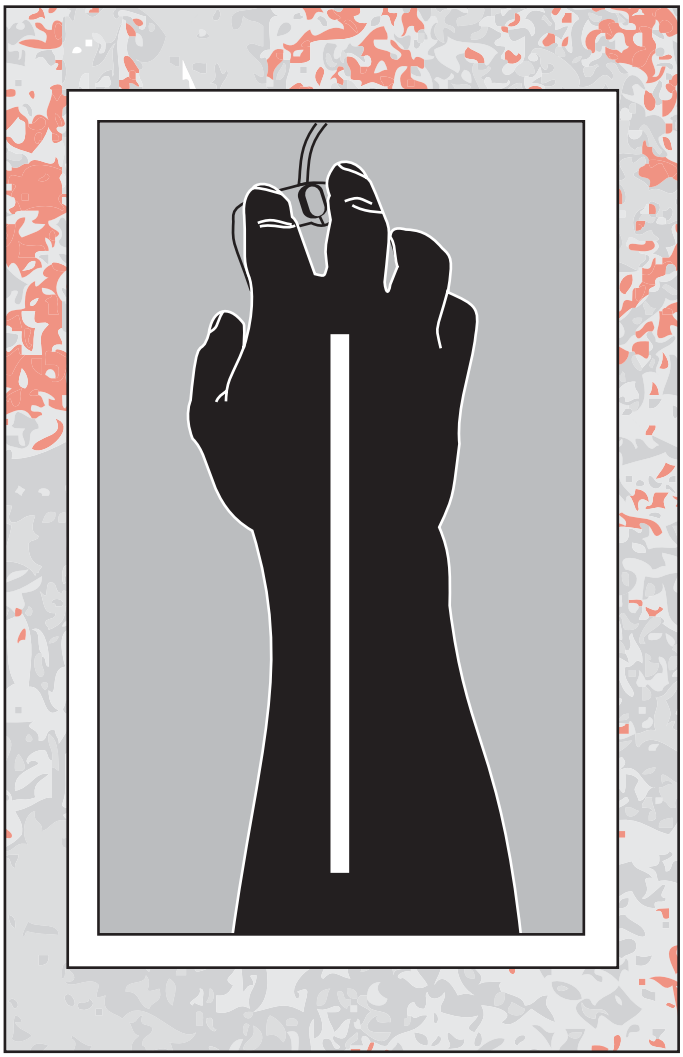
OFFICE ERGONOMICS HANDBOOK

FIFTH EDITION

Occupational Health Clinics for Ontario Workers Inc.



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FIFTH EDITION, MAY 2008

Occupational Health
Clinics for Ontario
Workers Inc.

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OHCOW clinics **Back Cover**

This handbook has been designed to serve as a guideline for office ergonomics. For more information or ergonomic support, please refer to the back cover for the clinic nearest you.

INTRODUCTION

WHAT IS ERGONOMICS?

Ergonomics can be defined as fitting the job to the worker. Not all workers are the same size and everyone has limits. Ergonomics aims to design workstations, work processes, equipment, and tools to fit you. As a worker, it is important that you know how to adjust your office workstation to suit your needs.

If a job does not fit a worker, the worker is more likely to be exposed to risk factors that may lead to musculoskeletal injury. The main ergonomic risk factors in the office include the following:

- REPETITION: tasks or body movements carried out over and over again.
- AWKWARD POSTURES: body positions which deviate from neutral such as twisting your neck to view your monitor or reaching to use your mouse.
- STATIC FORCES: maintaining a position for a prolonged period of time (e.g. prolonged sitting, viewing the monitor with a bent neck, or reaching for the keyboard).

Every person responds to ergonomic risk factors in different ways. For example, one worker may have symptoms of an injury while another worker performing the same tasks may not have symptoms. Ergonomic risk factors should be identified and reduced to lower the risk of injury for all workers. Even those workers who are not experiencing pain should take ergonomics seriously to reduce the risk of developing an injury.

Purchasing Considerations

When selecting office products, adjustability is a key feature. Even though a product may claim to be "ergonomic", it may not suit your needs, therefore, BUYER BEWARE. You can use the information in this handbook to determine what equipment you need to make your office fit you, while learning how to appropriately set up the equipment that is currently in your office.

BEFORE YOU BUY OFFICE EQUIPMENT

- Find out what you need.
- Most office equipment has been designed for the average male who is 5'10" while the average female is 5'4". This means that some chairs and other office equipment may be too large for some users , or too small for others.
- Try Before You Buy. Arrange to get samples of equipment from your supplier.
- Have your supplier explain and demonstrate adjustment features.

Figure 1: Example of a neutral working posture within the office.

HOW SHOULD I SIT AT MY COMPUTER WORKSTATION?

WRISTS:	Keep the wrists in a straight position. Do not bend them up, down, or from side to side.
ELBOWS:	Keep elbows bent between 90 and 100 degrees (right angle), keep them close to your body, and supported if possible.
SHOULDERS:	Relaxed (not slouched or raised).
NECK:	Facing forward and not looking up, down, or to either side.
HIPS:	Bent around 90 degrees with your thighs parallel to the floor.
LOW BACK:	Supported to maintain its natural curve.
KNEES:	Bent at approximately 90 degrees with enough space between the back of your knees and the chair to place your fist.
FEET:	Resting flat on the floor or supported by a footrest.

Take appropriate breaks throughout the day

Multiple short duration breaks provide the body with more rest than a single long duration break. These breaks, often called "Micro-Breaks", last anywhere from 10 to 60 seconds and should be taken throughout the day. During these micro-breaks, look away from the computer screen and focus on objects in the distance, remove your hands from the keyboard and/or gently stretch muscles. An example of an "active micro break" is taking 5 -15 seconds every 5 minutes to rest the eyes and upper body.

Try This...

Try to alternate your computer work with other tasks. For example, rather than typing continuously for an hour, stop and deliver a fax or do some filing. When you break up computer work with other office tasks, your arms, neck and back muscles can rest.

You may need to schedule breaks into your day until you are used to taking breaks away from the computer. Use the following table and worksheet as an example to help you organize some well needed breaks.

Time	Tasks	Time	Tasks
8:00 to 8:30	Computer Work		
8:30 to 9:00	Filing		
9:00 to 9:30	Computer Work		
9:30 to 9:35	Stretch		
9:35 to 10:00	Computer Work		

Try using your computer calender or scheduler to remind you of your breaks.

YOUR CHAIR

Your chair is the most important part of your office workstation. The chair has to fit you and suit the tasks that you do. One style of chair may not suit every worker. For example, the "average" chair is designed in some instances to fit the average male and may not suit other users.

When looking for a chair it is important that the users have the option to try several different designs prior to finalizing any purchase. A trial period should be long enough to allow for an opportunity to try the chair (i.e. several weeks) and to provide comments or concerns with the chair.

WHAT MAKES A CHAIR ERGONOMIC?

The following features are part of a good office chair. A chair is only "ergonomic" if you can adjust it to fit you. Get to know your chair by experimenting with the controls, so you can make adjustments quickly and confidently.

General Chair Features

- 5-caster swivel base
- Armrests
- Height adjustable seat pan
- Tilt adjustable back rest
- Ability to make adjustments easily while sitting in the chair
- Firm padding covered with non-slip, breathable fabric

Seat pan

- Rounded front edge
- Wide and deep (long) enough to fit you comfortably
- Adjustable in angle

Backrest

- Padding for the low back area that is curved to fit the shape of your back
- Height adjustable (separate from seat pan)
- Adjustable angle with locking mechanism
- Wide and high enough to fit your back comfortably

Note:

When we sit, our back tends to lose some of its natural curvature. An effective lumbar support of a chair is designed to help maintain the natural curvature of the spine when sitting. It is important to provide appropriate support for the spine so that there is no discomfort or pain (Figure 2A). If you are feeling pain while sitting, the lumbar support of your chair may not be placed correctly.

Figure 2A: Chair with adequate lumbar support.

Figure 2B: Chair without lumbar support.

Armrests

- Ability to rest the arms as they hang freely by your side
- Should provide height and width adjustability
- Should not interfere with the work surface

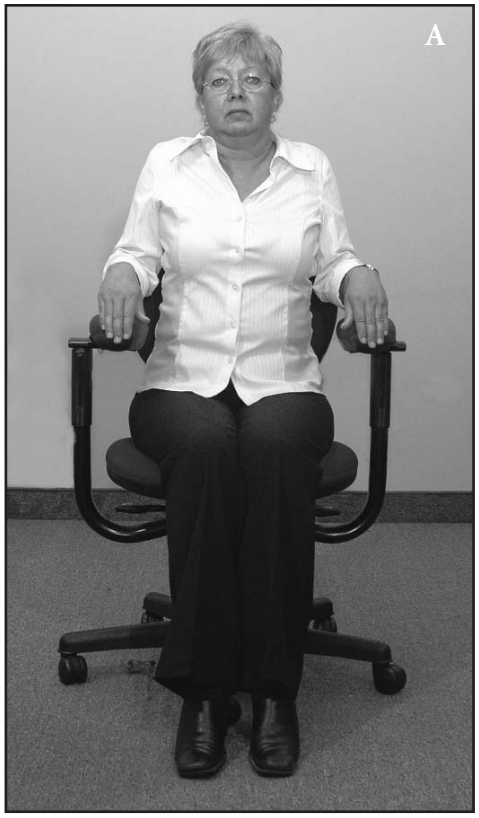


Figure 3A: If armrests are too high, they may cause the user to work with rasied shoulders.

Figure 3B: The shoulders should be relaxed and hanging comfortably at your sides.

How Do I Adjust My Chair?

In addition to having an adjustable chair, knowing how to properly use its controls is key for ensuring a neutral working posture. The following points are designed to help ensure proper adjustment.

- Standing in front of and facing the chair, raise or lower the chair until the front edge of the seat pan is just below your kneecap (Figure 4).
- Sit with your feet resting flat on the floor and legs at a 90-110 degree angle.

- Allow enough space for a closed fist between the edge of the seat pan and the back of your legs.
- Adjust the backrest so the lumbar support contacts the curvature in your lower back. You may need to move the backrest up or down as well as towards or away from you (Figure 5).
- Adjust armrests so that your elbows can rest on them while your arms hang freely at your side.

Figure 4: Seat pan slightly below knee cap.

Figure 5: The adjustment for the back rest height is usually located on the bottom of the seat pan.

Figure 6: A seat height that is too high can cause unwanted pressure on the thighs and not allow the feet to rest flat on the floor.

Chair height

If your keyboard is placed on an adjustable support:

- Lower the seat pan so your feet rest comfortably on the floor.
- Check for pressure points. You should feel even pressure from the seat pan. If you feel more pressure near the back of the seat (buttock region), raise the chair. If you feel more pressure under your thighs (near the knees), lower the chair.

If your keyboard is placed on a fixed surface (i.e. desk).

- Adjust your chair height so you can type comfortably with neutral wrist and arm positions.
- Use a footrest if your feet do not rest flat on the floor after you have adjusted your chair.

Try This ....

- Stand up and place your hand in the small of your back. Notice the inward curve in your lower back. Sit down on your chair while keeping your hand on your lower back. Notice how your curve flattens out. This shows you how easy it is to change the shape of your spine which can contribute to back pain.
- While keeping your hand on the small of your back, ensure that the lumbar support hits the hand.

YOUR WORKSTATION

ADJUSTABLE DESKS

It is often possible to add adjustable accessories to your desk. If you are purchasing a new desk, you may want one with adjustability built in. There are several methods of achieving adjustability:

1. You can purchase a complete workstation that allows for both regular desk work and space for the computer. The computer section should have an adjustable portion for the keyboard and mouse, and a separate adjustable portion for the monitor. The portion designed for the keyboard should have enough space for the mouse and keyboard to be placed side by side.
2. You can add attachments to your desk such as keyboard tray or monitor arm.
3. You can use a smaller separate computer workstation and continue to use your desk for regular work.
4. You can also purchase an L-Shaped workstation that allows for a separate writing and typing area.

If you have shelves above the workstation, ensure they do not interfere with adjusting the monitor height or block overhead lights.

The Non-Adjustable Desk

Use the information in the chair and desk sections above to ensure that neutral postures are achieved.

If the work surface is too low

Raise the desk using a stable support (ie. blocks under desk legs) until the work surface or keyboard is at elbow height.

Figure 7: Providing a chair and keyboard set up that is appropriate for the user enables him/her to type at, or just below, elbow height.

How should I arrange everything on my desk?

Items found on your desk should be arranged based on their weight and frequency of use. Heavier items, such as reference books, should be placed between seated shoulder and waist height.

Frequently used items, such as the keyboard, mouse and telephone should be located close to the user at a minimal reach distance. Infrequently used items, such as reference material, calculators or staplers can be located towards the back of the desk. A simple point to remember is that the more you use an item the closer it should be.

Telephone Usage

If you have to write or type while talking on the phone, you should use a headset or speakerphone to keep your hands free. This will help to reduce awkward neck and shoulder positions.

Figure 8A: Example of an awkward neck posture which occurs when multi-tasking.

Figure 8B: Elimination of awkward neck posture through the use of a telephone headset.

YOUR KEYBOARD AND MOUSE

Some "ergonomic" keyboards are not adjustable and rely on a one-size-fits-all theory. This may not be appropriate for all users since people often have different sized hands.

HOW DO I ADJUST MY KEYBOARD AND MOUSE?

Your keyboard and mouse should be slightly below elbow level and close to your body. The mouse should be beside the keyboard, and in front of your mousing hand. To use your keyboard and your mouse in the "neutral" position, you should adjust your keyboard tray or your chair.

If you have an adjustable keyboard/mouse tray, move the keyboard and mouse to elbow level.

If you do not have an adjustable keyboard/mouse tray, adjust the height of your chair so the keyboard and mouse are at approximately elbow level. The keyboard should be angled so your wrists remain straight.

Try This ....

Get a co-worker to check your wrist posture as you type and help you make adjustments if required.

ALTERNATIVE KEYBOARDS

"Ergonomic" keyboards, such as split keyboards, are designed to help keep your wrists in a neutral (straight) position when typing. First make as many improvements to your workstation as possible before thinking of changing your keyboard. It is important to remember that split keyboards are most effective when used by a "touch" typist. "Hunt and peck" typists tend to find these designs frustrating as they visually search for keys.

Considerations when changing your keyboard:

- The size and shape of the keyboard to ensure that you are using neutral and relaxed positions.
- The force required to depress the keys.

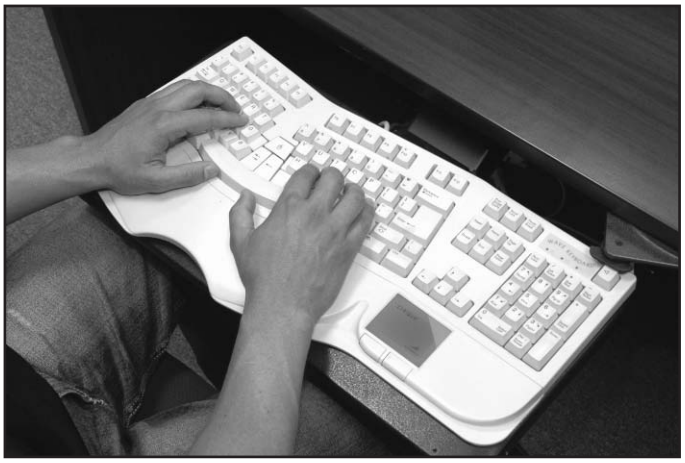


Figure 9: An example of a split keyboard which allows for neutral wrist and arm posture.

KEYBOARD TRAYS

Keyboard trays come in different sizes, adjustability levels and desk top connections. The keyboard tray should:

- Allow enough room for both the keyboard and mouse.
- Be easily adjustable in both height and angle (in all directions).
- Be free of attachments under the tray that can cause bruising, scrapes or contact pressure with your thighs or knees.
- Be easily moved under the desk and out of the way.
- Allow enough space for a wrist rest if desired.

Figure 10: Example of a fully adjustable keyboard/mouse tray.

Adjusting Your Keyboard

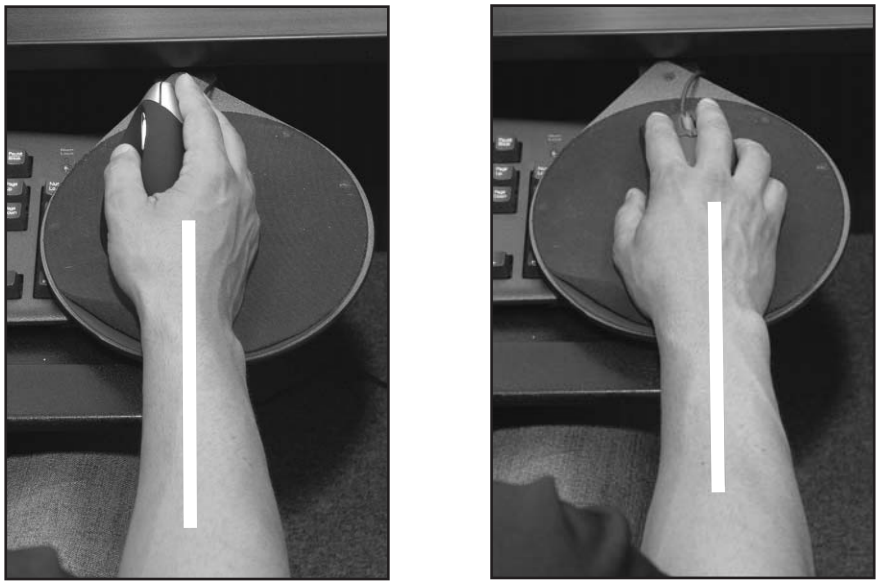
Place the keyboard directly in front of you.

- Type with your wrists "floating" over the keyboard.
- Maintain a straight wrist position when you are typing.

Adjusting Your Mouse

Place the mouse in front of your "mouse hand". You should NOT have to reach away from your body in order to operate the mouse.

- Position the mouse at the SAME height as the keyboard. Remember to maintain approximately a 90 degree elbow angle.
- Maintain neutral wrist posture when mousing (Figures 11 and 12).
- Rather than wrist movements alone, use your whole arm for mousing.



Figures 11, 12: Placing the mouse in the correct location allows the user to work with the wrist in a neutral posture.

MOUSEPADS

A mouse pad should be used in order to keep the mouse clean and moving easily. Even users who have an optical mouse should use a mouse pad as it provides the best surface for the movement of the mouse and for the optical sensor to detect movement.

Mouse Tips

To reduce stress on your dominant mousing hand try to use the mouse with the opposite hand, provided that you are using a universal design mouse. Alternating mousing hands can serve to reduce stress placed upon a particular arm while also improving working posture in some instances.

When using the mouse for prolonged periods of time, your lower arms should be supported. To support your arms:

- Rest your elbows on your armrests. Make sure the armrests do not restrict your arm movement when mousing.
- Rest your mousing arm on one side of the desk if your desk is "L" shaped and the height is around elbow level.
- Learn how to use keyboard shortcuts to minimize mouse usage (see "Hot Keys" listings below).

HOT KEYS

Windows Shortcut Keys

To reduce the amount of mouse work and the risk of injury, the following is a list of keyboard shortcuts ("hot keys") for commonly performed tasks. This is not a full list, but is meant to be a quick reference guide for the most commonly used and useful shortcuts. Many more shortcuts exist that may be found through the software's Help feature.

Windows General	
KEYS	**ACTION**
Windows Key	Brings up the start menu and the arrow keys can be used to select a program
Windows Key + D	Minimizes all open programs to show the desktop
Windows Key + E	Launches Windows Explorer
Alt + Tab	Holding Alt and pressing Tab allows to switch between open programs
Ctrl + Alt + Delete	Launches Task Manager
Alt + F4	Closes the current program
F2	Renames files/folders
Tab	Moves forwards through options in forms, dialog boxes, etc.
Shift + Tab	Moves backwards through options in forms, dialog boxes, etc.

Microsoft Office (Word, Excel, Outlook)	
KEYS	**ACTION**
Ctrl + A	Select all
Ctrl + S	Saves open file with current name
F12	Performs "Save As…" feature
Ctrl + P	Opens the print dialog box
Ctrl + O	Displays the open dialog box
Ctrl + N	Displays a new blank document
Ctrl + C	Copies selected item
Ctrl + X	Cuts selected item
Ctrl + V	Pastes/inserts copied or cut item
Ctrl + F	Opens the find box
Ctrl + Z	Undoes the last action
Ctrl + Y	Redoes the last action
Ctrl + B	Activates bolding
Ctrl + U	Activates underlining
Ctrl + I	Activates italicizing
Ctrl + }	Increases font size
Ctrl + {	Decreases font size
Ctrl + Mouse Wheel	Zooms in/out
Backspace	Returns to previous page in Explorer (Windows & Internet)
Shift + ⇐ or ⇒	Highlights
Ctrl + ⇐ or ⇒	Moves cursor one word at a time *
Ctrl + ⇑ or ⇓	Moves cursor one paragraph at a time *
Ctrl + End	Moves cursor to the end of the document *
Ctrl + Home	Moves cursor to the start of the document *
F2	Enters a cell at the end of existing text (Excel only)
F7	Runs Spell Check
Shift + F7	Launches the thesaurus

*** Can also be used with Shift key to highlight.**

WRIST RESTS (KEYBOARD AND MOUSE)

Padded wrist rests are often used in front of the keyboard and mouse to support your wrists. Wrist rests also reduce the contact pressure on your wrists from sharp workstation edges when you are taking a break from typing. These rests, if not used properly, can increase the pressure on your wrists, thus increasing the risk of injury, especially if used while typing.

- Typing should be performed with the hands "floating" above the keyboard. The heel/pad of your hand should only be resting on the pads when taking a break. Touch typing may also improve your neck posture by reducing the number of times you have to look down at your fingers on the keyboard.

Wrist rests should:

- Be long enough to fit in front of the entire keyboard and possibly the mouse.
- Be high enough to keep your wrist in a straight neutral position.
- Be made of moderately firm and comfortable material.
- Resting surfaces should be flat with curved edges to avoid pinch points.

SETTING UP YOUR KEYBOARD AND MOUSE

The goal for setting up your mouse and keyboard is to allow the user to maintain neutral working postures.

Figure 13: Neutral wrist postures through proper keyboard and mouse placement.

Adjust your workstation so that your hands are located at or slightly below elbow height when using the keyboard and mouse. An adjustable keyboard/mouse tray may be necessary to ensure a proper fit.

- The angle of the keyboard/mouse tray should allow your wrists to stay in a neutral posture.
- When the keyboard feet, located underneath the keyboard, are elevated the wrists may bend backward (extend) when typing.
- If a wrist rest is used and is too high, the wrists tend to bend forward when typing.

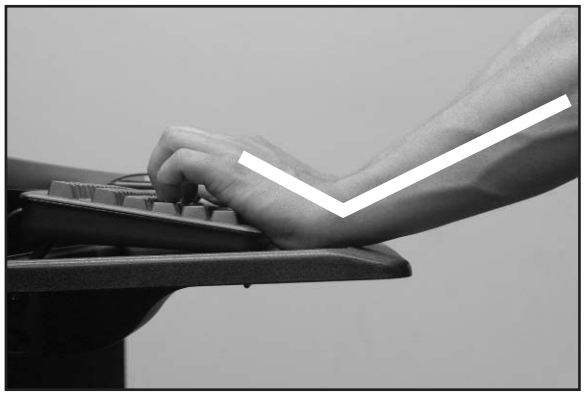
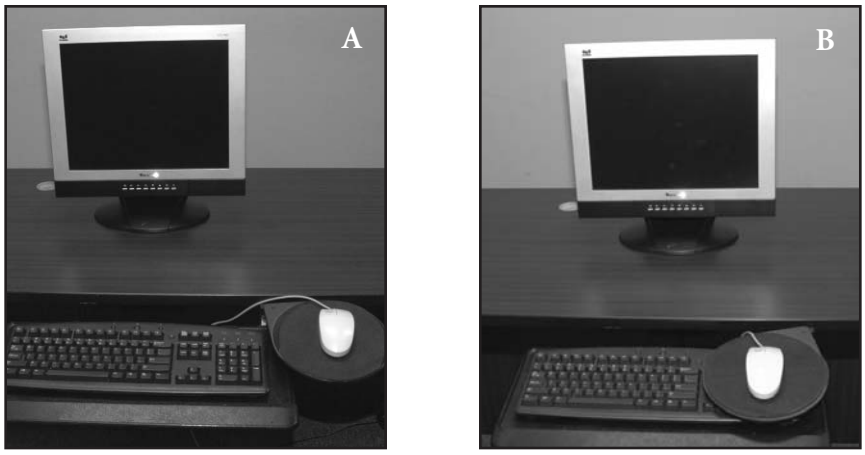


Figure 14: INCORRECT. The wrists are flexed excessively and the worker is not able to work in neutral postures.

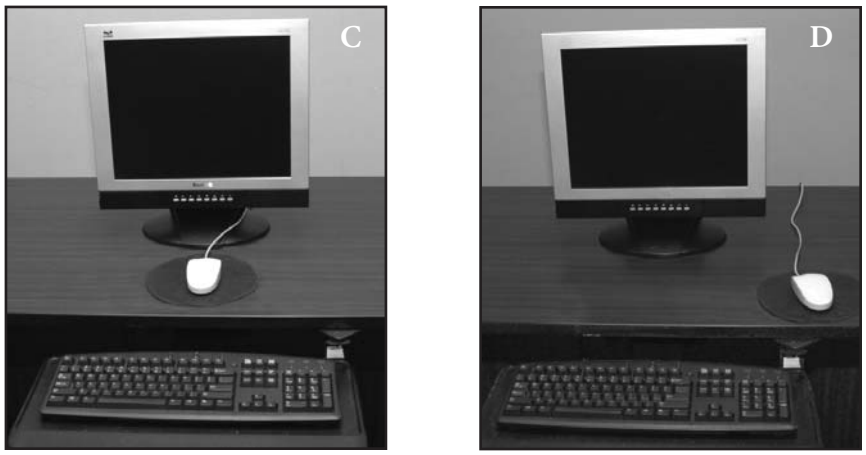
Figure 15: CORRECT. The wrists are in a neutral posture.

Mouse location

Mouse placement like those in Figures 16A and B allow the user to keep the mouse directly in front of his/her shoulder, which is ideal. Mouse locations in Figures 16C and D require the user to reach forward, which is not ideal.



Figures 16A, B: Examples of proper mouse location due to an adajustable mouse pad.



Figures 16C, D: Examples of improper mouse location.

YOUR MONITOR

WHAT TYPE OF MONITOR SHOULD I USE?

Flat screen monitors Liquid Crystal Display (LCD) monitors are becoming more prevalent in today's office environment. LCD monitors have several benefits when compared to the standard Cathode Ray Tube (CRT) monitors. These benefits are discussed below.

Do LCDs improve visual work performance?	◆ Visual search times for text targets are 22% faster for LCDs than CRTs, and also faster for low contrast, small characters. ◆ Eye fixation times are 9% shorter and 15% fewer eye fixations are needed to read the same information from an LCD versus a CRT. ◆ Visual search error frequency is 22% less when reading from an LCD than a CRT. ◆ LCDs have been shown to allow for greater postural variety during computer work.
Do LCDs eliminate geometric image distortions and flicker?	LCDs are free from flicker because they do not rely on a scanning electro beam. CRTs are more prone to flicker.
Do LCDs reduce glare probelms?	LCDs have uniform screen brightness and the screen is covered with a flexible surface that is substantially less prone to glare compared to glass covered CRT screen.

Do LCDs reduce Computer Vision Syndrome?	LCDs are flicker free, reducing the number of fixations, risk of headaches, and eyestrain.
Do LCDs save space?	LCD displays are thinner in design which can increase functional workspace.
Do LCDs save energy?	LCDs use less energy when on as well as in standby mode.
Do LCDs increase screen viewing areas?	A 15" LCD can give the equivalent area of a 17" CRT, and a 17" LCD the equivalent of a 19" CRT.
Do LCDs have better screen privacy than CRTs?	LCDs increase screen privacy as they cannot be viewed from side angles.
Do LCDs emit VLF/ELF electromagnetic radiation?	Unlike CRTs, LCDs are free from VLF/ELF electromagnetic radiation emissions associated with the scanning electron beam required for a CRT.

Note:

Many LCD monitors offer height adjustability, thereby eliminating the need for monitor arms.

HOW DO I ADJUST MY MONITOR?

- The monitor and keyboard should be directly in front of you.
- The top of the monitor should be at eye level.
- The monitor should be at least one arm's length away from you.
- The monitor should be angled slightly up towards your eyes. Angling the monitor up too high can increase glare (see the *Office Lighting* section).
- If the monitor sits on top of the computer hard drive, it is usually too high. Monitors are usually too low when they sit on the desk.

Note:

It is often easier to raise the monitor than to lower it. If the monitor cannot be lowered enough (so your neck is straight when looking at the screen), you may have to raise your chair. If you raise the chair, the keyboard height may have to be re-adjusted along with your footrest height. Also, the swivel base of the monitor can easily be removed, thus lowering the monitor. If the desk does not provide enough room to have the monitor at a correct distance, try altering the furniture and /or desk layout.

Figure 17: An example of recommended monitor placement (note the height and distance away from the user).

Examples of incorrect monitor placement

Figure 18: Is your neck bent forward when viewing the screen and/or document(s)? If yes, try raising the monitor and/or documents.

Figure 19: Is your neck flexed backwards, when viewing the screen and/or document(s)? If yes, try lowering your monitor and/or document(s).

Figure 20: Is your neck twisted to either side when viewing the monitor? If yes, try placing the monitor directly in front of you.

MONITOR ARMS

Monitor arms should allow the monitor to move in all directions and allow you to push the monitor completely out of the way when not in use. When buying monitor stands or arms ensure that the monitor can be located at the proper height. The arm must be strong enough to support the weight of the monitor.

Note:

Monitor arms are available both for traditional and flat screen monitors.

Additional considerations if you wear glasses?

Vision problems can lead to eye strain and headaches. If you work in an office, you should have regular eye examinations to determine if you have vision problems. You should explain the work you do with computers to your eye doctor. If you wear bifocals or trifocals, you may have trouble when working on computers since the lenses are generally designed for reading at a viewing distance of 40 to 50 cm and a downward gaze of about 25 degrees. If workstation changes do not correct bifocal/trifocal glasses problems, special computer glasses can be purchased.

DOCUMENT HOLDERS

You should use a document holder if you enter information from papers, files, binders, etc. Document holders help keep papers vertical or angled so you do not have to bend your neck to read them. Often people place papers flat on the desk and this requires excessive forward neck bending.

The document holder should be the same distance from your eyes as the monitor and at the same height as the monitor. When the document is close to the monitor, it is easier for your eyes to refocus between the paper and screen. By refocusing less often, strain on the eye muscles is reduced.

Various types of document holders are available including the following:

- Those that sit on desks (stand alone).
- Those that can be attached to the side of the monitor.
- Those that are on a movable arm which attach to or sit on the work surface (ensure there is enough space beside your monitor).

When buying a document holder ensure the holder has the following features:

- Large and strong enough for the different sizes and types of papers, books, files and documents you use.
- Easily adjustable (forward, backwards and sideways).
- The mechanism to hold the paper must be firm enough to prevent the paper from slipping out of the holder, adaptable to various sized documents, and easy to operate.
- The paper should remain straight (not curl up) and be easy to read.
- Easily moved to either side of the monitor.

Points to Remember

Cables are usually available in varying lengths so you can position your monitor wherever necessary.

You may need a co-worker to watch you to determine if you are working in an awkward position.

It is often difficult to tell if your neck is slightly bent. Even if your neck is only slightly bent back, your neck and shoulder muscles may ache and can become fatigued or injured.

LAPTOPS

Laptops are becoming more common in many different industries. They are light and portable but they present some problems that are distinctly different from the desktop computer. Laptop users should be aware of the following problems that can arise from prolonged use:

- Placing the laptop at an angle which is comfortable for the hands and arms can result in neck fatigue from bending to view the screen.
- Raising the laptop to view the screen can place the hands and arms in awkward postures.
- The small screen size can result in difficulty with reading and can lead to bending of the neck and upper back.
- Small key spacing results in cramped and awkward postures of the hands, arms, neck and shoulders.
- Using the touch pad or pointing device can result in awkward postures of the wrist and arm.
- Angling of the monitor to compensate for low height of the laptop can result in increased glare on the screen.

Recommendations for Laptop Use

- Use a computer docking station when in the office. This normally consists of a full size monitor, keyboard, and mouse with the laptop basically serving as the hard drive.
- An alternative option is to continue to use the laptop's screen and simply connect an external full-sized keyboard. In this scenario you must adjust the viewing height and distance the same way you would adjust a regular monitor. The external full-sized keyboard would also need to be correctly positioned as discussed in a previous section.
- When on the road, pack a light-weight keyboard and mouse.

OFFICE LIGHTING

Improper lighting can lead to eye strain and awkward postures. If light levels are too low muscles of the eyes can be strained and workers may adopt awkward postures to compensate. Since computer and paper work are commonly performed at the same time, light levels must suit both types of work. A desk lamp may be useful to control light levels as needed.

WHAT IS GLARE?

Glare is a common problem with lighting in offices. It makes it difficult to see the computer screen and strains the eyes. There are two forms of glare: direct and indirect.

- *Direct glare* occurs when light shines directly in your eyes.
- *Indirect glare* occurs when light is reflected from a surface. For example, light which may hit the monitor and reflect into your eyes.

Figure 21A: Example of direct glare.

Figure 21B: Example of indirect glare.

How to determine sources of glare

Turn off your monitor and look at the blank screen. This will display any light sources which may be affecting your screen. Identifying the source of the glare will allow you to take the necessary precautions (i.e. dim overhead lights or install window blinds).

HOW CAN I REDUCE GLARE?

The following are tips to reduce or eliminate glare:

- Position your monitor perpendicular to the windows and between overhead light panels.
- Use curtains and blinds to control the amount of natural light.
- Eliminate light sources that shine directly into your eyes.
- Eliminate light sources that reflect into your eyes.
- Consider the use of LCD (flat panel) monitors.
- Dim overhead lights.
- Angle the monitor away from the light.
- Place filters or fixtures on overhead lights.
- Tint windows.
- Cover the monitor with an anti-glare screen.

  Note: Polarized glass provides the most effective protection against glare.

REST BREAKS

MUSCLE RECOVERY—ARE YOU GIVING YOUR BODY A BREAK?

It is important to stand up and get away from your desk and/or computer regularly throughout the day. A five minute break away from the computer every hour allows the muscles within our bodies to rest. Changing positions throughout the day will help to reduce the stress and strain that builds up from staying in one position for a prolonged period of time. For example, adjusting the angle of the back rest of your chair even slightly will help change the position of your spine, giving certain muscles a "break". Movement is necessary to reduce the stress that builds up from sitting. Getting up and walking around, even short distances, throughout the day helps to reduce stress by improving circulation in the muscles and the spine.

If your computer workstation can be adjusted, one option is to stand while working at your computer. Even if your work station is not fully adjustable, tasks like talking on the phone, can be done while standing. It is preferable to break up sitting and standing tasks throughout the day. Other daily tasks, such as filing and interacting with staff can be done when away from your computer. Avoid remaining seated for extended periods of time. Try to stand up and change your position every hour.

Stretches You Can Do At Your Workstation

Figures 22A, B, C: Stretches for the wrists and arms.

Figures 23A, B: Stretches for the neck.

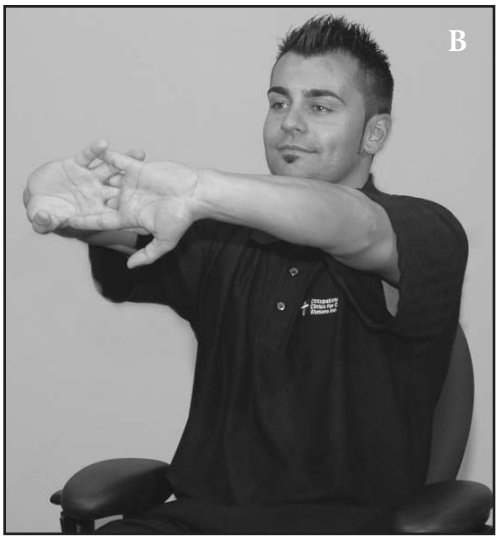


Figure 24A: Shows a whole body stretch.
Figure 24B: Shows an upper body stretch which can be performed in your chair.

Figures 25A, B, C, D: Various stretches which should be performed when standing.

OFFICE ARRANGEMENT

HOW SHOULD I ARRANGE MY OFFICE?

The following are some helpful hints on setting up your office.

- Allow adequate space for maintenance of equipment.
- Files and books that are used most often should be kept within reach.
- Files should be arranged in a filing cabinet so frequently used files are in the middle drawer or closest to elbow level. This should reduce the amount of bending and reaching required.
- Filing cabinets should be located so you have to stand up from your chair and walk to them. If the cabinet is far enough away you may have to stand to reach it. You will be less likely to twist and reach which may result in injury.
- You should use filing cabinets with a locking system so that no more than one drawer can be opened at once. If more than one drawer is opened there is a risk of the cabinet tipping.
- There should be enough space between the cabinet and the wall to pull open the drawers.
- File and desk drawers should be kept closed when not in use to avoid trips, bumps and scrapes.
- Heavy books should be accessed while standing and placed on the middle shelf or around elbow level.
- Shelf depth should allow for a comfortable reach.
- Equipment such as printers or fax machines should not obstruct movement.

ENVIRONMENTAL CONCERNS

WHAT ABOUT INDOOR AIR QUALITY?

Poor indoor air quality can cause many health problems. Common concerns in the office environment associated with poor indoor air quality can include:

- Eye, nose and throat irritations
- Headache
- Dry mucous membranes
- Dry skin
- Mental fatigue, trouble concentrating
- Nausea and dizziness
- Increased incidence of respiratory infections

When would I suspect that Indoor Air Quality may be a problem in my workplace?

- Co-workers have had most of the symptoms listed above on a weekly basis.
- The building ventilation system is deficient.
- The building has musty or chemical odours and/or has a history of water leaks.

Ways to avoid indoor air quality issues:

- Regular maintenance of the ventilation system and regular duct cleaning.
- Providing air purifiers in different areas of the office.
- Identifying possible sources of mould, i.e. wet spots on ceiling tiles.

WHAT ABOUT THERMAL COMFORT?

Do you feel hot, cold, or both? Is your skin dry? Is there a draft that makes you feel cold? If you answered yes to these questions, there may be temperature, humidity, and/or draft problems in your workplace. Thermal comfort is affected by your heating, ventilation and air conditioning (HVAC) system, the work activities you are doing, and personal preference.

The recommended temperature range is 20 to 23.5 degrees C in the winter and 23 to 26 degrees C in the summer with a relative humidity between 30% and 60%. The temperature range is lower in the winter because people tend to dress in warmer clothes.

Feeling cold can lead to increased muscle tension, increased stress levels, and awkward working postures, such as hunched shoulders.

What can be done about thermal comfort in my workplace?

Discuss the following issues with your Joint Health and Safety Committee:

Problems	**Possible Causes**
Drafts	Vents may not be positioned properly
Varying temperatures throughout the office	HVAC system may not be working properly
Static shocks	Humidity level may be too low

- Agree on one temperature setting at your work place. Workers can then dress according to their personal preference.
- Dress in layers if temperatures fluctuate.
- As a temporary solution, investigate the use of heaters or fans to accommodate personal preferences.

What can I do if I have concerns about indoor air quality or thermal comfort?

If you are concerned about indoor air quality or thermal comfort, talk to your Joint Health and Safety Committee members or contact an Occupational Hygienist at the OHCOW office nearest to you (see Back Cover).

What Should I Know About Electromagnetic Fields?

Electromagnetic fields (EMFs) are invisible lines of force that occur wherever there is electricity. They are made up of electric and magnetic fields. Electric fields can be blocked, but you cannot block magnetic fields.

What are Some Sources of EMFs?

Some other sources of electromagnetic fields in the office are:

- Ceiling fluorescent lights
- Photocopy machines
- Wiring
- Computers
- Other Electrical Devices

Another problem associated with computer workstations is electrostatic emissions, or static fields. Static fields attract dust to the computer screen.

What Precautions Should I Take to Reduce EMF Exposure?

Sit at least arm's length 71cm (28 inches) away from the computer monitor, and approximately 1.2 m or 4 feet from the backs and sides of co-workers' monitors. Electromagnetic emissions are reduced with distance; magnetic fields are not blocked by baffles or walls.

Avoid sitting next to electrical equipment (fax machines, laser printers, photocopiers). Take regular breaks away from computer work. This will reduce the exposure time to the electromagnetic fields.

Use equipment manufactured after 1983. Regulations were issued requiring that the radio frequency radiation from all computers be shielded to minimize interference with radio transmissions.

WHAT IS NOISE?

Noise is any unpleasant sound. We tend to call it "sound" when it is not annoying and "noise" when it is. Noise levels in your office are probably not high enough to damage your hearing, but noise may still cause problems.

Noise may:

- Interfere with communication.
- Annoy or distract people nearby.
- Increase the level of concentration required.
- Increase the level of fatigue.
- Cause stress.

Where Does Noise Come From in My Office?

Some sources of noise in an office environment are co-workers, the ventilation systems, fans, computers, photocopiers, fax machines, telephones, and the everyday outdoor noises, such as traffic.

How Do I Reduce Annoying or Distracting Noise?

Noise reduction is a specialized field in itself, but there are a number of techniques that may be used to reduce noise.

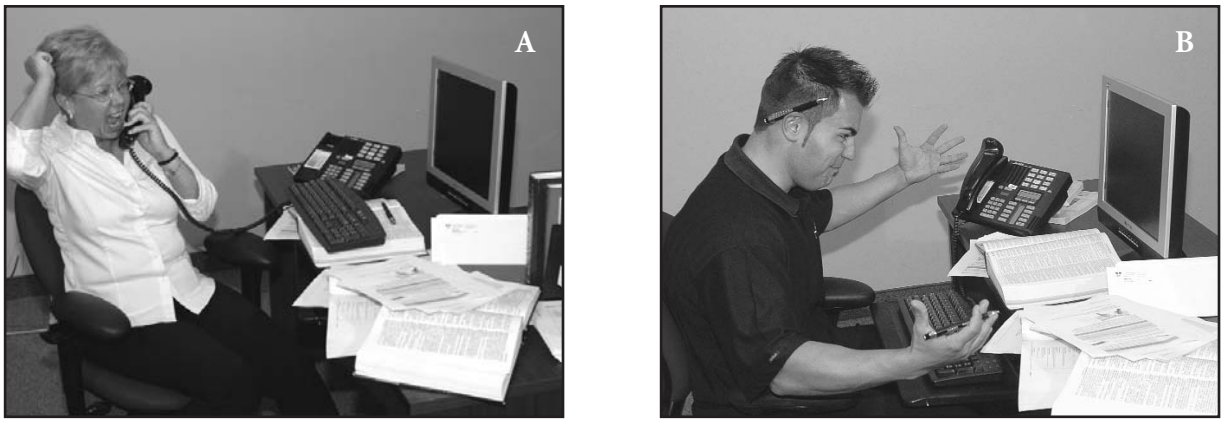
- Sound-absorbing tile, carpet, and barrier walls can be used.
- Noisy equipment can be isolated. For example, place the photocopy machine in a separate room to reduce noise.
- Temporarily use ear plugs while investigating noise reduction methods.
- Follow a regular maintenance schedule for the office equipment.

STRESS

STRESSED

Is your head pounding? Stomach upset? Feeling cold and clammy? You may be experiencing stress.

Stress is a serious workplace problem. You may experience stress as you drive through traffic to get to work, when you look at your "to do" list, or after your boss asks you to finish typing a letter which must be faxed immediately. It is no wonder you may be feeling tired by the end of the work day.



Figures 26A, B: Examples of stressed employees.

How Does My Body React to Stress?

- Upset stomach.
- Increased heart rate and blood pressure.
- Cold, clammy hands.
- Increased muscle tension.
- Rapid and shallow breathing.

Try This ....

To feel physical stress, make a fist with your right hand. Squeeze tightly for several seconds. Notice the tension in your hand, wrist and arm. To feel relaxation, open your hand gradually and pay attention to how light it feels in comparison to when you made a fist. Stress at work can play an important role in injury development. Stress can cause increased tightness in the shoulder and neck muscles and increase the risk of injury. Therefore, a reduction in stress may reduce the risk of injury.

What are some sources of stress in the workplace?

Stress levels at work can be affected by the following:

- A lack of job security
- A lack of control over how you do your job
- Having too much or too little to do
- Monotonous, repetitive work
- Not knowing what is expected of you
- Conflicting expectations or task demands
- Not being able to predict what people expect from you
- A lack of help, cooperation, and support from co-workers
- A lack of conversational privacy

What Can Be Done to Reduce Workplace Stress?

There are several things that can be done within your office environment to help reduce stress. Some examples are as follows:

- Improve communication through regular staff meetings.
- Control over everyday activities.
- There should be an open-door policy so workers can freely talk to supervisors about tasks to be performed and job expectations.
- If there are threats to job security, workers should be informed as soon as information about the future is known.
- Roles and responsibilities should be clearly defined when tasks are assigned.
- Every effort should be made to create a socially supportive work place where all workers feel they are an important part of the team.
- Workers should be given a chance to use and develop their skills.
- Reduce monotony through job enlargement and/or enhancement.

What Else Can I Do to Reduce Stress in My Life?

Some other things you can do to reduce stress include regular breaks, breathing and stretching exercises, and living a healthy life style.

- Living a healthy lifestyle strengthens your body. Along with regular exercise, a healthy lifestyle includes the following:
- Not smoking or being exposed to smoke
- Eating a balanced diet from the Canada Food Guide
- Getting enough rest and relaxation

Stretching can give your body a break and reduce stress. For stretching exercises that suit your needs, talk to a health professional.

Try This ...

When you feel stress, your breathing becomes rapid and shallow. By concentrating on deep breathing, you can reduce your stress level.

Sit or stand comfortably with your hands on your stomach. Breathe in through your nose slowly and deeply. Once you have inhaled as much as you can, hold your breath for a few seconds before breathing out. Exhale slowly through your mouth with your lips positioned as if you were going to whistle. When you are finished exhaling, breath in again slowly and repeat the cycle until you start to feel better.

PUTTING IT ALL TOGETHER

GUIDE FOR SETTING UP THE COMPUTER WORKSTATION TO FIT YOU

In order to work safely and comfortably each element of your computer workstation should be adjusted to fit your needs. The following section summarizes key points previously described in this handbook and is designed to serve as a quick guide on setting up your computer workstation. If you feel fatigued or start to experience muscle pain, use the following guide to re-evaluate your workstation. Do not be afraid to prediodically re-adjust your workstation. Remember, prevention is the best cure for musculoskeletal injuries.

Adjusting Your Chair

- Raise or lower the chair until the edge of the seat pan is just below your kneecap
- Sit with your feet flat on the floor and legs at a 90-110 degree angle
- Allow space for a closed fist between the edge of the seat pan and the back of your legs
- Adjust the backrest so the lumbar support contacts the curvature in your low back. You may need to move the backrest up or down as well as towards or away from you
- Adjust armrests so that your elbows can rest on them while your arms hang freely at your side.

Adjusting an Adjustable Working Surface

- Sit with your arms hanging straight down at your side
- Adjust the desk or keyboard tray to be level with your elbow height
- Raise your forearms to create a 90 degree angle at the elbow

Adjusting a Non-adjustable Working Surface

If the working surface is too high:

- Sit with your arms hanging straight down at your side
- Raise your chair until the desk or keyboard tray is level with your elbows
- Use a footrest to support your feet. Keep a 90-110 degree angle at the knee
- Raise your forearms to create at 90 degree angle at the elbow

If the working surface is too low:

- Raise the desk using a stable support (ie. blocks) until the work surface is at elbow height
- Raise your forearms to create a 90 degree angle at the elbow

Adjusting Your Keyboard

- Place the keyboard directly in front of you
- Type with your wrists "floating" over the keys
- Maintain a straight wrist posture when typing

Adjusting Your Mouse

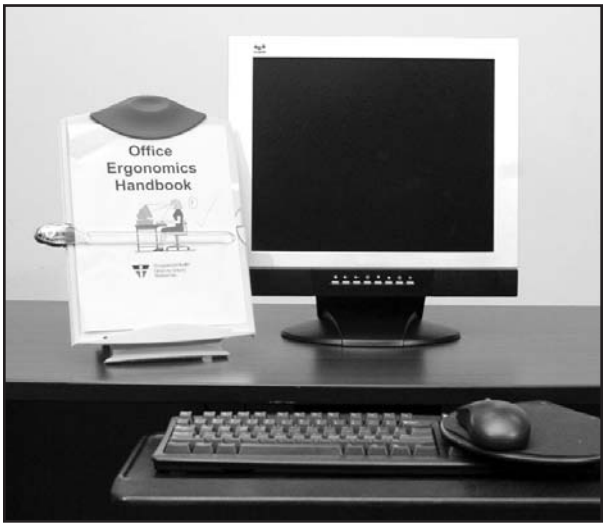
- Place the mouse in front of your "mouse hand". You should NOT have to reach away from your body when using the mouse
- Support your elbows on your armrests when mousing. Remember to maintain a 90 degree angle at the elbow
- Position the mouse at the SAME height as the keyboard
- Maintain a straight wrist posture when mousing
- Rather than wrist movements alone, use your whole arm for mousing.

Adjusting Your Monitor

- Position the monitor directly in front of you, at least one arm's length away
- Adjust monitor height so that the top of the screen is at seated eye height. Note: If it cannot be lowered to this height, you may have to raise your chair and readjust your workstation
- Angle the monitor slightly up towards your eyes
- Position the monitor perpendicular to windows and between overhead lights to reduce glare

Adjusting Your Document Holder

- Position document holders as close to the monitor as possible (same distance and height)



Points To Remember

After reading this handbook you should be able to adjust your workstation to suit you. Incorporating the principles outlined in this handbook will take some effort and getting used to on your part. Referring back to this handbook periodically is recommended to refresh your knowledge about office ergonomics.

Ergonomic equipment is only ergonomic if used correctly. Learn how to use your equipment. Reduce repetitive movements, awkward postures and static forces. Be conscious of your body positions and movements. Take a break away from your computer at least once every hour. Remember to keep moving. All aspects of your office interact to affect your health (workstation design, stress, air quality noise, etc.).

APPENDIX: LEGISLATION

As a worker in Ontario, you may be covered by the *Occupational Health and Safety Act* (Provincial) or the *Canada Labour Code* (Federal). Members of your Joint Health and Safety Committee should know which legislation applies to you.

Under the *Occupational Health and Safety Act* and the *Canada Labour Code*, workers have three basic rights:

- The right to know about workplace health and safety hazards
- The right to participate in making recommendations about health and safety concerns
- The right to refuse work if they have reason to believe it endangers their health and safety.

These rights can be used to protect office workers.

In Ontario while the only specific regulations that apply to ergonomics concern health care workers, they may be of use to you as a guide. Specifically, *Health Care and Residential Facilities (Ontario Regulation 67/93)* reads:

> *If a worker is required to use a video display terminal for a continuous period of one hour or more, the worker shall have at least five minutes of time free from such work in every hour.*

Sections 22 through 27 deal with lighting and read in part:

> *If a glare from a direct lighting source is likely to be a hazard to a worker, the source shall be shielded by louvres, lenses, lens covers or diffusers which control the glare.*

Lighting is also discussed in Section 6 of the *Canada Occupational Safety and Health Regulations*. Some of the highlights are as follows:

Section 6.7(2)
Reflection glare on a VDT screen shall be reduced to the point where an employee at a task position is able to read every portion of any text displayed on the screen and see every portion of the visual display on the screen.

Section 6.7(3)
Where VDT work requires the reading of a document, supplementary lighting shall be provided where necessary to give a level of lighting of at least 500 lux on the document.

Recently the federal government's Treasury Board passed a series of policies which provide specific guidelines for office workers. These guidelines can be found on the Treasury Board website *www.tbs-sct.gc.ca*. They may be helpful to you when trying to assess your needs and develop language for your own collective agreement.

British Columbia and Saskatchewan are the only provinces which have passed Ergonomic Regulations.

The full text of the regulations, which includes risk factors and safety requirements may be found on the British Columbia Workers Compensation Board website.

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If you need further assistance, call the Occupational Health Clinic for Ontario Workers Inc. closest to you.

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