist forward or backward; forceful bending of the wrist away from the outer arm (so that the thumb points upward).</p>	<p>Assembly-line workers, meat packers, electricians, plumbers, airlines reservations center workers.</p>
<p>Tendonitis of the shoulder or rotator cuff syndrome: Feels like dull, persistent ache in the shoulder region; sometimes can be pain in the arms.</p>	<p>Working with the elbows elevated with hand above the shoulder; regularly carrying loads on the shoulder; throwing objects.</p>	<p>Construction workers, painters, letter carriers, auto mechanics working underneath cars, airlines reservations center workers.</p>
<p>Neck-tension syndrome: Feels like dull pain in neck and upper shoulders; can include moderate to severe stiffness.</p>	<p>Maintaining the same posture for long periods of time; carrying loads, either on the shoulder or in the hand.</p>	<p>Typists, packers, small-part assemblers, conveyor-belt offbearers, airlines reservations center workers.</p>
<p>De Quervain's syndrome: Feels like pain especially on the side of the wrist and the base of the thumb.</p>	<p>Repeated wrist motions; forcefully extending the hand backward or to the side, or rapidly rotating the hand.</p>	<p>Riveters, surgeons, lumber workers, heavy manufacturing assemblers, airlines reservations center workers.</p>
<p>Thoracic outlet syndrome: Feels like carpal tunnel syndrome (see above) and it is sometimes mistaken for it. It involves the shoulder and upper arm instead of the wrist.</p>	<p>Working for long periods in a posture that restricts upper body movement; continuously reaching overhead; carrying loads in the hand or "lugging" loads around using a shoulder strap.</p>	<p>Frequent travelers who carry their own bags, overhead assembly workers, auto mechanics, finishers, data entry workers, airlines reservations center workers.</p>
<p>Tenosynovitis: Feels like dull persistent pain in the hands and shoulders.</p>	<p>Repeated wrist motions; forcefully extending the hand backward or to the side or rapidly rotating the hand.</p>	<p>Riveters, surgeons, lumber workers, heavy manufacturing assemblers, airlines reservations center workers.</p>

Computers and Vision Problems: An Introduction

Visual health problems of workers in airlines reservations centers include:

- n visual fatigue,
- n headaches,
- n eyestrain, and
- n sore eyes.

Visual fatigue is caused by the eyes being overused without a break from viewing or by environmental conditions such as glare from the viewing surfaces that cause the eyes to focus too hard. Overuse in reading can produce temporary “myopia” or nearsightedness.

Headaches can occur from constant viewing without a break. Sore eyes and eyestrain are symptoms of overusing the eyes and exposure to reflections and glare.

There is no evidence that these visual health problems are permanent. The National Academy of Sciences has described these visual health problems as “discomfort.” Fortunately, these visual health problems are usually temporary. Often they disappear after you leave work and have a chance to rest. Visual health problems are more likely to occur in office jobs than in most other kinds of work, except industrial quality inspectors.

Risk Factors

- n Illumination (too much light or too little light),
- n Glare from windows, computer screens, and other shiny surfaces,
- n The computer monitor (screen flickering and jitter, difficult to read screen characters, and poor contrast between the screen characters and background),
- n Working too long without a break.

Each of these risk factors will be covered in more detail in several fact sheets.

FACT SHEET

Lighting

Lighting or illumination has three key properties that we are concerned with in airlines reservations centers: illumination, luminance, and reflectance. They might sound alike, and indeed they're related, but they are different.

Illumination is the amount of light that falls on a given surface.

Luminance or brightness is the amount of light *reflected* from a given surface area.

Reflectance is the ratio of luminance from a single reference area to the illumination on that same surface.

Airlines reservations centers (computer) offices should be designed or remodeled with non-gloss, matte or earth tone finishes on ceilings, walls, and floor coverings. For example, dark green or brown colors are preferred over light green.

How Much Illumination Do I Need?

In a 2001 survey of CWA members working in US Airways Reservations Centers, 62% of reservations agents reported that the workplace lighting or illumination in their work area seemed too bright or caused glare, making screen characters harder to read. The illumination required for a task is determined by the visual requirements of the task and the visual capabilities of the concerned employees. The illumination in workplaces in which only computer monitors are used should be lower than in workplaces in which hard copy is used. For example, you probably want less light when you watch TV and more light when you're trying to read a

book or newspaper. Thus, lower levels of illumination will provide better computer (as well as TV) screen image quality and reduce screen glare.

The lighting level in your work area should also be set up according to the visual demands of the tasks performed. Conflicts can arise when different employees in the same office who have differing job task requirements or differing visual capabilities perform both computer and hard copy work. As a compromise, room lighting can be set at lower or intermediate levels and additional task lighting can be provided at each workstation as needed. Such additional lighting must be carefully shielded and properly placed to avoid glare and reflections on the computer screens and adjacent working surfaces.

FACT SHEET**Glare**

Excessive luminance (brightness) may produce glare. Glare from light sources (bulbs, luminaires, and lighting bays) is called *direct glare*, while glare reflected from surfaces is termed *reflected glare*. Direct glare can be reduced by shielding the light sources with shades, baffles, or louvers, or through recessed or indirect lighting. Going back to our television example, in our TV room we wouldn't want to turn on lamps without the glare protection provided by lampshades; therefore, we use lampshades to cover or shield bare light bulbs to protect the eyes from *direct glare*.

As for *reflected glare*, the eyes will adapt and function more effectively when the luminance in the work environment does not vary too much from task to task. The greater the difference in luminance between your screen, work surface, and hard copy, the more frequently and significantly your eyes have to adjust. This of course can lead to visual fatigue.

The general rule for controlling reflected glare is to use floor, ceiling, wall, and window coverings that absorb reflected glare. Ceilings should be designed to *absorb* illumination. In addition, the reflectance of walls should be between 40-60 percent, and

work surfaces should fall in the range of 25-45 percent. Floors should reflect the least amount of light.

Finally, the computer screen may also reflect glare and other bright objects, which, in turn, reduces your ability to read the screen characters and can often lead to performance errors. While it is preferable to control the problem at the source, i.e., by shielding windows and overhead lighting, many times screen reflections and glare can be reduced by installing a glare-reduction filter.

- n **Glare:** Glare from light sources (bulbs, luminaires, lighting bays, and outdoor sources, e.g., the sun).
- n **Methods to Reduce Direct Glare:** Shades, luminaire covers, or recessed or indirect lighting.
- n **Reflected Glare:** Glare from surfaces including the computer monitor and the work surface. The greater the difference in luminance between the computer screen, work surface, and hard copy, the more frequently and significantly your eyes have to adjust. This, of course, can lead to visual fatigue.
- n **Methods to Reduce Reflected Glare:** Use of floor, ceiling, wall, and window coverings that absorb reflected glare as well as an anti-glare filter for the computer monitor.*

* There are drawbacks to some filters. You may have to try several different glare filters to find the right balance between glare reduction and character visibility.

FACT SHEET

Computer Monitor

In a 2001 survey of CWA members employed at US Airways Reservations Centers, 16% indicated that they were not provided with a computer monitor that allowed them to adjust the screen angle. Compare this to a 1998 CWA telecommunications industry study that found 11% of directory assistance workers reported not being provided with angularly-adjustable monitors.

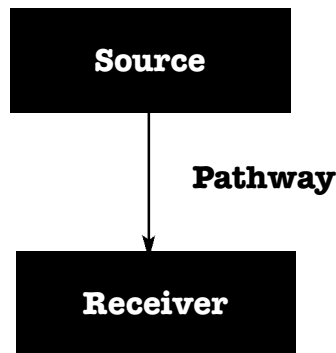
Angular adjustability of the computer monitor provides an easy method for reducing screen glare. Reorientation of the monitor screen around its vertical and horizontal axis can help reposition the screen to reduce screen reflections and glare. Reflections can be reduced by simply tilting the display slightly back or down, or, depending upon the angle of the glare source, to the left or right. Screen reflections depend not only upon screen tilt, but also upon the operator's viewing angle of the screen. Typically, visual angles should be within the range of 10-20 degrees downward.

CORRECTIVE ACTION CHECKLIST

Visual Problems

As with the risk factors associated with computer use and visual problems, the corrective actions are also interrelated—if you attempt to minimize or eliminate one risk factor, you often wind up reducing the other risk factors.

Let's start by dividing the problem into three separate parts. Let's begin with the source of the problem, followed by the pathway the source travels towards the receiver, and the receiver, i.e., the worker.



We can then think about the problems of lighting, glare, and reflection in terms of the source—where the light comes from; the pathway—how it bounces off the floor, ceilings, walls, or work surfaces; and how it is received by the worker where it can, if significant exposure occurs, lead to the visual health problems of fatigue, headaches, eye-strain, and eye soreness.

Use of this approach is the most effective method of controlling or eliminating the risk factors or ergonomics problem(s) at the source. The next most preferred approach is achieved by controlling or eliminating the ergonomics problem(s) along the pathway and, finally, the least preferred approach is to control the problem at the receiver.

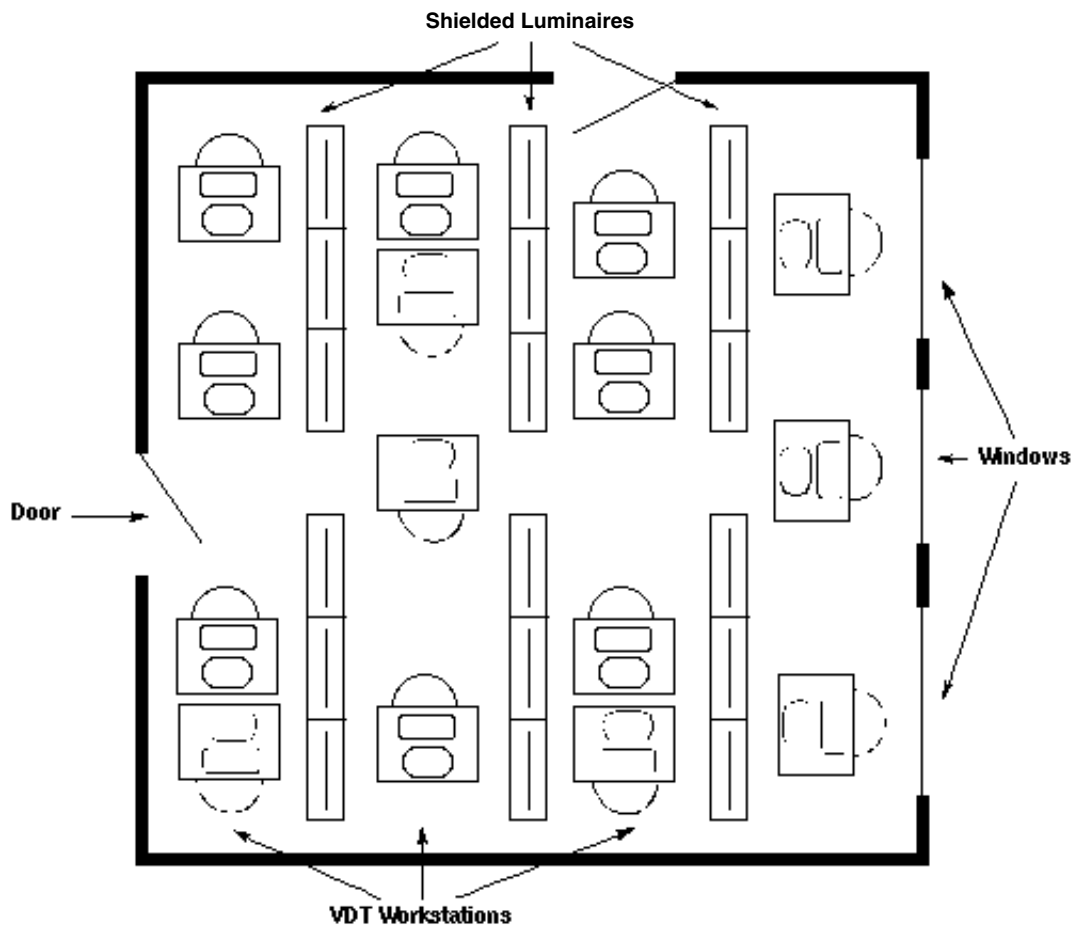
Controlling lighting problems at the source is preferred because it usually controls or eliminates the ergonomics problem(s) for all or most of the affected workers.

Let's begin by reviewing how it is possible to control lighting at the source.

1. Control lighting problems at the source:

- n **Control light from windows:** Regulate the amount of light in the work area by partially or totally closing or opening drapes, shades, and/or blinds over windows, especially during sunny conditions.
- n **Control light from the luminaires (lighting fixtures):** If there are no windows, or if windows are not the source of reflected light (glare), you should look to the overhead luminaires (lighting bays) as the glare source.
 - ☒ Place the computer screen parallel to windows and luminaires.
 - ☒ Place computer screens *between* luminaires, not underneath them.
 - ☒ Use screen hoods to block excess light from overhead lighting sources.
 - ☒ If possible, try *recessing* light fixtures. Indirect lighting is a form of this.
 - ☒ Use light focusing *diffusers*. They direct most of the light directly downwards, rather than bouncing it off the walls and floors.

**PROPER LAYOUT OF A COMPUTER WORKPLACE
TO RESOLVE VISUAL PROBLEMS**



2. Control glare along the pathway (floors, walls, and work surfaces):

- ☒ Reduce the amount of light reflected from walls, floors, and work surfaces. Generally, this means that light-absorbing colors and finishes should be used. Non-glare matte and earth tone finishes are preferred; whereas, high gloss or semi-gloss finishes are not recommended.
- ☒ The amount of light reflected from the floor should not exceed 30%.
- ☒ The amount of light reflected from the walls should not exceed 40-60%.

- ☒ The amount of light reflected by work surfaces should not exceed 40-60%.

The above items are important considerations when remodeling the workplace and when selecting or designing new office equipment or work areas.

3. Control visual problems at the receiver:

- ☒ Add an anti-glare filter on the computer screen.
- ☒ Tilt the screen up or down (vertical adjustment) or right or left (horizontal adjustment) to minimize glare.
- ☒ Add more frequent (micro-) breaks.

JOB HAZARD ANALYSIS— COMPUTER OPERATION

Visual Problems

Problem/Hazard	Risk Factor	Corrective Action (see “Checklist”)
Visual fatigue	<p>Glare and reflections, (overuse: your eyes have to “work too hard”).</p> <p>Excessive lighting.</p> <p>Inadequate/infrequent rest breaks.</p>	<p>Reduce glare and reflections by reducing outside light, controlling overhead lighting, installing light-absorbing floor, wall, window, and work surface coatings, and installing anti-glare filters or changing angle of monitors;</p> <p>Conduct lighting survey, reduce excess light, increase use of task lighting if necessary;</p> <p>More frequent “micro”-breaks.</p>
Headaches	<p>Constant viewing with close attention to detail.</p> <p>Inadequate/infrequent rest breaks.</p>	<p>Regularly check quality of characters on-screen; adjust and maintain computer as needed;</p> <p>Take more frequent “micro”-breaks;</p> <p>Use document holders.</p>
Sore, strained eyes	<p>Glare, reflections from monitor, monitors with characters that are difficult to read.</p>	<p>Regularly check quality of characters on-screen; adjust and maintain computer as needed;</p> <p>Use anti-glare filters or change angle of viewing monitor;</p> <p>Glare control (see above).</p>

TAKE HOME QUESTIONS

Vision and Visual Problems with Explanation

The purpose of this questionnaire is to help you become more aware of your airlines reservations center (computer) workplace conditions. We appreciate your help in completing this survey and getting another co-worker to complete it as well.

We'd now like to go over the lighting questions in this "take home" survey so you'll understand what we are asking for and why.

Each of the questions is in bold-face type; the explanation of each question follows.

1. **Manufacturer and model number (of your computer monitor).**

What we are looking for here is the manufacturer of the computer monitor. If you use more than one monitor (because you work at different workstations) try to find the name of the manufacturer for the monitor you most often use.

The manufacturer's name and model number will be on a plate installed on the back of the monitor, so you will have to turn the monitor around or go behind the monitor. If you cannot find the model number, just write down the manufacturer's name. (Do not write down the serial number.)

2. **Is an anti-glare filter installed on the screen?**

Yes No

Anti-glare filters are usually pretty easy to spot. They are usually attached by Velcro, tape, screws, or plastic mounting devices to the outside plastic frame of the computer screen. They can be plastic, Polaroid® glass, or wire mesh. If this applies to your screen, check "Yes"; if not, check "No."

3. **If an anti-glare filter is not used, are there any unusual or hard-to-read characters?**

Yes No

If you answered "No" to the previous question, are there any characters that are distorted or hard to read? If not, check "No"; if there are, then check "Yes."

4. **If an anti-glare filter is used, are the characters sharply defined?** Yes No

If you answered "Yes" to "3," then answer the question. If *any* screen character is blurred or difficult to read when the filter is on, please indicate "No"; if they are all clearly defined and easy to read, then check "Yes."

5. **Is the screen brightness adjustable?** Yes No

Somewhere on the front, left, or right side of the monitor should be a control that adjusts the brightness of the screen characters. If you cannot find one, check "No." If you can find one, turn it clockwise and counter-clockwise. Does it make the characters brighter or darker? If it doesn't, check "No"; if it does, check "Yes."

6. **Is the screen contrast adjustable?** Yes No

You should also be able to locate a *contrast* knob which, when turned clockwise or counter-clockwise, adjusts the brightness or darkness of the screen *background*. If you do not have such a control on the left-hand, right-hand or front of the screen, check "No." If turning this knob has no effect, then also check "No." But if turning the knob clockwise and counter-clockwise does change the brightness of the screen background, check "Yes."

7. **Are the adjustment controls for screen and character brightness and contrast on the front of the monitor?** Yes No

If the adjustment controls for screen and character brightness and contrast are on the front of the monitor, check "Yes." If you couldn't find any, or if they are on the side of the monitor, check "No."

8. **Are there visible reflections or glare on the screen?** Yes No

When sitting in front of the monitor in your normal working position, can you see any reflections of other workers, workstations, or light sources on the screen? If so, check "Yes."

If you can see screen reflections or glare, check "Yes." If you can't see either reflections or glare, then check "No."

9. **Are there distortions at the edges of the screen?** Yes No

If characters, instructions, or other letters or numbers on the *edge* of the screen are distorted—fuzzy, double-outlined, misshapen—answer "Yes" to this question. If they are not, answer "No."

10. Are there variations in brightness of the screen?

Yes No

Answer "Yes" to this question if one or more areas of the screen appear to be brighter than others. Answer "No" if all areas of the screen are of *equal* brightness.

11. Is it possible to adjust the computer screen in a vertical direction?

Yes No

Can you actually move or tilt your computer screen up and down? Usually, this means that your screen is mounted on a base that allows vertical movement. If the only way to tilt your screen up or down is by putting a book, wedge, or some papers underneath it, answer "No" to this question.

12. Is it possible to adjust the computer screen in a horizontal direction?

Yes No

Can you move your screen (monitor) right or left? Answer "Yes" if you can push the screen right or left to give you a good viewing angle, i.e., without having to physically move the monitor to the right or left. If you have to actually move the monitor to adjust the screen, then answer "No" to this question.

If after answering these questions you are able to identify problem areas, or have any questions or concerns of your own, please contact _____ or your Local President.

Computers and Musculoskeletal Health Problems: An Introduction

As with vision problems, there are many short-term or temporary musculoskeletal health symptoms or disturbances as well as several serious, potentially permanent, musculoskeletal disorders associated with working in airlines reservations centers. The temporary health symptoms include:

- n muscle fatigue,
- n aches and pains in muscles and joints, and
- n temporary weakness and dysfunction of muscles.

There are also some permanent disorders that have been observed among airlines reservations center employees, including:

- n lower back pain,
- n cumulative trauma disorders of the upper extremities, such as carpal tunnel syndrome and tendinitis,
- n cervical-brachial disorder,
- n thoracic outlet syndrome, and
- n chronic fatigue.

These musculoskeletal health problems occur at about the same rate as in other high exposure industries. This is somewhat disconcerting since work such as that performed by airlines reservations center workers has always been thought of as

“safe” because it is free of the safety hazards that are often seen in manufacturing and construction. However, when it comes to ergonomic hazards, airlines reservations center or office work is almost as dangerous as these high-risk industries.

In airlines reservations centers, the design of the technology or equipment often dictates the flexibility of the workstation. The greater the lack of fit with the worker, the more significant the musculoskeletal hazard. Other risk factors include:

- n continuous work without breaks,
- n high frequency and short cycle tasks, and
- n use of too much force due to excessive load or poor personal technique.

In addition, continuous static loading of the muscles reduces circulation and increases the risk of cumulative trauma disorders. Some experts also feel that compression of tissues caused from contact with working surfaces can also increase the risk of cumulative trauma disorders. Sometimes environmental conditions such as glare on working surfaces or ventilation blowing on an individual operator results in poor postures that can increase the risk of musculoskeletal disorders.

In addition, there are personal medical conditions and characteristics that increase the risk of cumulative trauma disorders.

These include:

- n circulatory problems,
- n diabetes,
- n obesity,
- n arthritis,
- n acute injuries to the bones, muscles, tendons, ligaments, and joints,
- n menopause and its treatment, and
- n pregnancy.

Postural or musculoskeletal health problems are common in many sedentary jobs. Operator complaints are most often related to the neck, shoulders, back, and wrists. Complaints mentioned less often involve the arms, hands, and legs. Researchers find that computer operators report these symptoms more often than workers in other jobs. According to the scientific and medical literature, serious musculoskeletal health problems are most often associated with computer jobs requiring constrained working positions for an entire work shift.

In a seated position, the computer operator is subject to continuous stress on almost all postural muscles. The amount of stress is dependent upon the position of various parts of the operator's body. Holding the head to the side or forward may lead to neck and shoulder fatigue and pain. Other neck and shoulder complaints result from the use or position of the operator's arms. For example, elevation of the arms will add to neck and shoulder strain. Prolonged, constrained postures required by the job will make this condition worse. Over the long term, continued wear and tear may result in a gradual deterioration of joint tissues.

There are several common characteristics of computer jobs that have been related

to increased musculoskeletal complaints.

These include:

- n the design of equipment,
- n work pace,
- n repetitiveness of the job,
- n work and rest break schedules, and
- n personal attributes of workers.

The more serious musculoskeletal health disorders such as carpal tunnel syndrome and cervical-brachial syndrome are becoming much more prevalent among office workers, especially those working at computer terminals. These health disorders often diminish the work capacities of employees and can lead to permanent disability. At the very least, they require extensive and painful medical treatment that leads to high medical costs. An example would be carpal tunnel syndrome. Employees who develop carpal tunnel syndrome often lose the ability to carry out fine motor movements with their fingers or to grasp and hold heavy objects, such as children. The causes of these disorders are:

- n high frequency of repetitive motions,
- n poor body part posture such as flexion, extension, and twisting,
- n heavy loads or high force requirements specific to a particular body part, and
- n work organization.

We'll now turn our attention to how you can reduce or eliminate the risk factors associated with the occurrence of repetitive motion illnesses or cumulative trauma disorders. We'll focus on four main elements—the keyboard/keypad/mouse, the chair, the workstation, and rest breaks—as explained in the following fact sheets.

FACT SHEET

Keyboard/Keypad/ Mouse Design

The keyboard, keypad, and mouse are the standard devices used to input data into the computer terminal; however, touch panels, light pens, and tablets are becoming more commonplace. The “2001 CWA US Airways Reservations Centers Workplace Ergonomics Survey” found that nearly 79% of the reservations agents reported using both a keyboard and a keypad to perform their work.

Although the keyboard/keypad/mouse don’t present a serious risk factor; *the way it/they are used by the computer operator* in relation to her/his posture and the physical components of the computer workstation (e.g., the chair, monitor, and work surface) can affect the risk of **repetitive motion illnesses**.

Keyboards/keypads/mouse equipment should be detachable, so they can be positioned to best suit the posture and work requirements of each individual operator. They should be located next to one another on the same or directly adjacent work surface. The angle of the keyboard/keypad should be relatively flat and adjustable as well, particularly where the keyboard/keypad will be used by several different workers. Individual operators will prefer a slightly different angle. You should try to adjust the angle of your keyboard/keypad to keep your wrist as flat (a neutral position) as possible. Sometimes you can do this by moving the keyboard/keypad further away from you. But not all keyboards/keypads are easily adjusted. Some may have only one or two settings; others may provide no adjustability at all. The “Workplace

Ergonomics Survey” found that only 40% of the reservations agents reported that the keyboard and keypad were situated at the same height and angle and located next to one another on the work surface.

The mouse should be designed to fit comfortably with the hand and positioned with the click buttons level with the keyboard/keypad. The mouse should be held loosely with the wrist in a neutral position and operated by moving the entire arm and shoulder and using a light touch when clicking the mouse buttons.

Wrist rests are another way to help maintain a neutral wrist posture and to avoid resting your wrists on a sharp object (that can affect the blood supply and nerves going into your hand). It is only natural that you will want to rest your elbows, arms, and/or wrists on something solid to relieve the fatigue of holding your lower arms outstretched for long periods of time. But you need to be careful what you rest your wrists on. Wrist rests should be at least two inches wide and should be placed over the edges of work surfaces, such as the edge of the keyboarding surface or worktable. In addition, they should provide firm, yet cushioned, support. Ideally, wrist rests should not be used while operating the keyboard/keypad/mouse, but rather while resting.

In some cases, palm rests are used. Palm rests are designed to provide support for your palm by providing a resting place for your palm that relieves some of the fatigue in your arms.

FACT SHEET

Chair

In the “2001 CWA US Airways Reservations Centers Workplace Ergonomics Survey” conducted by the Union’s Safety and Health Department, 11% of reservations agents reported that they were not provided with an adjustable chair, compared to only 4% of directory assistance operators who participated in a 1998 CWA telecommunications industry survey.

The chair is a critical component of an ergonomically correct computer workstation. Besides being able to adjust the height of the seat pan and the angle of the seat pan to a forward or backward tilt, you need to be able to adjust the backrest to provide proper back support. In order for you to comfortably view the monitor, you should also be able to move the chair closer to or farther away from the work, yet maintain your wrists in a neutral posture.

Making these adjustments will allow you to find a “**comfort zone**.” In this comfort zone, your feet are firmly supported by the floor or a proper footrest, your wrists are as flat (a neutral position) as possible and you have proper support and an adequate amount of “wiggle room” from the chair. Assuming you have the right chair, you can usually find the “comfort zone” by raising or lowering the chair, adjusting the seat pan angle, and/or pushing it closer to or away from the work. If you are sitting too low, you will probably have to bend your wrists down (wrist flexion) to use the keyboard; if you are sitting too high, you will have to extend your wrists (up). But by adjusting the chair height, as well as the height of the keyboarding surface, you can find the right combination that allows you

to keep your wrists in a neutral posture. The chair should be adjustable so that the seat pan can be raised or lowered to between 16 and 20 inches from the top of the seat pan to the floor.

The seat “pan” directly supports the weight of the buttocks. It should be wide enough to permit operators to make slight side-to-side shifts in posture. The minimum recommended seat pan width is 18 inches. The seat pan depth (from front to back) should be between 15-17 inches. If it is deeper than this, some operators will not be able to sit all the way back in their chairs and take advantage of the back support the chair provides. The seat pan should be tiltable forward and backward. The front edge of the chair should be well rounded downward to reduce pressure on the underside of the thighs (that can affect blood flow to the legs and feet). The seat needs to be padded to the proper firmness that ensures an even distribution of pressure on the thighs and buttocks. A properly padded seat should compress about one-half to one-inch when a person sits on it.

The tension and tilt angle of the backrest should be adjustable. Inclination/declination of the chair backrest is important and necessary for operators to be able to lean forward or backward in a comfortable manner, while maintaining a correct relationship between the seat pan angle and the backrest angle, i.e., the amount of inclination/declination. The advantage of having an independent backrest tilt angle adjustment is that the backrest tilt will have little or no effect on the front seat height. This adjustment also allows operators to more easily shift postures and find their “comfort zone.”

Another important chair feature is armrests. Some chair armrests can actually restrict arm movement, interfere with keyboard operation, cause a pinching of the

fingers between the armrest and table, restrict chair movement such as under the work table, lead to irritation of the arm or elbows, and cause workers to adopt awkward postures. On the other hand, well-designed padded armrests can provide support for resting the arms, thus preventing or reducing fatigue.

While operating the computer, if your feet aren't firmly touching the floor, you should be provided with a properly designed footrest. The footrest should be height and angular adjustable and have a non-skid surface that is large enough to prevent your feet from slipping off the surface. The footrest should be angled slightly (between 5 to 15 degrees). In addition, the footrest should be portable, yet heavy and secure enough to prevent it from sliding across the floor.

FACT SHEET

Workstation

In the “2001 CWA US Airways Reservations Centers Workplace Ergonomics Survey”, 65% of participating reservations agents reported that they were not provided with a workstation that allowed them to adjust the height of their keyboard/keypad/mouse or monitor, compared to 9% of directory assistance operators in a similar 1998 CWA telecommunications industry survey.

There are four basic elements to an effective strategy aimed at reducing the risk of developing repetitive motion illnesses and at reducing musculoskeletal health problems. They include:

- n **the keyboard/keypad/mouse**—its/their location and angle, proper wrist support, and wrist alignment;
- n **the chair**—it must both provide proper postural support and provide enough adjustability to help the operator find her/his “comfort zone”;
- n **the rest break schedule**—modifying it to allow more micro-breaks to relieve physical and mental fatigue; and
- n **the workstation**—it must also be adjustable to help the operator find her/his “comfort zone” and must provide enough space and flexibility to arrange and perform the work in such a way that allows the worker to maintain proper posture and reduce fatigue.

The size or area of the work surface is dependent upon the task(s), the document(s), and the technology. Whatever job you do, you need an adequate workspace or area. This workspace needs to contain enough surface area to:

- n allow you to move the screen forward or backward,
- n move/adjust the keyboard/keypad/mouse to comfortably perform the work, and
- n permit source documents to be properly positioned.

Sometimes secondary work surfaces, such as a separate keyboard/keypad/mouse or document holder surface may be required in order to store, lay out, read, and/or write on documents or materials. The space requirements will depend upon the job being done.

The tabletop under which the operator puts her/his legs should be as thin as possible to provide clearance for her/his thighs and knees. The under-table space should provide unobstructed room for the feet and legs so that the operator can easily shift her/his posture. The recommended minimum width for leg clearance is 24½ inches. The minimum depth under the work surface from the edge of the work surface, i.e., closest to the operator, should be 15 inches at knee level, and 24 inches at toe level. These distances should be measured from the leading edge of the front of the working surface and should be regarded as *minimum* distances. Proper workstation design must consider the variability of individual body sizes and allow for maximum operator adjustment or movement.

Adjustable workstation equipment such as multi-surface tables enable proper posture by allowing the keyboard/keypad/mouse and monitor to be independently adjusted to appropriate keying and viewing

heights for each individual and each task. Tables that cannot be easily adjusted are not appropriate when used by different-sized individuals. If adjustable tables are used, the ease of adjustment is essential. Adjustments should be easy to make and operators should be instructed how to properly adjust the workstation.

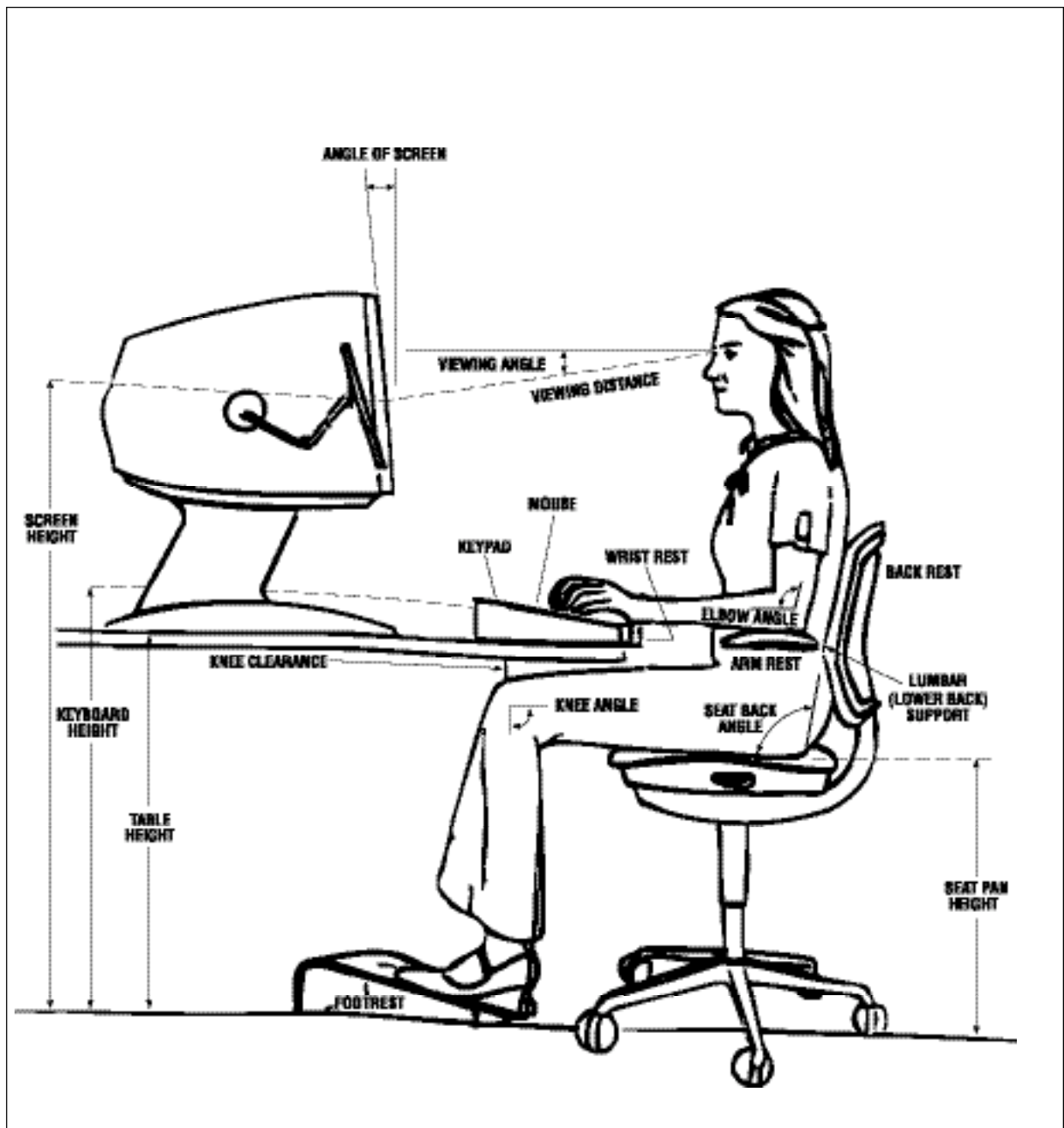
Specifications for the height of the work surface vary based upon whether the table is adjustable or a fixed height, and whether it has a single work surface or multiple work surface(s).

The proper height for a *non-adjustable* working surface is about 28 inches, measured from the floor to the top of the work surface. Adjustable tables allow vertical adjustment of the keyboard/keypad/mouse and monitor. Some even allow for independent adjustment of the keyboard/keypad/mouse and monitor. For single adjustable work surfaces, the work surface height adjustment should be between 28-32 inches.

For independently adjustable keyboard/keypad/mouse and monitor work surfaces, the appropriate height of the work surfaces should range from 23¹/₂- 28¹/₂ inches for the keyboard/keypad/mouse (measured from the top of the keyboard/keypad/mouse surface to the floor) and 28-32 inches for the monitor (measured from the bottom of the monitor to the floor). It is important to note that you should always be viewing the monitor in a slightly downwards direction (10-20 degrees).

Another important component of the workstation that can help reduce musculoskeletal loading is a document holder. This equipment allows source documents to be placed in a central location at the same viewing distance and height as the computer screen. Properly designed document holders reduce awkward inclinations as well as frequent up and down movements of the head and neck, thus reducing the possibility of developing repetitive motion illnesses.

Computer and Workstation Design Variables



CORRECTIVE ACTION CHECKLIST

Musculoskeletal Health Problems

The key to any corrective action aimed at eliminating or minimizing musculoskeletal problems is proper workplace design that focuses upon three key design elements of airlines reservations center (computer) work: the keyboard/keypad/mouse, the chair, and the work surface. In addition, to make it possible for a wide range of different-sized and shaped individuals to find their “comfort zone,” workstation equipment should be adjustable to accommodate individual users.

A. Keyboard

- ☒ Make sure the keyboard/keypad is/are detachable from the monitor and can be moved around to give you the most comfortable posture for the work you’re doing.
- ☒ The keyboard/keypad should be relatively flat in relation to the working surface and the angle should not be more than 15 degrees off horizontal. Also, the keyboard and keypad should be located at the same height and angle and positioned next to one another.
- ☒ Use a cushioned wrist rest (minimum of two inches wide) to support your wrists. The wrist rests should be rounded on the front edge, that is, the edge facing you. Ideally, wrist rests should not be used while keying, but rather while resting.
- ☒ Keep your wrists in as neutral a posture as possible. Armrests can help you do this.

B. Mouse Equipment

- ☒ The mouse should be designed to fit comfortably into the hand and positioned with the click buttons level with the keyboard/keypad. The mouse should be at the same height and angle as the keyboard/keypad and situated next to the keyboard/keypad. Also, the work surface upon which the mouse is used should be large enough to allow for the proper and intended operation.
- ☒ When using the mouse, it should be held loosely with the wrist in a neutral position and operated by moving the entire arm and shoulder using a light touch when clicking the mouse buttons.
- ☒ Use a cushioned wrist rest to support your wrists. Ideally, the wrist rest should not be used while operating the mouse but rather while resting.

C. Chair

- ☒ **Adjustable height:** The height of the seat pan should be adjustable to a range of 16 to 20 inches from the floor. Use this feature to raise or lower the chair so that the angle between your upper and lower leg is roughly perpendicular (about 90 degrees).
- ☒ **Footrest:** A footrest should be provided for operators who cannot securely place their feet on the floor while seated. The

footrest should be adjustable both in height and angle and have a non-skid surface (where the feet actually rest).

- ☒ **Seat pan:** The minimum width should be 18 inches, and the depth (front to back span) should be between 15-17 inches. The seat pan should have tilt angle adjustability, a rounded front edge (the edge closest to your knees), and should provide enough padding so that the padding is one-half to one inch thick while you're seated.
- ☒ **Backrest:** The backrest should be height-adjustable and provide adequate lumbar support. In addition, the chair should allow for angular adjustability of the backrest, thus providing for variations in the operator's posture.
- ☒ **Casters:** The chair should be moveable, supported by at least five casters.
- ☒ **Armrests:** As long as they don't interfere with movement and the performance of work, padded armrests should be provided to support your elbows and upper

and lower arms. The use of armrests will also help to maintain a neutral wrist posture.

D. Workstation

- ☒ **Adequate workspace:** You need enough workspace to be able to move and properly position your keyboard/keypad/mouse, monitor, and document holder.
- ☒ **Document holder:** When you work with hard copy, a height and angularly adjustable document holder should be provided.
- ☒ **Adequate knee and leg space under the work surface:** The minimum recommended width under the work surface is 24¹/₂ inches. The minimum recommended depth at the knees is 15 inches. The minimum recommended depth at the feet is 24 inches.

**JOB HAZARD ANALYSIS—
COMPUTER OPERATION**

Musculoskeletal Health Problems

Problem/Hazard	Risk Factor	Corrective Action
<p>Tendonitis, tenosynovitis, carpal tunnel syndrome.</p>	<p>Wrist flexion or extension, repetitive keying.</p>	<p>Make sure the keyboard/keypad is/are detachable from the monitor and can be moved around to give you the most comfortable posture for the work you're doing.</p> <p>The keyboard/keypad should be relatively flat in relation to the working surface, and the angle should not be more than 15 degrees off horizontal.</p> <p>The mouse should be designed to fit the operator's hand, have a sloping or slanted surface, and have a drag-lock surface. The placement of the mouse should be within easy reach of the operator, located at the same height and angle as the keyboard/keypad and situated next to the keyboard/keypad.</p> <p>Wrist rests (minimum of two inches wide) to support your wrists should be provided. The wrist rests should provide cushioned support and be rounded on the front edge, which is the edge facing you.</p> <p>Keep your wrists in as neutral a posture as possible. Arm and wrist rests may help you do this.</p>
<p>Muscle soreness, cramping, and fatigue, particularly in shoulders, neck, and back.</p>	<p>Improper posture and static loading caused in large part by chairs, keyboards/keypads/mouse equipment, and work surfaces which are adjustable or are not adjustable to the proper height and configuration. (cont. p. 24)</p>	<p>Adjustable height: The height of the seat pan should be adjustable to a range from 16 to 20 inches from the floor. Use this feature to raise or lower the chair so that the angle between your upper and lower leg is roughly perpendicular (about 90 degrees).</p> <p>Seat pan: The minimum width should be 18 inches, and the depth (span across the seat pan) should be between 15-17 inches. The seat pan should be tiltable forward and backward and have a rounded front edge (the edge closest to your knees) and should provide enough padding so that the padding is one-half to one inch high while you're seated.</p> <p>Back rest: The back rest should be tiltable, so you can recline backward or forward with adequate support, as well as height-adjustable. Lumbar (lower-back) support should be provided.</p> <p>Casters: The chair should be moveable, supported by at least five casters.</p>

(continued from page 29)

Problem/Hazard	Risk Factor	Corrective Action
<p>Muscle soreness, cramping, and fatigue, particularly in shoulders, neck, and back.</p>	<p>Improper posture and static loading caused in large part by chairs, keyboards/key pads/mouse equipment, and work surfaces which are adjustable or are not adjustable to the proper height and configuration.</p>	<p>Armrests: As long as they don't interfere with movement and the work, cushioned armrests may be helpful to support your elbows and upper and lower arms, and maintain a neutral wrist posture.</p> <p>Footrest: A footrest should be provided for operators who cannot securely place their feet on the floor while seated. The footrest should be adjustable both in height and angle, and have a non-skid surface where the feet actually rest.</p> <p>Adequate workspace: You need enough tabletop space to be able to move and properly position your keyboard/keypad, mouse, monitor, document holder, and hard copy materials.</p> <p>Adjustable height work surface(s): A second surface just for the keyboard/keypad/mouse is recommended. The height range for the dedicated keyboard/keypad/mouse surface is 23½-28½ inches off the floor. The recommended height for the base of the monitor from the floor is 28-32 inches. If there is not a separate surface for the keyboard/keypad/mouse, and the work surface cannot be raised or lowered, the recommended height, measured from the top of the table to the floor, is 28 inches.</p> <p>Adequate knee and leg space under the work surface: The minimum recommended width under the work surface is 24½ inches. The minimum recommended depth at the knees is 15 inches. The minimum recommended depth at the feet is 24 inches.</p> <p>Document holder: When you work with hard copy, an adjustable (angle and height) document holder should be provided.</p> <p>Micro-breaks: More frequent but shorter breaks in addition to the regular scheduled breaks every two hours.</p>

TAKE HOME QUESTIONS

Musculoskeletal Health Problems with Explanation

The purpose of this questionnaire is to help you become more aware of your airlines reservations center (computer) workplace conditions. We appreciate your help in com-

pleting this survey, and getting another co-worker to complete it as well. Each of the questions are in bold-face type; the explanation of each question follows.

1. KEYBOARD/KEYPAD**a. Manufacturer and model number:**

Usually, this can be found by turning your keyboard/keypad upside down. Write down the manufacturer and model number, but not the serial number.

b. Is the keyboard/keypad moveable in relation to the screen? Yes No

If the keyboard/keypad is attached to the monitor by a cord, then it is moveable, so check "Yes." If not, check "No."

c. Is the keyboard/keypad angle adjustable? Yes No

Can you change the *angle* of the keyboard/keypad, i.e., can you raise the *back* of the keyboard/keypad (that part closest to the monitor) so the angle gets steeper or shallower? If you can, check "Yes."

d. Is there space between the edge of the table and the keyboard/keypad to rest your palms? Self-explanatory. Yes No

2. MOUSE EQUIPMENT

a. Does the mouse fit comfortably in the palm of your hand? Self-explanatory. Yes No

b. Is the mouse located next to and at the same height and angle as the keyboard/keypad? Self-explanatory. Yes No

c. Are you able to use the mouse without developing finger/hand discomfort? Self-explanatory. Yes No

3. CHAIR

a. Manufacturer and model number:

This information can be obtained by turning the chair upside down and looking for a plate stapled or attached to the seat pan. Write down the manufacturer and model number, *not* the serial number.

b. Are armrests provided? Self-explanatory. Yes No

c. Do the armrests interfere with movement? Yes No

Are the armrests too close to your body or placed in a location that restricts your movement in the chair?

d. Is the seat pan height and angle adjustable ? Yes No

Can you raise and lower the height of the seat pan; can you adjust the angle of the seat pan forward and backward?

e. Does the seat pan have a rounded front edge? Yes No

Does the front edge of the chair (which rests against the back of your legs) have a rounded edge (check "Yes") or a sharp edge (check "No")?

f. Does the seat surface have enough padding? Yes No

Do you think there is enough padding on the chair to sit comfortably for the work day?

g. Is the backrest height and angle adjustable? Yes No

Can you raise and lower the height of the backrest; can you recline backward or incline forward with adequate support?

h. Does the chair provide lumbar (lower-back) support? Yes No
Self-explanatory.

- i. Does the chair have a five-leg base?** Yes No
 Are there five legs or casters (check "Yes") or are there fewer (check "No")?

4. WORKSTATION DESIGN

- a. Is the work surface or table height adjustable?** Yes No
 Can you raise or lower the height of the work surface or table?

- b. Is/are there a separate keyboard/keypad/mouse surface(s)?** Yes No

- c. Can the keyboard/keypad/mouse surface(s) be moved away from or towards the operator?** Yes No

- d. Is there a separate surface for the monitor (display)?** Yes No

- e. Is the area under the work surface free of obstructions that might interfere with varying your posture?** Yes No
 Is the location where you place your legs and feet free of obstacles, allowing you to shift positions in your chair?

- f. Is there space upon the work surface to rest your arms while you're not keying?** Yes No

- g. Does the work surface have well-rounded edges and corners?** Yes No
 Are there sharp edges and corners that you can bump against?

5. DOCUMENT HOLDERS, FOOTRESTS, AND WRIST RESTS

- a. Are document holders provided for use of hard copy?** Yes No
 Does your workstation have a document holder that you can place hard copy upon? If so, check "Yes." If not, check "No."

- b. Is the document holder height adjustable?** Yes No
 Can you raise/lower the document holder to provide a more comfortable viewing angle? If you can, check "Yes." If not, check "No."

- c. Is the document holder distance-adjustable?** Yes No
 Can you move it closer to or farther away from you?

d. Is the document holder angularly adjustable? Yes No

Can you change the angle of the document holder?

e. Is there adequate space to properly locate the document holder? Yes No

Do you have room on your work surface to put the document holder in a position that provides the best view of the hard copy?

f. Is a padded wrist rest provided? Yes No

Don't confuse this with a *palm* rest. A wrist rest is usually located at the edge of the work surface that the keyboard/key-pad/mouse is/are located on. Ideally, the wrist rest should support your wrists while resting. However, if you use a wrist rest while keying, it should allow you to keep your wrists in as neutral a position as possible. If your employer does not provide you with a wrist rest, check "No." If one is provided, check "Yes." If a wrist rest is not provided, skip the next two questions (g and h).

g. Is the wrist rest wide enough (2 inch minimum)? Yes No

To be effective, the wrist rest should be at least two inches wide. If the wrist rest is not, check "No."

h. Does the wrist rest have a rounded front edge? Yes No

The front edge of the wrist rest (which faces you), should be rounded so that you do not rest your wrists on a sharp edge. If the front edge is rounded, check "Yes."

i. Is a footrest provided? Yes No

If you do not have a footrest, you should skip questions j, k, l and m, but make sure you answer the last question about cushions or pads. If you do have a footrest, check "Yes," no matter whether you or your employer provided it.

j. Is the footrest home-made? Yes No

Did you make the footrest yourself, even if it is something you found in the reservations center, like a box or several reams of paper? If you did, then check "Yes." If you do not know who made it, or if the employer provided it, check "No."

k. Does the footrest have a non-skid surface? Yes No

Does the section of the footrest where you place your feet have a non-skid surface so your feet won't slip off accidentally? If it does, check "Yes," if not, check "No."

l. Is the footrest height adjustable? Yes No

Can you raise or lower the footrest without having to put a wedge or something underneath it? If you can, check "Yes"; if it can't adjust in height, check "No."

m. Can the angle of the footrest be adjusted? Yes No

Can you change the angle of the footrest, i.e., can you adjust the angle of the surface towards or away from you?

n. Do you use a cushion or a pad in your chair? Yes No

Do you use or have to bring your own chair cushion or pad to make the chair comfortable? If "Yes," check "Yes"; if not, check "No."

Should you have any questions or concerns after completing the questionnaire, please contact _____ for further assistance.

Occupational Stress and the Workplace

Occupational stress is one of the major health hazards of the modern workplace in which CWA members are employed. It accounts for much of the physical illness, substance abuse, and family problems experienced by millions of blue and white-collar workers. Also, occupational stress and stressful working conditions have been linked to low productivity, absenteeism, and increased rates of accidents on and off the job. The traditional response of management has been to “blame the victim,” defining stress as an “individual” or “personal” problem that workers bring from home to work. Instead of this approach that blames people for their inability to fit into an inhumane work environment, it is important to analyze the structure of job requirements and social relationships at work as the primary sources of stress.

Although office work has always been stressful, recent scientific studies and surveys have helped focus attention on the issue of job stress. The National Institute for Occupational Safety and Health (NIOSH) found that operators of computers experienced greater job stress than any other occupational group that NIOSH had ever studied. The CWA/North Carolina Occupational Safety and Health Project Office Workers Stress (computer) Survey found that computer use and job stress may result

in the occurrence of chest pain among CWA members who use computers.

Further, the landmark CWA National Occupational Stress Study (1990) found that one stressor, electronic performance monitoring, was a major cause/promoter of physical and psychological health complaints. Monitored workers reported more boredom, high tension, extreme anxiety and depression, anger, and severe fatigue than non-monitored workers. Also, monitored workers reported more musculoskeletal problems (i.e., wrist, arm, shoulder, neck, and back problems) and headaches than non-monitored workers.

In 1992, NIOSH reported the findings of a scientific study regarding computer use and associated musculoskeletal health effects involving CWA and US West. This investigation identified several factors such as: fear of being replaced by computers, increasing work pressure, lack of job diversity with little decision-making opportunity, high information processing demands, and surges in workload as being related to computer musculoskeletal repetitive motion illness. In addition to the above variables, uncertainty about one’s future (occupation) and lack of co-worker and supervisor support were found to be associated with musculoskeletal repetitive motion health symptoms in computer work environments.

The body has a normal mechanism for dealing with stressful situations that is known as the “fight or flight” response. As soon as the brain senses danger, it sends messages (electrical, chemical, and hormonal) that stimulate the extra energy needed to fight the danger or run away from it. The “fight or flight” response is extremely functional when we confront short-term specific dangers. When the danger or challenge is removed or has been dealt with, the body returns to a state of equilibrium.

To understand why exposure to stress, especially prolonged stress, can cause ill health, it is helpful to know what changes take place in the body during the “fight or flight” response. The heart starts beating faster in order to get more blood to the muscles, adrenaline and other hormones are released to provide more energy, additional stomach acids are secreted, and respiration increases. All these changes are intended to prepare the body for action. When these bodily processes are constantly functioning, however, our bodies are working overtime. Under these circumstances, the entire system is weakened, and the weakest spots are the first to show signs of strain. If this burden continues over long periods of time without adequate opportunities for relaxation, the entire body may start to break down.

Numerous investigations have shown that job control and job demand are directly related to the cause of occupational stress. Job control determines how much or how little control a worker has over her/his job, and job demand determines how much or how little production or productivity pressures there are on the worker and the quality of the physical work environment. Thus, the more control a worker has over her/his job, the greater the likelihood that she/he will not suffer occupational stress.

Some examples of job control and job demand stressors include:

Job Control	Job Demand
n lack of control over your work	n contracting out work
n lack of recognition for work done	n fragmentation/job de-classification
n job insecurity	n poor ventilation and heating
n fear of layoffs	n poor lighting
n harassment	n forced overtime
n physical or psychological isolation from peers	n poor computer workstation
	n monitoring (e.g. AWT standards)

Responses to Occupational Stress

CWA national and local leaders have responded to these demands and begun to develop successful approaches to challenge stressful working conditions. Some of the specific strategies that have been used to fight occupational stress are:

- n **Educating the membership**—Conducting classes or seminars on stress.
- n **Collective bargaining demands**—Negotiating over clauses such as notice about introduction of new technologies, stress days off, additional breaks or micro-breaks, and more flexible attendance policies that reduce the impact of job stress on workers.
- n **Legislative and political action**—Introducing CWA-sponsored legislation on computers and demands for increased staffing levels in public sector workplaces.
- n **Stress surveys**—Documenting the link between working conditions and negative health effects.

- n **Medical screenings**—Conducting union-sponsored screenings for vision or hearing problems (that can generally be arranged with local occupational health clinics or doctors).
- n **Workers' compensation**—Filing for workers' compensation benefits on behalf of workers.

While CWA recognizes that occupational stress is a major problem in today's "high tech" society, with the use of existing structures, such as health and safety committees, to address the issue of job stress, local unions can begin to adopt creative strategies to improve working conditions. The activities undertaken by these committees have included some of the following:

- n Conducting regular walk-around inspections.
- n Investigating incidents which might have been related to stress.
- n Reviewing health, absenteeism, and other available records.
- n Training other committee members and stewards to recognize stressful situations and workers suffering from stress.

- n Reviewing and recommending changes in work practices and procedures for potential as stressors.
- n Participating in training programs on job stress and job design.
- n Documenting activities and events related to potential stressful situations.
- n Educating the membership through the formation of discussion groups, via published news articles on job stress in union publications, and developing stress-related materials for distribution to members and new employees during orientation sessions.
- n Conducting on-and off-the-job relaxation and physical conditioning programs.

Local leader use of the suggested strategies to identify and minimize/eliminate job stressors will help improve members' health and well-being. In addition, absenteeism and lost work time will significantly decrease and productivity will increase, an important concern to management.

1-Day Airlines Reservations Centers Workplace Ergonomics Training Evaluation

Name _____ Local # _____

Class Location _____ Date _____

Occupation _____

1. Please describe briefly how this training class has been of benefit to you.

2. Please list the benefits you feel your members will derive from the information you will be sharing.

3. How will this training assist you in improving the conditions within your work area?

4. Was the training material clear and easy to understand? If not, please explain.

5. Were there any topics omitted from this course that you feel should be added? If so, please list them.

6. In what way(s) can your local, district and/or national bargaining unit office and the CWA Occupational Safety and Health Department in Washington support you in your efforts?

Grant-Developed Materials

The following materials contained in the Awareness Program manual were developed under the CWA OSHA Grant:

1. CWA Airlines Reservations Centers Workplace Ergonomics Awareness Program
2. CWA Airlines Reservations Centers Workplace Ergonomics Training
 - Fact Sheet: Computers and Vision Problems: An Introduction
 - Fact Sheet: Lighting
 - Fact Sheet: Glare
 - Fact Sheet: Computer Monitor
3. CWA Airlines Reservations Centers Workplace Ergonomics Training—
Take Home Questions on Vision and Visual Problems with Explanation
4. CWA Airlines Reservations Centers Workplace Ergonomics Training—
Computers and Musculoskeletal Health Problems: An Introduction
5. CWA Airlines Reservations Centers Workplace Ergonomics Training—
 - Fact Sheet: Keyboard/Keypad/Mouse Design
 - Fact Sheet: Chair
 - Fact Sheet: Workstation
6. CWA Airlines Reservations Centers Workplace Ergonomics Training—
Checklist of Recommended Corrective Actions for Musculoskeletal Health Problems
7. Job Hazard Analysis—Computer Operation Musculoskeletal Health Problems
8. CWA Airlines Reservations Centers Workplace Ergonomics Training—
Take Home Questions on Musculoskeletal Health Problems with Explanation
9. Occupational Stress & the Workplace
10. 1-Day Airlines Reservations Centers Workplace Ergonomics Training Evaluation