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Feeling Good in My Job: A Guide to Protect Computer Users from Repetitive Motion Injuries

Maine Department of Labor
Work Safety!

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Feeling Good in my job

A Guide to protect computer users from repetitive motion injuries
At first glance, working at a computer may seem safe enough. But stroking keys over and over (repetitive motion) and sitting in one place for a long time (static posture) can make you uncomfortable and even cause injury. In fact, working at a computer is one of the most common causes of injury at work.

What is it about working at a computer (or video display terminal) that can hurt you? How can you protect yourself from Repetitive Motion Injuries and Static Postures? How can you help yourself Feel Good on and off the job? What does the law say about working with computers? This handbook answers these and many other questions.

Whether you use a computer for work or fun, for many hours a day or for a short time, this information will help you stay safe and comfortable.

It's not hard to Feel Good.

▲ Use the checklist in the center of this guide to help you set up your work station correctly.

▲ Set the Work Station Check tent card on top of your terminal as a daily reminder to check your station before you start.

▲ Do the simple stretches shown in this guide.

▲ Talk to your supervisor if you have questions or concerns.

For more information on working safely with computers, or any workplace safety and health issues, call SafetyWorks! at (207) 624-6400 or toll-free at 1-877-SAFE-345. There is no charge for our help.

Good luck and Feel Good!
Here are some of the hazards that can lead to repetitive motion injuries:

- Motions which are performed in one of the following ways:
  - More than fifty percent of your time
  - More than 900 times per day
  - Every few seconds for more than two hours

  For computer operators, that motion is keying.

- Forceful motions such as using a paper punch or stapler repeatedly.

- Awkward postures such as:
  - Overhead work
  - Extreme reaching
  - Forearm rotation
  - Wrist deviation
  - Pinch grip
  - Static posture

- Mechanical pressure from tools or edges of work surface. A wrist rest cushions the edge of your desk.

- Cold compresses blood vessels and interferes with circulation.

- Incentive work or overtime increases the number of repetitions and reduces recovery time.

- Job dissatisfaction increases muscle tension. Tense muscles are more likely to tear. Prolonged stress also interferes with the immune system and healing.

- Hormonal changes may increase fluid retention which increases pressure in carpal tunnel.

- Nutritional deficiencies, especially of the B vitamins can interfere with healing of tissues.

- Smoking interferes with the repair of connective tissue.
SYMPTOMS AND INJURIES

The Maine Video Display Terminal law states that if you work on a Video Display Terminal (VDT) more than four hours a day, you must be trained to use your terminal properly and to protect yourself from injuries from computer use. See pages 17 and 18 for more about the law.

Here are some warning signs:

Carpal tunnel symptoms include numbness, tingling, aching, burning, clumsiness, weakness or swelling of the thumb and first two fingers. You may be dropping things or can’t open that jar that you previously could. Pain or weakness may be worse at night or when you are driving. It may disappear as you work during the day. Pain or weakness is caused by compression of the nerve due to swelling of tissues. Swelling results when the wrist is used repeatedly with force in bent postures for long periods of time.

Tendinitis may occur in your hand, arm or shoulder. The pain is dull and aching, and aggravated by using your arm. It is not usually painful at rest. Pain occurs with extreme reaching below and behind or overhead with elbows above shoulder height. Reaching for a telephone placed on the desk behind, closing file draws, etc., if done enough can contribute to tendinitis.

DeQuervain’s Disease, also called “washerwoman’s sprain,” is a condition that causes pain at the base of the thumb. It occurs when the wrist is used in bent positions and the thumb is stretched frequently. Using a hand held stapler frequently or lifting heavy files in a pinch grip could be an aggravator if done often.

Trigger finger results from using the finger or thumb in a flexed position and with tools which have hard or sharp edges. The finger locks in the bent position.

Tennis elbow and Golfer’s elbow occur when the forearm is rotated and the wrist bent.

Many other conditions may be aggravated by repeating the same motions combined with force and awkward postures.
Performing any activity a few times a day spread out over your workday is not going to be a problem.

If you find yourself doing a repetitive activity or notice symptoms of a Repetitive Motion Injury, try to reduce that activity and report symptoms to your supervisor. Prevention is more effective than cure.
STATIC POSTURES

When muscles are contracted or in awkward positions for long periods of time, they don’t receive the blood supply needed to sustain them.

For instance, in holding your arm over your head, your shoulder joints are holding up about seven to ten pounds of weight in your arm. If you flex your head forward, chin to chest, your head is putting ten to fourteen pounds of weight pull on neck, shoulder and upper back muscles.

That is why changing positions, stretching and exercise are good prevention. Periodically removing the strain allows stressed body parts to rest and recover.

Alternating tasks that use different groups of muscles is another good thing to do. For instance, if you open mail and enter data into a computer, alternate each task for small amounts of time.

<table>
<thead>
<tr>
<th>Examples of Static Effort</th>
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</thead>
<tbody>
<tr>
<td>- Holding objects in hands</td>
</tr>
<tr>
<td>- Pushing and pulling heavy objects</td>
</tr>
<tr>
<td>- Working in bent over posture</td>
</tr>
<tr>
<td>- Working with arms raised</td>
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<tr>
<td>- Working with arms held out horizontally</td>
</tr>
<tr>
<td>- Working with bent neck or back</td>
</tr>
<tr>
<td>- Sitting without back support</td>
</tr>
<tr>
<td>- Working in constrained postures</td>
</tr>
</tbody>
</table>
Injuries to keyboard users result from holding fingers and hands in readiness over the keyboard more often than from the number of keystrokes per minute. This puts continuous stress on muscles, joints, ligaments, tendons, and nerves.

Wrist Rests keep our wrists from dropping into the "cobra" position and give us a place to rest the wrists and hands between keying. Sharp work surface edges can compress tissues and interfere with circulation. Wrist Rests cushion and promote healing of fatigued tissues.

Operators should not "stick" their wrists on the rest while keying. This position puts too much pressure on the hands and wrists. Instead, leave the whole arm "free floating" to make sure that all structures share in the work load.

Most important, keep the wrist as straight as possible. Avoid curves such as these:

Tightly grasping the mouse is another static posture. Move your whole forearm instead of flicking your wrist from side to side. If you notice hand discomfort, you can switch the mouse to the other side for a while. You may need to make a change in your program to do this. Many other pointing devices, trays and rests are available. Get some ergonomics catalogs and surf the possibilities. Whatever your arrangement, avoid reaching up and out to use the mouse. You are overloading your elbow and shoulder. The mouse should be positioned beside your keyboard.
Adjust your work station to fit you. If your work surface is not adjustable, start with your arm position in relation to the work surface. Your forearms and upper arms should be at about right angles with your shoulders completely relaxed. Wrists should be straight. This is the starting point. Raise or lower your chair until you achieve this position.

Check your legs. Are your thighs parallel to the floor? Are your thighs and lower legs at right angles? Knees should be slightly higher than hips to take pressure off the spine. Are your feet firmly planted on the floor? If not, you will need a foot rest or box for that purpose.

Does the “fat” part of the chair support your lower back? Is the edge of your seat about three fingers breadth from the back of your knees? If not, adjust your chair accordingly.
Adjust your screen to avoid reflections and get the best contrast. (See "Taking Care of your Eyes"). Make sure the top of the screen is slightly below eye level. For a thorough station evaluation, go through the VDT Workstation survey included with this handbook.

If you have an adjustable surface or keyboard, start with your feet flat on the floor and adjust your chair. Then adjust your work surface so that your arm position is correct. Continue as above.

Wrist posture is related to keyboard location.

Elevation of one shoulder, depression of the other and twisting of the neck can be reduced by using a document holder.
TAKING CARE OF YOUR BACK

Prolonged sitting places excessive static loads on the muscles of the back and legs. Over a period of time this can lead to fatigue, discomfort and injury. Sedentary workers have almost as many back injuries as construction workers.

If prolonged sitting is required, look at ways to reduce injury.

- Avoid prolonged slouching. The back has three curves which make it strong and resistant to injury. Slouching straightens out the lumbar curve. Head forward takes away the upper curve; it stretches ligaments which normally support the spine.
- Place feet on a foot rest with knees slightly higher than hips.
- Use well designed, supportive, adjustable chairs. (See "Choosing a Chair"). If you can’t get a good adjustable chair right away, use a small pillow or folded towel to support your lumbar curve.
- Be sure your work surface is at appropriate height. Slide your chair as far under your work surface as possible so you don’t lean out to your work.
- Keep reading materials as close to eye level as possible so that you are not bending your head forward.
- Change positions frequently, at least every hour. Getting up to go to the photocopier, getting supplies, etc., qualify.
- Take stretch breaks routinely. Stretches should be designed to stretch the muscles and tendons which have been flexed or statically loaded. They should not duplicate the stresses of the job. If your job requires forward bending, do not do forward flexions as a stretch. Do backward stretches.
CHOOSING A CHAIR

The most important part of your station is your chair. It can often make up for the lack of adjustment in permanently installed office furniture. You can raise or lower the chair to provide the best working position for the upper body. This position is upper arms and lower arms at right angles with shoulders in a relaxed position. Having an easily adjustable chair is especially important if you have work surfaces of different heights. Adjust the chair to provide correct arm position at each of the different heights. An “ergonomic” chair is a chair that can be adjusted to support your body in a natural, comfortable position.

Many back injuries may result from sitting in one position for long periods of time. This can reduce blood flow and break down tissues. A good chair which is adjustable to many positions, together with a program for position change, can go a long way toward preventing injuries.

Work efficiency is often improved by reducing fatigue.

When selecting a new chair, we strongly suggest that employees “try out” a chair before purchase. Even an “ergonomic” chair is not comfortable to everyone and even the worst chair may fit someone perfectly. If a salesperson will not accommodate you, find another company.
<table>
<thead>
<tr>
<th>Adjustment factors that contribute to comfortable seating:</th>
</tr>
</thead>
<tbody>
<tr>
<td>■ A back rest that is adjustable up and down as well as in and out. Many people prefer high backs because of the support. The &quot;fat part&quot; of the back rest should fit into the small of your lower back.</td>
</tr>
<tr>
<td>■ A lever adjustment for raising and lowering the seat.</td>
</tr>
<tr>
<td>■ Arm rests should be removable if they prevent workers from getting close to work surfaces or get in the way of work tasks.</td>
</tr>
<tr>
<td>■ Authorities recommend tiltable seats. However, some do not like the feel of being tipped forward. If this feature is selected, it should also allow an optional straight seat pan.</td>
</tr>
<tr>
<td>■ A tiltable or rocking back rest allows for position change and is a nice option. The back should be lockable or it will not offer sufficient support.</td>
</tr>
<tr>
<td>■ Seat covering materials should be porous and comfortable.</td>
</tr>
<tr>
<td>■ Seats should be generous with not more than three fingers breadth between the back of the knees and the chair edge. If the chair has an adjustable back, move the back away from the seat to provide more room.</td>
</tr>
<tr>
<td>■ The chair should be soft and not press into the legs when sitting. (Restricts circulation).</td>
</tr>
<tr>
<td>■ The chair should be easily adjustable. If too difficult to adjust, many employees won't bother.</td>
</tr>
</tbody>
</table>
HEAD FORWARD POSTURE

How much do you think your head weighs? Some of us hope it carries a lot of weight! Well, it's actually twelve pounds of weight pulling on neck and shoulders.

Holding the neck forward can produce neck, shoulder and upper back pain. This posture results in reduced blood supply and failure of the tissues to repair adequately.

To read objects on a flat surface, we need to flex the neck to see them. Straighten the neck and better align the body by placing the book or papers on a tilted surface. This can be a fancy device like a draftsman's table or a simpler object such as a box cut into a triangle.

Cut the box with a knife or cutter. You may need to tape edges to reinforce. Glue, tape, tie or clamp a strip of heavy cardboard, light strapping or foam to make an edge to hold your reading materials.

This also makes a good, inexpensive device to determine if head forward posture is the source of your discomfort. Give it a few days to work.
No evidence exists that operating a VDT will damage your eyes. You may, however, develop symptoms of eye fatigue. Existing visual problems may worsen if you spend a lot of time on a computer.

If you already suffer from tired eyes, you should know about these risk factors:

- Work performed at a viewing distance of 16-24 inches is considered "near work." As we get older, most of us have trouble with "near" work. Our eyes do not focus as well on close objects. It may be time to get bifocals. This will require some station adjustment (See under "Visual Correction").

- Certain characteristics of the video monitor may also stress the eyes. The resolution or dots per inch (dpi) determines the sharpness of the picture. A screen with a dpi of 70 may appear fuzzy or blurry. 90-120 dpi is the optimum range.

- VDTs continually draw and redraw the image on the screen in order to update it. This is called the refresh rate. We see "flicker" if the refresh rate is below 75 Hz.
Video screens can have either negative or positive polarity. Positive polarity means that the VDT forms white images on black; negative polarity means the black images are formed on white backgrounds. Positive polarity screens may pose a problem for the eyes because they are the opposite of hard copy documents. They force the eyes to adjust every time the focus shifts from screen to hard copy. They also are more likely to show light reflections because of the black background. Amber and green letters on a black background would be considered positive polarity. Negative polarity screens are more similar to hard copy, minimize glare, have superior brightness and contrast.

A downward viewing angle of 10-20 degrees improves focusing ability of the eyes and may prevent eye dryness and discomfort. In practical terms, this means that the top of the screen should be slightly below eye level.

Two problems related to computer operation are poor alignment and unequal lighting of documents. We view the screen at a horizontal angle and lay documents flat on the work surface. Shifting the gaze from one surface to the other can lead to eye fatigue. Similarly, if we have a bright light or window in our viewing field, the eye must change back and forth to the bright field and the dim field like a camera lens.

Be aware if you keep the overhead light low for the screen and use bright task lighting on documents. Experts recommend 18-46 foot candles for VDT stations. The typical station has a 75 to 100 fc level. The levels for video display operation can be much lower than those for reading. A good working balance should be obtained. Conflicts between workers may occur when different light levels are needed to see well. Individual work station lighting is often the best solution with the overall light level kept fairly low. Bright overhead light tends to reduce screen contrast by washing out the background.

When glare or reflections interfere with viewing the screen, people may often adjust their posture to find the best visual angle. This can result in stress on other parts of the body.
Visual Correction:

Uncorrected vision disorders can produce headaches, fatigue, blurred or double vision or eye discomfort. Get your eyes checked at least every two years!

People with bifocals present a challenge to balance postural and visual needs. They tend to bend their necks backward and lean forward to see clearly through the bottom half of the lens. Talk to your optician about adjusting your glasses for your computer.

Suggestions:

- Obtain a pair of glasses with a single focal length, selected for the specific focal distance of your screen. Disadvantage: it may be difficult to read copy at closer focal length.
- Have your optician use the distance focal length for your computer. (Great if your distance vision is good).
- Consider trifocals or graduated (no line) lenses.
- Try flip up, clip ons for computer focal distance.
- Magnifying screens are available.
- Place screen lower and tilt (Last resort. May aggravate neck problems).

Suggestions to reduce eye strain:

- Alternate periods of VDT use with other tasks which are not vision intensive.
- Avoid excessive near viewing (less than 24 inches).
- If possible, choose a screen with high resolution, minimal flicker and negative polarity.
- Minimize light intensity and distance between screen and documents.
- Occasionally look into the distance to rest eyes.
Lighting:

Avoid over lighting

- If lighting is too bright, remove some bulbs in fixtures or replace with bulbs of lower wattage.
- Install parabolic louvers.
- Redesign lighting system.
- A visor or similar eye shield may keep overhead lights out of eyes.
- Indirect lighting (that which casts light upward toward ceiling) tends to produce fewer reflections. Direct lighting (that which casts light downward), should be placed so that there is an even reflected light pattern over the ceiling surface. A dappled effect tends to produce noticeable reflections. Lamps should be placed to the side of the worker.

Avoid bright side lighting

- Do not place under shelf lights behind the monitor.
- Place computer terminal at right angle to windows and light fixtures.
- Use window treatments like curtains, blinds, awnings, tinted glass, dark film or clear polarized shades.
- Use panels to block out ceiling or window brightness.

Avoid reflected light

- Use a commercial or home made bonnet/hood to keep reflections from screen.
- Avoid glossy, light colored wall and furniture surfaces.
- Hang light absorbing rather than reflecting materials over light surfaces, i.e., dark colored wall hangings or posters.
- Use monitors that can be tilted and swivelled to avoid reflectance.
- Use glare filters.
- Consider glare reducing sleeves for fluorescent tubes.

Avoid white or bright clothing which reflects light
Try a screen or filter

- There are several types of glare filters, however, all reduce brightness to some degree. If many employees in an office need filters, it may be cheaper to use another control method.
- Mesh screen: Inexpensive ($30), filter out reflections, limit the viewing angle, and collect dust.
- Polarized glass: More expensive ($150), especially effective.
- Film coatings: spray on glass, can be easily scratched.
- Screen treatments: can be applied by the manufacturer.

MAINE VIDEO DISPLAY TERMINAL LAW

This handbook contains the information you need to do the training required by law.

The poster on the next page explains the law. You can post that page, or call us for a full-size poster.

If you would like help with training, a copy of the law, or a VDT poster—all at no cost—call us at (207) 624-6400.
Maine has a VDT law that gives VDT operators certain rights. If you work on a VDT for more than four hours a day, you are a VDT operator.

Your employer must train you to use your VDT and to avoid or minimize conditions that may arise from long or improper use.

Your employer must train you on the importance of proper posture when you use a VDT and how to adjust your workstation to achieve proper posture.

Your employer must train you within the first month of your being hired and once a year after.

Your employer must post a notice of your rights under this law.

If you have questions about this law, you can call the Department of Labor at 624-6400.
FEEL GOOD PROGRAM

Start your day like athletes do, with a set of warm-up exercises. Tight muscles and tendons are prone to injury. Take regular stretch breaks throughout the work day.

This program can improve circulation to cramped muscles, reduce fatigue and improve your feeling of well being. We want you to go home with something left for your family and yourself.

Many studies even suggest that an exercise program can improve work efficiency and production.

Use the following as a guideline to your program. A brisk walk prior to exercising will supply extra blood to muscles and improve the stretching capacity.

1. Do the stretches slowly and only to the point of pull. If you have discomfort, back off.
2. Hold the stretch for five seconds, don’t bounce or jerk. Increase the length gradually to ten or more.
3. In the beginning, do each exercise five times and gradually increase to ten or more.
4. Breathe normally throughout. Do not hold your breath.
5. If you have a pre-existing condition, please consult your doctor about specific exercises.
6. Never exercise to the point of pain. Everyone is different.
On a small work surface, can I put my monitor in the corner where my desk and computer table come together?

You may be able to do so if both work surfaces are the same height and you can face the monitor and keyboard directly. You would need a wide wrist rest to offer your forearm support and bridge the crack. Many new work stations offer this arrangement, but they have the inside corner angled off. Don’t set the computer off to the side and twist your head to view the screen.

What is an ergonomic chair?

An ergonomic chair is adjustable. You can adjust it to fit your body and your work station. It is the most important piece of your work station because it can make up for other problems in your work station. Each chair has its own adjustment system. Ask the salesperson to show you how to adjust it. You should try it out for several hours before choosing. Not all ergonomic chairs are comfortable to everyone.

Are bright spots on the screen a problem?

You have glare or reflections from light. Both can make reading difficult and cause eye strain or headaches after a period of time. Refer to “Taking Care of Your Eyes” for solutions.

Do wrist rests really help?

Wrist rests keep your wrist from flexing and offer a place to rest forearms in between keying. Your arm weighs about eight pounds. Holding that weight out without support can put a lot of stress on shoulders and neck. Even if you don’t have arm pain, a wrist rest will reduce fatigue. There are many types available. Look at a selection, check with others in your office and try some out.
I have to use the telephone many times a day while I look up information on the computer. I have neck discomfort from holding the receiver between neck and shoulder. I have been told to get a head set. I have tried one before and really don’t like them. Is there any other way?

You could use the speaker phone, but many callers are uneasy about who might be listening. It also has a tinny sound that easily identifies it. There are many types of head sets available. Many are cordless. Others are super light weight. It does take some getting used to, but the freedom to use your hands and freedom from pain are worth it.

I’ve been offered the opportunity to work four ten-hour days. What effect will that have on my body if I rest on my day off?

Most of us use that extra day to “get things done”. Few people rest. All that aside, you will have two extra hours using your work muscles each day and two less hours of different activity to rest those muscles that you constantly use in your job. It’s easy to get into a fatigue/rest imbalance which can lead to injury.

Some of the people in my office have been spending five minutes every two hours to do stretching exercises. How can that small amount of time help?

Studies have shown that even that little bit of time spent stretching cramped muscles (muscles held in static posture) can prevent injury, improve work performance and reduce fatigue. Those are good reasons, so get the kinks out and enjoy feeling better!
Ergonomics Web Sites

Occupational Safety and Health Administration-Ergonomics Page
www.osha-slc.gov/SLTC/ergonomics

National Institute for Occupational Safety and Health
www.cdc.gov/niosh/

Typing Injury FAQ
www.tifaq.com

IBM Health Computing
www.pc.ibm.com/us/healthycomputing

National Coalition on Ergonomics
www.ncergo.org

AFL-CIO and Safety
www.aflcio.org/safety

American Occupational Therapy Association
www.aota.org

Ergonomics Catalogs

The following is a partial list of ergonomics catalogs available. Catalogs are an excellent source of ideas for resolving ergonomic hazards in the workplace. Ergonomics teams find them useful aids for brainstorming.

Call to have a copy sent to you.

North Coast Medical, Inc. 800-277-6826
AliMed 800-225-2610
Fox Bay 800-874-8527
R & D Ergonomics 207-865-6445
IMPACC 800-762-7720
ESI 800-833-3746
Adaptables 800-701-8262
Hello Direct (headsets) 800-444-3556
Ergo Source 800-969-4374
Notes
Here are some exercises that may help you feel better and reduce fatigue.

Remember, adjusting your work station addresses the hazard of awkward postures. It will not help your body fight off the effects of static posture. Only movement will do that.

The following exercises have been evaluated by experts in the field (A Review of Physical Exercises Recommended for VDT Operators: Lee, Swanson, Sauter, Wickstrom, Walkar and Mangum). This selection was found to be easy and safe to perform. If you have a medical condition, consult your doctor.

- Walk in place, letting shoulders and arms hang loose.
- Place one foot forward and one back. Keep back heel on floor. Bend front knee. Lean forward until you feel slight stretch in calf. Hold 5 counts. Reverse legs and repeat.
- Place palms across the small of the back. Arch spine 5-10 times. May be done standing or sitting.
- Sitting erect in chair, press down alternately with ball and heel of right foot several times. Repeat with other foot.
Glide head back as far as it will go, keeping head and ears level. Now glide head forward. Repeat three times.

Lift shoulders towards ears in a shrug. Relax and let them fall back.

Straighten fingers and spread apart as far as possible. Hold for count of 10. Relax. Repeat three times.

Slowly raise arms and draw stomach in. Let arms drop. Repeat twice.

Stretch right hand out. Gently pull the thumb down and back. Hold 5 seconds. Relax and repeat 2 times. Repeat with left hand.

Raise arms to the sides, elbows straight. Slowly rotate arms in small circles forwards, then backwards. Lower arms. Repeat 3 times.