

## **Working in comfort with your HP Computer Equipment**

Thank you for choosing Hewlett-Packard equipment. To maximize your productivity and health, this document provides guidelines and hints, based on the latest research, to help you work in a comfortable and ergonomically sound environment. Also, international regulations and guidelines are included. This document is based on the European Community Display Screen Equipment directive and ensures that the information presented is applicable worldwide.

Please be aware that the quoted dimensions are for a person who may need to be adjusted to your individual physical characteristics. For you or for other people, your work surface may need to be larger than is shown in the brochure.

Please be aware that when using Hewlett-Packard equipment, work these hints, suggestions and special information listed in this document. Additional hints are given in the user's manual. If, during use of this or any other equipment, you experience pain or discomfort, stop work and review this brochure. If the discomfort persists, discontinue use of this equipment and consult a physician, if possible.

Various aspects of equipment and environments setup are described below. Inventory diagrams for easy reference are also included.

## Working in comfort with your HP Computer Equipment

Thank you for choosing Hewlett-Packard equipment. To maximize your comfort and productivity it is important that you set up and use your equipment properly.

This brochure provides guidance and hints, based on the latest ergonomic findings, to help you work in a comfortable and ergonomically low-risk environment. Also, international regulations and guidelines are included from the European Community Display Screen Equipment directive and ISO 9241 to ensure that the information presented is applicable worldwide.

Please be aware that the quoted dimensions are for an average person. They may need to be adjusted to your individual physical characteristics. For example: If you are an extra tall person, your work surface may need to be higher than the range that is listed in the brochure.

Prior to using any Hewlett-Packard equipment, study these instructions and suggestions and consult information listed in the Additional Reading section at the end of this brochure. If, during use of this or any other equipment, you experience pain or discomfort, stop work and review this brochure. Should the discomfort return, discontinue use of this equipment and consult a doctor as soon as possible.

Various aspects of equipment and environment setup are described in sections below. Summary diagrams for easy reference are also included.

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## Installing your monitor

- Most HP displays come with a tilt and swivel feature that makes it easy to adjust the screen position. If your monitor does not have this feature, consider acquiring an accessory to provide this capability.
- The optimum distance between the eyes and the screen depends on the size of the displayed characters.
  - Optimum readability is generally considered to be 21 minutes of arc. This corresponds to a character size of 3.7 mm (0.15 in) at a viewing distance of 60 cm (24 in).
  - If your eyes are closer to the screen than 50 cm (20 in) undue stress may occur. Most people prefer a viewing distance of approximately 60 cm (24 in).
  - The maximum viewing distance is usually limited by the character size and the available space on the desk top.
- The top of your monitor screen should be at or slightly below eye level. This will keep you from looking down more than 15 to 20 degrees to see the center of the screen. You should not have to look down more than 60 degrees for normal work tasks, such as typing or reading.
- Ideally the screen should be positioned perpendicular to your line of sight. In case of undesirable reflections, tilting the screen forward slightly usually solves the problem. However, if this is not sufficient, it may be necessary to change the position of the monitor on the desk, or change the location of the desk.

If this still does not correct the problem, try a good quality anti-glare filter, or a screen hood.
- Keep the contrast and brightness adjusted to the level that is most comfortable for you. High contrast and low brightness is usually the preferable combination.
- Since build up of screen dirt is gradual and therefore often overlooked, don't forget to clean the screen on a regular basis.

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## What is Displayed on the Screen

- Text should be easy to read. To help ease eye strain, try to adjust text attributes to make reading the display as easy as possible (adjust such attributes as character size, spacing, and color).

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**Note:** The ISO 9241 and ANSI/HFS 100-1988 standards give ample technical recommendations on how to achieve good readability.

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- If the image on your screen is not stable, the monitor may require repair or adjustment.
- When possible, use a program that has a simple “machine/user interface”. Also, screen information should be displayed in a structured and well organized way.

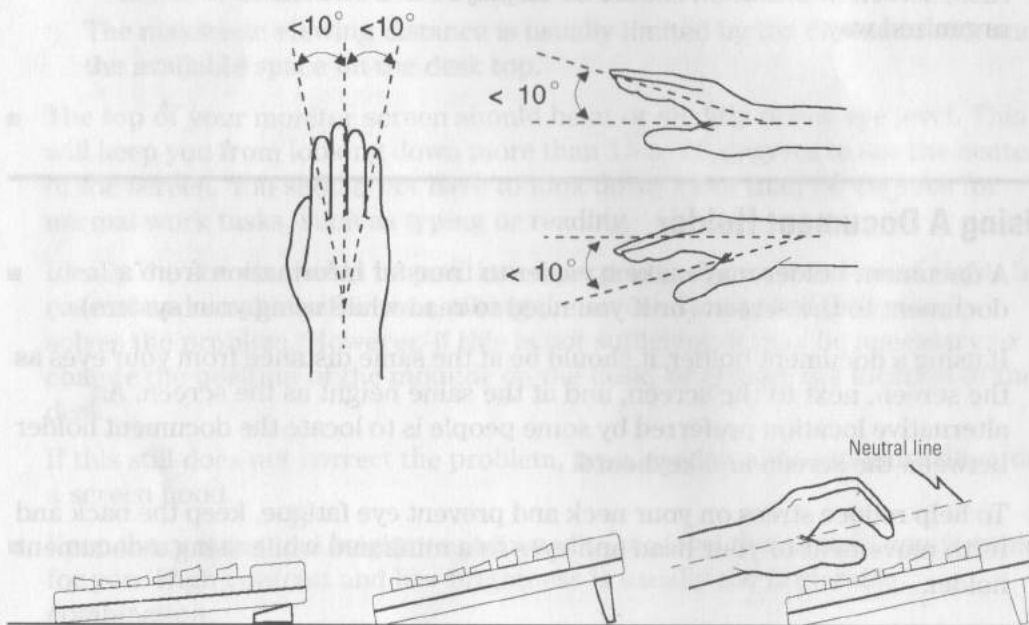
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## Using A Document Holder

- A document holder may make it easier to transfer information from a document to the screen (or if you need to read while using your system).
- If using a document holder, it should be at the same distance from your eyes as the screen, next to the screen, and at the same height as the screen. An alternative location preferred by some people is to locate the document holder between the screen and keyboard.
- To help reduce stress on your neck and prevent eye fatigue, keep the back and forth movement of your head and eyes to a minimum while using a document holder.

## Your HP Keyboard

- Your HP keyboard has a long cable so you can place it in the position that is most comfortable for you while you are using your system.
- The keyboard has a low profile to prevent excessive bending of your wrists while typing. Literature suggests that you should not bend your wrists more than 10 degrees up or down, or more than 10 degrees sideways. Keep your wrists straight by moving your entire hand and forearm over to use the function keys or numeric keypad.



- Your HP keyboard may have a kickstand which can be opened or closed to raise or lower the keyboard angle. If your elbows are at about the same level as the work surface, then you may choose not to use the kickstand. If your elbows are below the work surface, you may wish to raise the back of the keyboard by using the kickstand. The point is to make sure that your hands are

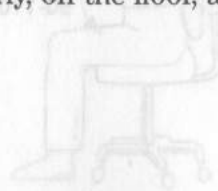
in a “neutral” or flat position when you use your keyboard. This means that your forearms, wrists, and hands should be in a straight line.

- You may use a wrist rest to help keep your wrists in a more comfortable and neutral position. If you use a wrist rest, ensure that it is flush in height with the front edge of the keyboard, and rounded or padded. Try not to rest your wrists on a sharp edge, such as a desk edge, when typing.
- It is recommended that you place your keyboard in front of the screen or document holder (whichever is viewed the most).
- If you use a mouse or trackball, position it close to the keyboard so you do not have to stretch while using it.
- It is not necessary to type with very much force. Use of too much force can place unnecessary stress on your body, including tendons and muscles in your hands, wrists, and forearms, and increase risk of discomfort or injury.

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## Your Desk

- Sufficient desk space should be available to allow you to set up your equipment in a convenient, comfortable arrangement. Recommended workstation desk space is 160 by 80 to 90 cm (63 by 32 to 36 inches). Depending on the nature of your work, you may need a smaller or larger work surface.
- To minimize reflections and glare (and thus eye discomfort), the surface of the desk should be non-reflective (matt).
- Ideally, the worktop height should be adjustable. Recommended range is 66 to 77 cm (26 to 30 inches). If the desk top height is fixed, it should be between 72 and 75 cm (28.5 to 29.5 inches).
- There should be at least 6 cm (2 inches) of space between your thighs and the desk top. If the desk has a “kneehole” it should be at least 58 cm (23 in) wide, 65 cm (25.5 in) high, and 60 cm (24 in) deep.
- If possible, choose a desk with cable management capabilities. This will keep your cables and wires orderly, off the floor, and out of the way.



## Your Chair

- Your chair should have a stable base (for example: five legs with casters). It is important that the casters be matched to the type of floor in your workspace (that is, hard surface or carpet).
- The chair must provide a comfortable sitting position.
  - You should be able to easily adjust the height. Minimum range should be (40 to 52 cm (15.5 in to 20.5 in) as measured from the floor.
  - It should have a back support that is adjustable in both height and tilt (0 to 30 degrees backwards). It is important that your lower back be correctly supported (lumbar curve of the back).
  - You should be able to freely swivel from side to side.
  - The front of the seat should be curved ("waterfall" edge), and the chair fabric should be breathable.
- If your chair has armrests, they should be fully adjustable. The arms should not interfere with adjusting the chair or moving it close to the desk.
- Adjust the chair so that the work surface is at elbow height.
- If the chair has an adjustable seat pan, inclining the seat slightly forward will transfer some of the pressure from the spine to the thighs and feet. This will relieve spinal fatigue.

Use a chair with an adjustable lumbar (back) support, which can be moved up and down. Adjust the back of the chair so that the part that curves outward (A) (towards the front of the chair) corresponds to the part of your lower back that curves inwards. (Portable lumbar support cushions are also available at medical and office supply houses.)



Adjust the angle of the back rest and seat tilt so that your back is erect or angled slightly backward (90 to 110°). Some people feel more comfortable up to a 135° angle.

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## **Your Posture**

- While sitting at your workstation, your back should be erect or angled slightly backwards. Your back should be supported by the backrest.
- Your arms should be relaxed and loose, elbows close to your sides, with the forearms and hands approximately parallel with the floor.
- Your wrists should be as straight as possible while keyboarding or while using the mouse or trackball. They should not have to be bent upward, downward, or to either side more than 10 degrees.
- Your thighs should be horizontal or bent slightly downward. Your lower legs should be near a right angle to your thighs. Your feet should rest comfortably on the floor (flat). If necessary, use a footrest to get into a comfortable position.
- Your head should be upright or tilted slightly forward (but not more than 15 degrees).
- Avoid working with your head or trunk twisted at an unnatural position.
- Change your position frequently to avoid fatigue.

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## **Your Workspace and Work Environment**

- To prevent muscle stiffness, you must have enough space to move around and vary your position. Do not remain in one position for extended periods of time.
- For better eye relief, the ceiling, walls, and floors should have a medium level of reflectance (approximately 75%, 40%, and 30% respectively). Try to avoid excessive contrast between the screen and its surroundings.
- The work environment should be as quiet and free of distraction as possible (background noise preferably below 55 dBA).
- Where possible, relative air humidity should be in the range of 40 to 60%.



- The recommendation for room temperature is 19 to 23 degrees C (66 to 73 degrees F). If possible adjust the temperature for whatever is comfortable to you.
- The workplace should be well ventilated (as with any indoor environment).

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## Lighting

- Lighting in your area should allow easy reading of documents and keyboard legends. Recommended levels are:
  - Not too bright. Values over 1000 lux (100 foot candles) are considered to be too bright.
  - Recommended value is between 300 and 500 lux (30 to 50 foot candles).
  - For work on the screen, 300 lux (30 foot candles) is enough for most work.
  - When documents are to be read, 500 lux (50 foot candles) is recommended.
  - If more light is needed for a particular task, use an individual lamp ("task lighting") rather than increasing the general lighting.
- Incoming light should be shielded or diffused to prevent glare and distracting reflection. In cases where strong sunlight is a problem, curtains, adjustable shades, or monitor hoods are recommended.
- If possible, try not to position the monitor in front of windows where glare, high contrast, and reflections will interfere with your screen presentations. Try to position the monitor so the screen is at a right angle to the window.

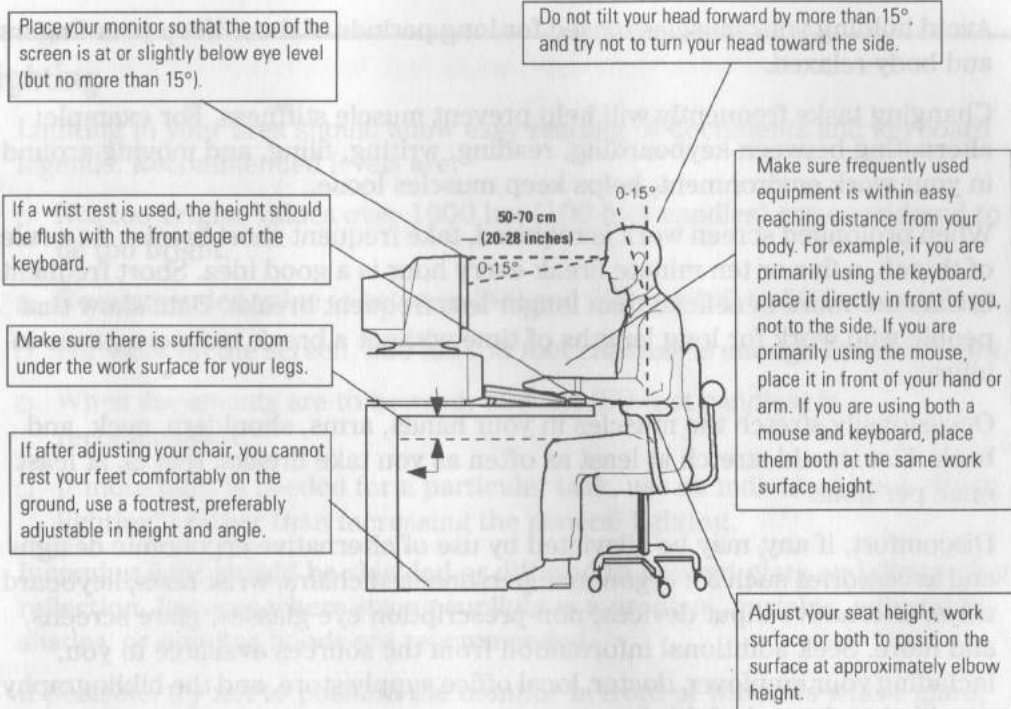
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## Further Suggestions

- Have your eyes checked on a regular basis and ensure your eyeglass prescription is suitable for working on a monitor screen.
- Look away from the screen from time to time to help reduce eye strain. Focus on distant objects briefly. Also, blinking periodically helps lubricate the eyes.
- Avoid holding your muscles tensed for long periods of time. Keep your fingers and body relaxed.
- Changing tasks frequently will help prevent muscle stiffness. For example: alternating between keyboarding, reading, writing, filing, and moving around in your work environment, helps keep muscles loose.
- When prolonged screen work is required, take frequent short breaks. As a rule of thumb, a five or ten minute break every hour is a good idea. Short frequent breaks are more beneficial than longer less frequent breaks. Data show that people who work for long lengths of time without a break are more prone to injury.
- Occasionally stretch the muscles in your hands, arms, shoulders, neck, and back. You should stretch at least as often as you take breaks, that is, at least once per hour.
- Discomfort, if any, may be alleviated by use of alternative ergonomic designs and accessories such as: ergonomic personalized chairs, wrist rests, keyboard trays, alternative input devices, non-prescription eye glasses, glare screens, and more. Seek additional information from the sources available to you, including your employer, doctor, local office supply store, and the bibliography provided at the end of this brochure.
- If you experience any discomfort, discontinue use and see a doctor as soon as possible. If you want additional information on VDT setup, ergonomics and related topics, consult your employer and the sources listed at the end of this brochure.

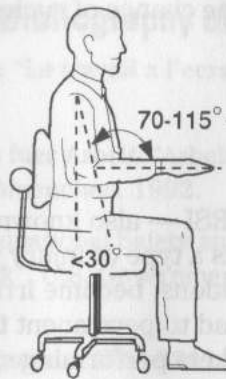
## Summary Recommendations

The recommendations in the following illustrations are drawn from the latest available international ergonomic standards and recommendations, including ISO 9241 and ANSI/HFS 100-1988.



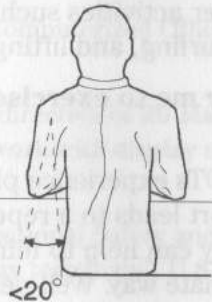
Remember to occasionally shift position and move your body. Keeping your body "locked" in one position for a long period of time is unnatural and stressful.

Make sure your arms and elbows are relaxed and loose, with your upper arm perpendicular to the floor or slightly forward (no more than 30°).



Keep your forearms and hands approximately parallel with the floor. (Elbows bent between 70° and 115°).

Keep your elbows close to your sides (less than 20° away from your body).



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## Repetitive Strain Injury (RSI)

Because your safety and comfort is our primary concern, we strongly recommend that our equipment be used in accordance with ergonomic standards and recommendations. Recent literature suggests that there may be a relationship between injury to soft tissues, especially in the hands and arms, and the prolonged use of keyboards or other equipment requiring repeated motions of the hands and forearms. Literature also suggests that there are many other risk factors which may increase the chance of such soft-tissue injury, commonly called Repetitive Strain Injury.

### Questions and Answers

#### ■ What is RSI?

Repetitive Strain Injury (RSI — also known as cumulative trauma disorder or repetitive motion injury) is a type of injury where soft tissue in the body, such as muscles, nerves, or tendons, become irritated or inflamed. In an extreme case, this irritation can lead to permanent tissue damage. RSI has been a reported problem for workers performing specific tasks such as assembly line work, meatpacking, sewing, playing musical instruments, and VDT work. It may also result from other activities such as carpentry, knitting, housework, gardening, tennis, windsurfing, and lifting children.

#### ■ Why is it important for me to exercise care in how I set up and use my equipment?

Some people who use VDTs experience physical discomfort during their use. Sometimes this discomfort leads to a repetitive strain injury. Setting up and using equipment properly can help to minimize this discomfort. Use your equipment in an appropriate way. Well-designed and adjusted equipment may not be sufficient to eliminate all potential problems. How you perform your VDT activities is also important.

#### ■ What causes RSI?

RSI is caused by any demanding activity that exceeds the ability of the body to do work. Common factors that are associated with RSI include too many uninterrupted repetitions of an activity or motion, performing an activity in an awkward or unnatural posture, maintaining static posture for prolonged periods, failing to take frequent short breaks, and stress. Also, certain medical conditions such as rheumatoid arthritis and diabetes may contribute to RSI.

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■ **What should I do if I start to experience RSI symptoms or discomfort?**

By following the above guidance on proper equipment and work environment set up and use, the risk of developing RSI can be minimized. However, if you are experiencing any discomfort, seek professional medical advice immediately. Typically, the earlier a problem is diagnosed and treated, the easier it may be to resolve.

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**For More Information and a Bibliography of Articles**

- 1 Caisse Nationale d'Assurances: "Le travail a l'ecran de visualisation", Luzern (Switzerland), 1991.
- 2 Bayerisches Staatsministerium fuer Arbeit: "Arbeiten mit dem Bildschirm - aber richtig !", Max Schick GmbH, Muenchen, 1992.
- 3 U.S. Department of Labor/Occupational Safety and Health Administration: "Ergonomics: the study of work", U.S. Government Printing Office, Washington D.C., 1991.
- 4 International Standards Organization: "ISO 9241: Ergonomic requirements for office work with visual display terminals (VDTs)", Geneva, 1992.
- 5 Eric Granjean: "Ergonomics in Computerized Offices", Taylor & Francis, London, 1987.
- 6 European Community: "Council directive of 29 May 1990 on the minimum safety and health requirements for the work with display screen equipment", Directive 90/270/EEC, Brussels, 1990.
- 7 U.S. Department of Labor/Occupational Safety and Health Administration: "Working safely with video display terminals", U.S. Government Printing Office, Washington D.C., 1991.
- 8 Swedish National Board of Occupational Safety and Health: "Work with Visual Display Units (VDUs)", Ordinance AFS 1992:14, Stockholm, 1992.



By following the above guidelines on proper equipment and work environment, you can reduce the risk of developing RSI. However, if you are experiencing any discomfort, seek professional medical advice immediately. Typically, the earlier a problem is diagnosed and treated, the better the outcome. Some handpumps are also available to help reduce the risk of developing RSI.

**For more information and a bibliography of articles**

1. *Causes Nationale d'Assurance: Le travail à l'écran de visualisation*, Luzzati (Suisse), 1991.
2. *Bayerisches Staatsministerium für Arbeit, Arbeiten mit dem Bildschirm - Arbeit*, Max Schick GmbH, München, 1992.
3. *U.S. Department of Labor, Occupational Safety and Health Administration, Ergonomics in the Workplace*, U.S. Government Printing Office, Washington, DC, 1991.
4. *International Commission on Occupational Health, International Commission on Occupational Health, Occupational Health and Safety*, Geneva, 1991.
5. *The European Commission, Commission of the European Communities, Working Conditions in the Office*, Luxembourg, 1987.

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