WORKING WITH A COMPUTER

(VISUAL DISPLAY UNIT)

A USER'S GUIDE

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1. YOUR COMPUTER WORKSTATION

Many studies have shown that many occupational or work related diseases are connected to poor design of tools, machines and the workplace. These, however, can be prevented or minimised by the application of ergonomic principles when selecting equipments or designing the workplace/workstation and by the way the user use the equipments and the workplace/workstation.

Ergonomics can be regarded as a science which is primarily concerned with the adaptation of work to the physical and physiological capabilities and limitations of man. The application of ergonomic principles to visual display unit (VDU) work is basically the integration of job tasks with the design of computer hardware and software, workstations and work environments.

The modern office has seen the use of VDU an essential commodity in all organisations. VDUs have been blamed for a wide range of health problems. In fact, only a small proportion of VDU users actually suffer ill health as a result of their work. Where problems do occur, they are generally caused by the way in which VDUs are being used, rather than the VDUs themselves.

This guide outlines the main ergonomic factors that should be taken into consideration, related health issues and practical tips to enable you to be in optimum comfort and productivity whilst using your VDU.

1.1 Your Workstation

Ideal workstation design and equipment **(see Figure 1)** should:

i. Fit
-Be designed such that it could be adjusted to suit all individuals. If this is not possible, it should be designed to accommodate at least 90% of the population based on anthropometric dimensions.

ii. Flexible
-Enable you to perform a range of tasks comfortably and efficiently.

iii. Posture
-Be designed to place you in the best working posture. It should not restrict your movement and change of posture as this can lead to fatigue and discomfort.

Make full use of the equipment provided, and adjust it to get the best from it and to avoid potential health problems.

Use the checklist in the **appendix** to identify any ergonomic problems at your computer workstation.

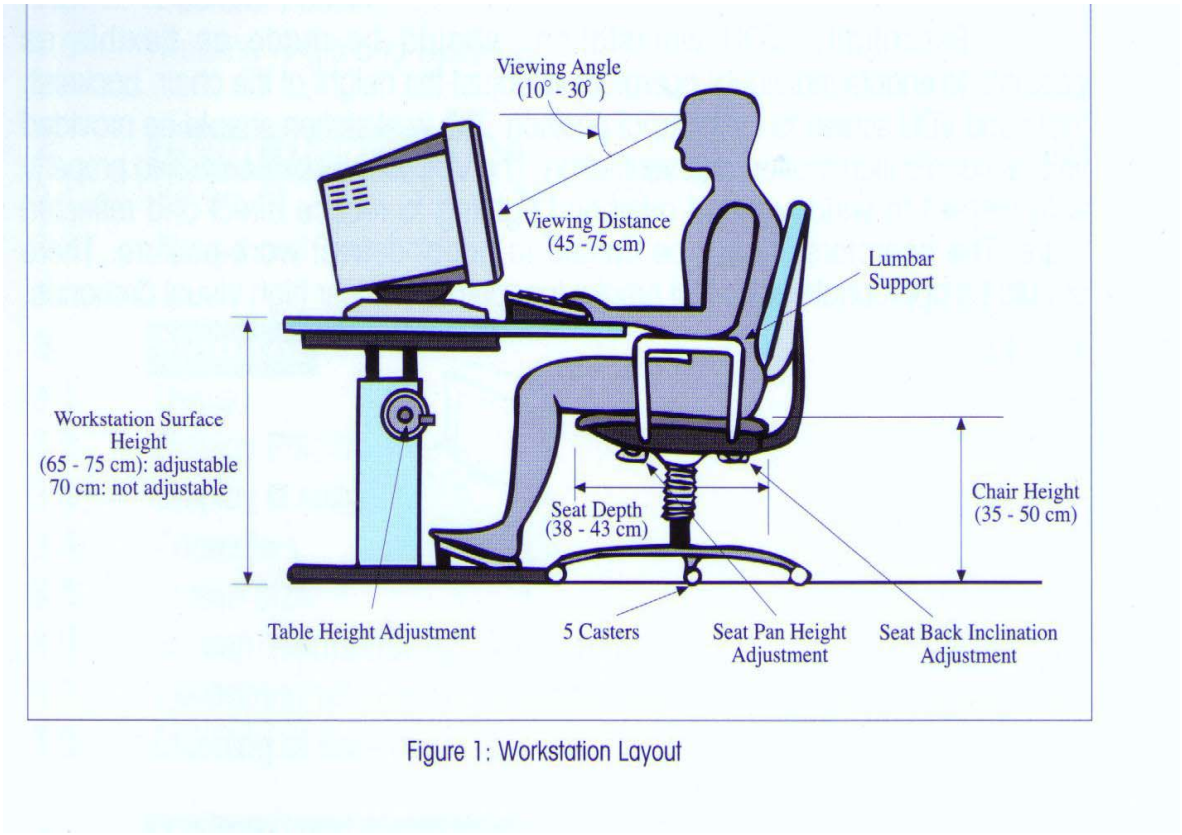


Figure 1: Workstation Layout

- Adjust chair and VDU to find the most comfortable position for your work. As a broad guide, your forearms should be approximately horizontal and your eyes the same height as the top of the VDU.

- Legroom: Make sure there is space underneath your desk to move your legs freely. Move any obstacles such as boxes and equipment.

- The minimum distance between you and your adjacent colleague should be 1.0 m (measured from the centres of your workstations).

1.2 Work Surface

- Your workstation surface height, if adjustable, should be between 65 cm and 75 cm. If it is not adjustable, the distance between the floor and the work surface should be 70 cm.

- Surface: The desk surface should not be reflective. Make sure you have enough workspace to take whatever documents or other equipment you need.

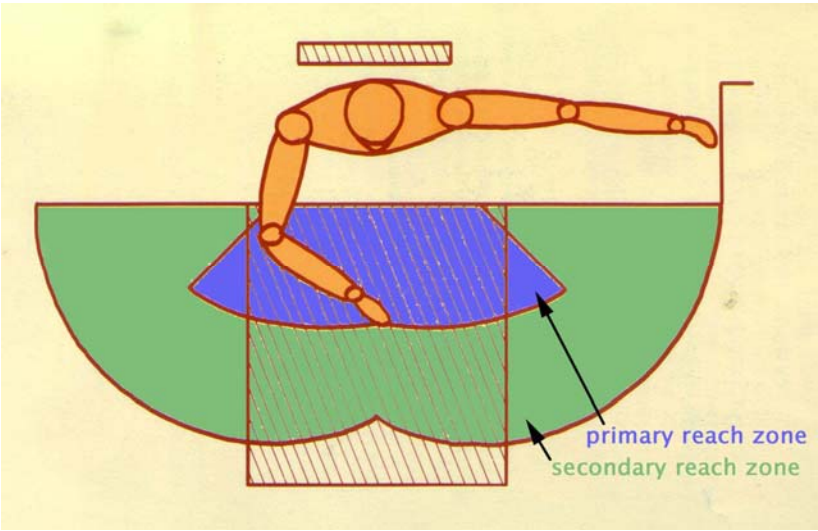
- Document Holders: They should be positioned so as to minimize the need for uncomfortable head and eye movements.

- If your job consists primarily (more than 80%) of direct work on the terminal, the best position for the VDU is directly in front of you, with access to secondary working surface to the side.

- If your job consists largely of other tasks and VDU work is not a main task (secondary task), it is best to place the VDU on the left hand of the table if you are right handed, or to your right if you are left-handed.

- Organisation: Your workstation should be organised to minimise frequent awkward posture or over-reach. Keep all items within easy reach by locating frequently used items in the primary reach zone and less frequent items in the secondary zone **(see Figure 2).** Try different arrangements of keyboard, screen, mouse and documents to find the best arrangement for you.

FIGURE 2



1.3 Chair and Backrest

Your chair should be adjustable, stable and provide good back support. The adjustment controls should be easy to locate and operate.

- Height - should be adjustable (between 35 cm and 50 cm).

- Backrest - should be adjustable in the forward and backward directions to allow for a slight reclining position. This reduces pressure on your spine. Backrests that are easily adjustable at the lumbar region (lower-back) provide adequate support for your back.

- Seat depth - should be between 38 and 43 cm **(see Figure 3)**

FIGURE 3

- Seat pan - should be reasonably firm, and support your body weight at your buttock and not through your thighs. The edge of your seat should not touch the back of your legs and knees and have a rounded “waterfall” edge.

- Armrests - should not prevent your from moving your chair closer to the workstation. It helps to reduce load on your back, neck and shoulders.

- Footrest - Use a non-slip foot rest if your chair is too high for your feet to rest flat on the floor.

1.4 Visual Display Unit

- **Monitor**

The monitor should be adjustable with tilt and swivel mechanisms to enable you to adopt correct postures, viewing distances and angles. You should also be able to adjust screen brightness and contrast.

Viewing Angle and Distance

-The best viewing angle is in the range of 10^{o} - 30^{o} below the horizontal plane at the operator's eye level **(see Figure 1)**. The top edge of the VDU screen should not be higher than the eye level and the bottom edge should not be lower than 40^{o} below the eye level. If the screen is above or too far below eye level, viewing the screen will result in awkward and tiring neck movements for the user.

-The proper viewing distance is between 45 and 70 cm. The line of sight should be approximately at right angle to the screen which should also avoid reflecting light.

Reading the screen

-Adjust the brightness and contrast controls on the screen to suit lighting conditions in the room.

-Make sure the screen surface is clean. Clean display screens regularly using proper and recommended cleaning agents and cloths. Dust accumulation will obscure the screen display and may also act as a glare source by reflecting light into your line of sight.

-In setting up software, choose options giving text that is large enough to read easily on your screen, when you are sitting in a normal, comfortable working position. Select colours that are easy on the eye (avoid read text on a blue background or vice versa).

-Individual characters on the screen should be sharply focused and should not flicker or move. If they do, the VDU may need servicing or adjustment.

- **Keyboard**

The keyboard should be as slim as possible, preferably not more than 3 cm.

The surfaces of the keyboard and key tops should be neutral in colour and reflection free.

The letters and symbols on the key tops should be clear, and easily recognizable.

Keying in

-Adjust your keyboard to get a good keying position. A space in the front of the keyboard is sometimes helpful for resting the hands and wrists when not typing.

-Try to keep your wrists straight when keying. Keep a soft touch on the keys and don't overstretch your fingers. Good keyboard technique is important.

- **Mouse**

The mouse should fit into your palm without any undue strain on the wrist and forearm muscles. The pressure needed to click the buttons should not be excessive.

Using the mouse

-Position the mouse within easy reach, so it can be used with the wrist straight. Sit upright and close to the desk, so you don't have to work with your mouse arm stretched. Move the keyboard out of the way if it is not being used.

-Hold the mouse loosely in your hand, and relax your grip at frequent intervals to reduce any strain.

- **Wrist rest**

A wrist rest may be used to support your wrists while typing or when using a mouse.

2. *WORKING POSTURE*

Prolonged working in a fixed posture or adopting incorrect postures can cause muscle fatigue and musculoskeletal problems.

2.1 Your Correct Working Posture (Figure 4)

FIGURE 4

Sitting

- ✓ You should sit in a reclining and relaxed position with your back supported and your feet resting comfortably on the floor or footrest.
- ✓ Your shoulders should be relaxed with your arms parallel to your body and the elbows at the same level as the desk.
- ✓ There should be no excessive pressure on the underside of your thigh.

Wrist-hand posture

- ✓ Keep your wrists straight while using the keyboard or mouse. A wrist rest may be used to support your wrists while typing or when using a mouse.

Remember!

- ➢ Don't sit in the same position for long periods. Make sure you change your posture as often as practicable
- ➢ Avoid repeated stretching to reach things you need (if this happens frequently, rearrange your workstation)
- ➢ Take opportunities to take a break from the screen e.g. stand up, stretch, walk around, do filing or photocopying.

2.2 Poor Working Postures

Examples of poor working postures which you must avoid;

X Working with the neck bent backwards
-causes: monitor too high
chair too low

X Working with the neck bent forwards
-causes: monitor too low
chair too high

X Work with arm raised and elbow stretched
-causes: mouse keyboard too far from the keyboard

X Seating with lower back unsupported
-causes: seat pan too deep
seat back rest not adjusted properly
chair too high to allow good support of feet

3 WORK ENVIRONMENT

The environment in which you perform VDU work may affect your health, comfort and productivity. Important environmental factors in VDU work include lighting, noise, temperature and humidity.

3.1 Lighting

Sufficient lighting should be provided for you to perform your tasks. Illumination levels should range within 300 – 700 lux depending on the visual tasks required in the same work area. In areas where special attention or concentrated vision is required, higher illumination levels (700 – 1000 lux) are needed. However, high illumination levels can contribute to glare problems.

Practical tips to reduce glare

- ✓ Arrange your desk and VDU to avoid glare or bright reflections on the screen. This will be easiest if neither you nor the screen is directly facing windows or bright lights. e.g. placing monitors perpendicular to windows.
- ✓ Adjust curtains or blinds to prevent unwanted light.
- ✓ Placing glare shields on the monitor
- ✓ Tilting monitor and adjusting the brightness and contrast of the display

3.2 Ambient Noise Level

A noisy working environment can be a source of annoyance. The ambient noise level for VDU work should not exceed 55 dBA. Noise generated by equipments such as printers can be reduced by enclosing them in an acoustic hood.

3.3 Temperature and Humidity

If you work in an air-conditioned space, the recommended ambient temperature is 23 – 25^{o}C and the maximum relative humidity is 75 %. Bear in mind that VDU equipment does give off a small amount of heat.

Locate equipments which emit ozone such as photocopiers and printers where there is good air circulation.

4 WORK PRACTICE AND SAFETY

As in other work activities, sustained effort in operating a VDU, be it visual, physical or mental, results in fatigue, headaches, sleeplessness, muscular complaints and in severe cases can lead to injury. This can be connected with the monotonous VDU work and the organisation of that work. To minimise visual and muscular fatigue, it is important to include rest pauses and job variation for such work. VDU operators should also be given proper training on the use of computer hardware and software as well as sufficient time to adjust to the work environment.

4.1 Job Variation

It is good practise to vary your work activities and posture from time to time to allow tired muscles a chance to rest and recover. Stand up or take a walk to talk to your colleagues instead of using the phone.

4.2 Instruction and Training

You should be given sufficient instruction and training to enable you to carry out your work efficiently and safely. You may experience stress when you do not have insufficient knowledge on the use of your VDU or when it does not function properly. Training should also be provided whenever new tasks, equipment and software is introduced.

You should be trained on:

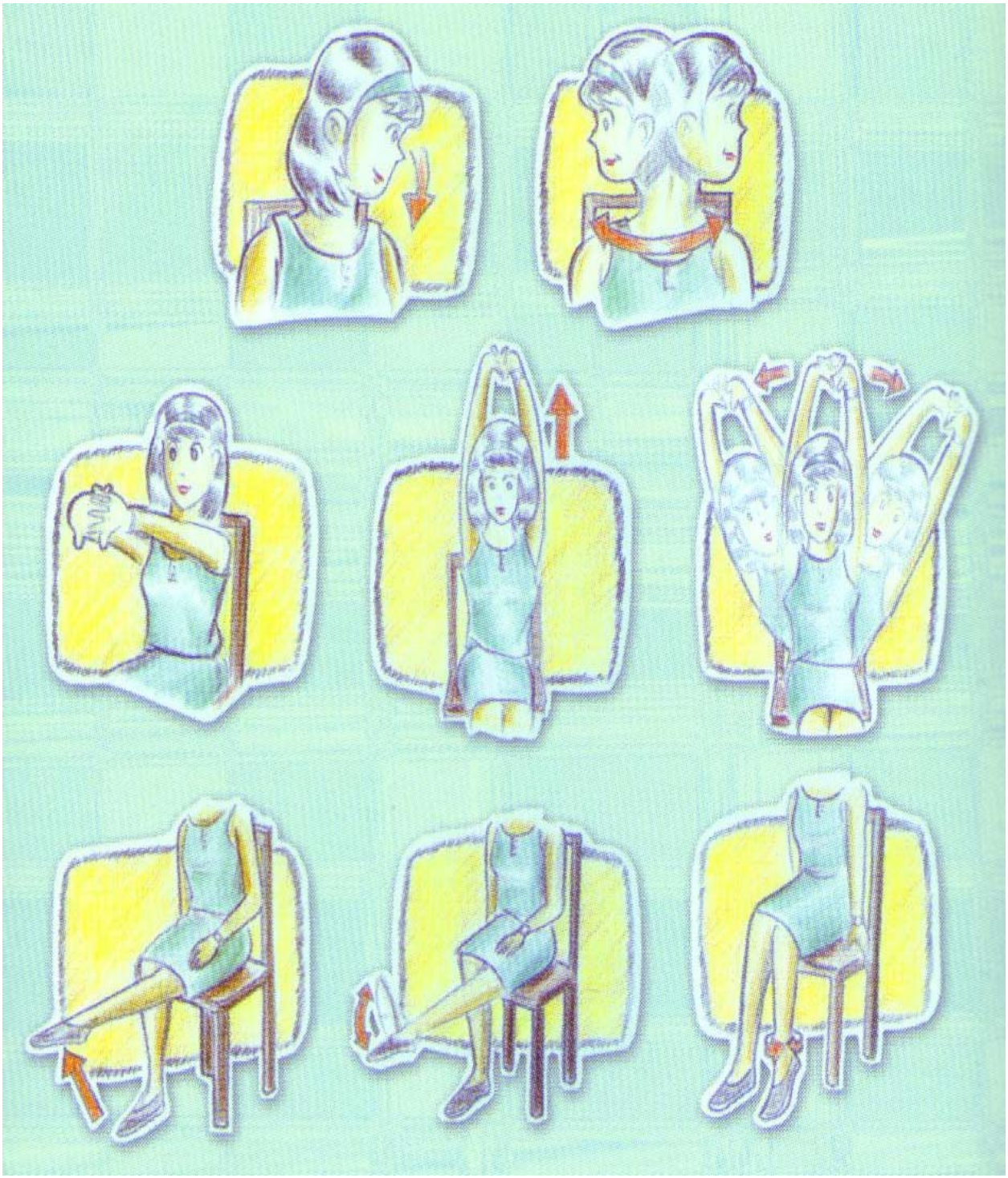
- computer hardware and software.
- appropriate settings of each equipment e.g. VDU tilting angle and monitor screen brightness.
- correct seating postures.

4.3 Rest Breaks and Exercises

- You should pause for a short rest pause every hour of continuous VDU work to offset the start of both visual and postural fatigue. Short, frequent rest pauses are more effective than occasional pauses of longer interval.

- Light stretching exercises **(see Figure 5)** may be helpful and could be carried out during rest pauses.

FIGURE 5



- You can do eye relaxation exercises to reduce visual fatigue**.**

How to do eye exercises

1. Remove visual stimuli

   - ✓ Place cupped hands over closed eyes to remove all light.
   - ✓ At same time take deep breaths as follows:

Breathe in through nose

↓

Hold breath

↓

Breathe out through mouth

Do each for a count of 4 seconds. Repeat 4 times

2. Exercise Facial Muscles/Moisten Eyes

   - ✓ Force a yawn by dropping your jaw.
   - ✓ Increase blinking.

3. Exercise Ocular Muscles

Close eyes

↓

Move eyes up and down, left and right, circulate.

4. Exercise Ciliary Eye Muscles.

Hold finger at arm lengths in front of face

↓

Focus on finger and draw towards you

   - ✓ Focus on distant objects.

4.4 Safety

Keep your work area from fire and safety risks by:

- Keeping equipment ventilation grills uncovered
- Switching off the VDU when not in use
- Keeping liquids such as drinks away from electrical equipment
- Prevent trailing leads

5 FAQ'S ON HEALTH ASPECTS OF VDU USE

? Why do I have aches and pains after using a VDU?

- Some users may get aches and pains in their hands, wrists, arms neck, shoulders or back, especially after long periods of uninterrupted VDU work. 'Repetitive strain injury' (RSI) has become a popular term for these aches, pains and disorders; a better medical name for this whole group of conditions is 'upper limb disorders'. Usually these disorders do not last, but in a few cases they may become persistent or even disabling.

? How can I avoid these aches, pains and disorders?

- Problems can often be avoided by good workplace design so that you can work comfortably, and by good working practices (like taking frequent short breaks from the VDU). However, it may also be more likely if a VDU user feels stressed by the work.

? How can I reduce stress in my VDU work?

- People who use a VDU sometimes complain of stress, but this usually arises from increased pace of work or pressure to meet deadlines, not the VDU itself. It can also happen when a system does not work well or when the user does not feel in control or competent to operate it.

- Employers can help overcome stress by providing the right training, and by designing systems and tasks to match the abilities of the people who work with them.

? Can work with VDU's affect eyesight?

- One of the commonest complaints of the VDU user is visual fatigue more usually referred to as eye strain. Symptoms vary but may include headaches, visual discomfort, pain behind the eyes or blurring of vision. Uncorrected vision can make VDU work more tiring and stressful. Users over 40 years old may need reading glasses specifically adapted for VDU reading distances.

- VDU operators should have a visual acuity which is adequate for the size of the characters to be displayed on the VDU screen.

- Operators with visual problems should consult their doctors. All visual defects should be corrected for VDU work.

? Can VDU work cause headaches?

- Headaches may result from several things that occur with VDU work, such as:

  - Screen glare
  - Poor image quality
  - A need for different spectacles
  - Stress from the pace of work;
  - Reading the screen for long periods without a break
  - Poor posture, or a combination of all the above.

- Many of these things can easily be put right once the cause of the problem has been found.

? What about harmful radiation?

- Levels of radiation emitted by VDUs are well below safe levels set out in international recommendations.

? What should I do if I'm pregnant?

- You don't need to stop working with VDUs. Many scientific studies have now been carried out and, these do not show any link between miscarriages or birth defects and working with VDUs.

? Can working with VDUs cause skin disorders?

- This is rare. A few people have experienced irritation, rashes or other skin problems when working with a VDU. The exact cause is not known, but it seems possible that a combination of dry air, static electricity and individual susceptibility may be involved. If this is the case, increasing the humidity or allowing more fresh air into the room may help.

? Can VDUs trigger epileptic fits?

- Most people with epilepsy are completely unaffected by VDUs. A few who suffer from photo-sensitive epilepsy and are susceptible to flickering lights and striped patterns may be affected in some circumstances. Bur even they can often work successfully with VDUs without provoking an attack.

APPENDIX

VDU USER WORKSTATION CHECKLIST

	YES	NO
1. Display Screen		
- Are the characters /images on the screen well-defined and clear?		
- Is the screen image stable with no flickering?		
- Is the brightness and/or contrast between the characters and background easily adjustable?		
- Does the screen swivel, rotate and tilt easily?		
- Is the screen free of significant reflections and glare likely to cause discomfort?		
- Is the screen clean?		
- Is the top of your monitor screen at or slightly below your eye level?		
2. Keyboard and Mouse		
- Is the keyboard tillable and separate from the screen?		
- Is there sufficient space around the keyboard to rest your forearms when not typing?		
-Does the keyboard have a matt surface to avoid reflective glare?		
- Are the keys clean and symbols easily legible?		
- Is your mouse located beside or close to the keyboard?		
- Is your mouse at the same height as your keyboard?		
- Do you keep your wrists straight while using the input devises?		
3. Work desk/surface		
- Is a document holder available and easy to use?		
- Can you find a comfortable working position?		
- Are you able to adjust the height of your work surface?		
- Do you have sufficient knee clearance and leg room?		
- Is your work surface large enough to perform the required tasks and to hold all the equipment?		
- Are frequently accessed items (e.g. phone and files) within easy reach?		

	YES	NO
4. Work Chair		
- Is the seat adjustable in height?		
- Is the seat back adjustable in height and tilt?		
- Has the chair been correctly adjusted?		
- Do you know how to adjust your chair?		
- Is the chair in good repair?		
- Do you need a footrest?		
- Is a footrest available?		
- Is your seat pan size suitable for you?		
- Does your seat pan have a rounded “waterfall’ edge?		
- Does your arm rest allow you move closer to your workstation?		
- Are all the chair adjustments easy to locate and operate?		
5. Lighting		
- Is the lighting adequate?		
- Are you free from glare problems?		
6. Noise		
- Is equipment too noisy (making normal conversation difficult or distracting attention)?		
- Are the noise sources isolated or enclosed?		
7. Temperature and Humidity		
- Is the temperature and humidity at the workstation comfortable?		
8. Software		
- Does your software help you perform your task efficiently?		
- Is the software easy to use?		

	YES	NO
9. Work Posture		
- Do you sit in a slightly reclining and relaxed posture with the back supported and the feet resting comfortably on the floor foot-rest?		
- Are you able to avoid adopting poor working postures (e.g. neck bending or twisting or unsupported back)?		
10. Work Practices		
- Do you have sufficient control over the way you do your work?		
- Does your work allow variation of activities and frequent posture change?		
-Do you receive sufficient training for the task to be carried out?		

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