PC5086 and PC5286
User Manual and
Guide to MS-DOS

AMSTRAD

MS-DOS is a registered trademark of Microsoft Corporation.
Windows and GW BASIC are trademarks of Microsoft Corporation.
IBM is a registered trademark of International Business Machines Corporation.
1-2-3 and Lotus are trademarks of Lotus Development Corporation
Gem and Digital Research are registered trademarks of Digital Research Inc.
Hewlett-Packard is a trademark of Hewlett Packard Corporation

AMSTRAD is the registered trademark and Amstrad PC5086 and PC5286 are trademarks of AMSTRAD PLC.

Unauthorised use of the name or logo AMSTRAD is strictly forbidden.

Preface

This manual is in two parts:

    Part 1   **- Guide to using PC5086 and PC5286**

    Part 2   **- Guide to MS-DOS v.3.30A (Microsoft® Disk Operating System).**

Each chapter in Part 1 gives an introductory description of a part, or parts, of the PC: how each part works and what it can be used for. Highly technical information is included in some chapters, to be used when writing programs and performing specialised tasks with the PC. This level of information is not comprehensive. It is supplied to supplement the Industry Standard documentation, where Amstrad PCs include features additional to Industry Standard PCs.

Do not worry if you do not understand the technical information; the majority of users most certainly will not need to understand this information.

The first thing you will probably want to do is install the PC, rather than read the manual! Chapter 3 describes the installation steps, so if you feel confident that you know how you want to set up your PC, you could start installing straight away.

If you are new to computing you may want to understand what you are doing during the installation process, in which case, you could read Chapter 2 first, which gives a broad view of the possible uses of the PC.

Note that most of the information given applies to all PCs but differences between the models are clearly indicated, where necessary. Many of the example screen displays are taken from just one model, when the display would be almost identical for the other models.

Part 2 is a tutorial and reference guide to the operating system, MS-DOS, which is supplied with your PC.

If you run into difficulties, you should look at "Troubleshooting" in Part 1 Chapter 14, and Part 2 Chapter 10 to see if you can find out what has gone wrong, and what to do about it. If you experience difficulties which are not covered in this manual, consult your dealer.

PART ONE

Guide to PC5086 and PC5286

Part One - Contents

1. Reference Information

1.1 Contents of the packages
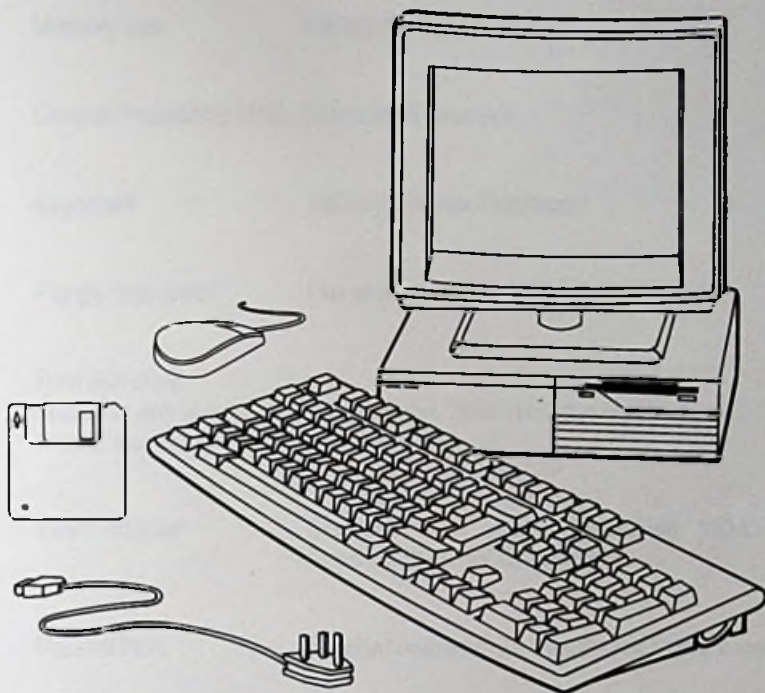
Your PC is contained in three packages. Check that, in addition to this manual, the packages contain the following items:

- a PC system unit

- a VGA monitor

- a keyboard

- a mouse

- a floppy disk - the part number stamped on the disk should be 50030

- a power cord

- a guarantee card

If any item is missing, consult your dealer.

Save all the packing materials in case you want to transport your PC at some later date.

Since your PC is heavy, difficult to transport and would be damaged if dropped, we recommend that you obtain on-site service cover, from your dealer, if this is not already provided for you.

1.2 Specifications

This information will be required if you want to use application programs or any additional hardware with your PC, for example, a printer, a monitor or expansion cards.

Standard features of PC5086

Memory size	640 kilobytes of RAM.
Central Processing Unit:	8MHz 8086 processor
Keyboard:	102-key, Enhanced keyboard
Floppy disk drive:	One or two 3.5 inch, 720 kilobyte
Hard disk drive: *(available only in hard disk PC models)*	40 megabytes, 28ms average access time
Video Adaptor:	Extended VGA adaptor supporting MDA, CGA, Hercules, EGA, MCGA and VGA
Parallel Port:	Standard centronics 25-way, D-type female connector
Serial Port:	9-way, D-type male connector
Expansion slots:	Two 8 bit, ISA, half-length expansion slots
BIOS:	Super XT-type ROM Operating System
Operating system:	MS-DOS v3.30A

This information will be required if you want to use application programs or any additional hardware with your PC, for example, a printer, a monitor or expansion cards.

Standard features of PC5286

Memory size	1 megabyte of RAM. On board memory can be expanded to 2 or 4 megabytes by fitting SIMMs onto the motherboard.
Central Processing Unit:	16MHz 80286 processor
Keyboard:	102-key, Enhanced keyboard
Floppy disk drive:	3.5 inch, 1.44 megabyte
Hard disk drive: *(available only in hard disk PC models)*	40 megabytes, 28ms average access time
Video Adaptor:	Extended VGA adaptor supporting MDA, CGA, Hercules, EGA, MCGA and VGA
Parallel Port:	Standard centronics 25-way, D-type female connector
Serial Port:	9-way, D-type male connector
Expansion slots:	Two 16 bit ISA half-length expansion slots
BIOS:	AT-type ROM Operating System
Operating system:	MS-DOS v3.30A

1.3 Memory Configuration - PC5286 only

The memory in PC5286 may be divided between Base memory, Extended memory and Expanded memory as follows:

	Base Memory	Extended Memory	Expanded Memory
1M PC	640K	0 - 384K	0 - 384K
2M PC	640K	0 - 1024K	0 - 1024K
4M PC	640K	0 - 3072K	0 - 3072K

Use the SETUP utility, in the system BIOS, to define the amount of extended memory. These definitions will be stored in an area of battery-backed CMOS RAM. The remainder of the RAM, if any, is available for use as expanded memory. SETUP is described in Chapter 4. See Chapter 8 for definitions of these different types of memory.

The recommended configurations are:

- If your application is known to require expanded memory, allocate less extended memory to automatically leave a suitable amount of expanded memory.

- Some applications (for example RAMDRIVE and SMARTDRIVE) can use either extended or expanded memory. We recommend that you use extended memory for these applications, unless there is a specific reason to prevent you from doing so.

  Note that expanded memory is only available when using the SCATEMM.SYS memory manager. See Chapter 4 for a description of SCATEMM.SYS.

When using MS-DOS, the recommended memory configurations are as follows:

Type and usage of PC	Base	Extended	Expanded
1Mb PC with no LIM application software	640	384	0
1Mb PC with LIM application software	640	0	384
2Mb PC with no LIM application software	640	1024	0
2Mb PC with LIM application software needing x Kbytes of LIM	640	$1024-x$	x
4Mb PC with no LIM application software	640	3072	0
4Mb PC with LIM application software needing x Kbytes of LIM	640	$3072-x$	x

1.4 Safety

The mains lead plug, fitted to the computer's UK supply lead, is only suitable for use with a 13 Amp socket.

If the socket you intend to use is not a 13 Amp type, or if you wish to fit an alternative mains plug onto the mains lead, the moulded plug may be cut away and the ends of the lead stripped as required to suit the plug to be fitted.

WARNING

IF YOU REMOVE THE MOULDED PLUG, DISPOSE OF IT IMMEDIATELY. THE PLUG IS NON-REWIRABLE AND WOULD CAUSE A SHOCK HAZARD IF IT WERE INSERTED INTO A SOCKET.

WARNING

THIS APPARATUS MUST BE EARTHED

If a UK, 13 Amp (BS1363) plug is used, a 5 Amp fuse must be fitted. The 13 Amp fuse supplied must not be used. If any other type of plug is used a 5 Amp fuse must be fitted, either in the plug or in the adaptor or at the distribution board.

IMPORTANT : As the wires in the mains lead of this apparatus may not correspond with the coloured markings identifying the terminals in your plug, proceed as follows:

i) The wire which is coloured green and yellow must be connected to the terminal in the plug which is marked by the letter "E" or by the safety Earth symbol ⏚ or coloured green and yellow.

ii) The wire which is coloured blue must be connected to the terminal which is marked with the letter "N", or coloured black.

iii) The wire which is coloured brown must be connected to the terminal which is marked with the letter "L" or coloured red.

IMPORTANT: DO NOT PLUG YOUR PC INTO THE MAINS SUPPLY YET

WARNING

HIGH VOLTAGE INSIDE. DISCONNECT THIS EQUIPMENT FROM THE POWER SUPPLY BEFORE REMOVING ANY COVER

Details of the supply voltage and the frequency range are given on the back panel of the system unit.

WARNING

DO NOT CONNECT TO "I T" POWER SYSTEM

Note: An "I T" power distribution system has no direct connection to earth; the exposed conductive parts of the electrical installation are earthed.

1.5 Software Licence Agreement

Amstrad Software licence agreement for all software described in this manual.

VERY IMPORTANT

Amstrad provides the Software and the Program described in this manual incorporated in or embedded on magnetic disk, tape, hard disk or other media and the descriptive material related to that Program in this manual or in other documents strictly subject to the terms and conditions of this Licence Agreement.

By breaking the Seal on the package in which the Software is provided and/or by entering, utilising, running, listing, copying or otherwise manipulating the magnetic disk, tape, hard disk, other media, Program, manual or other documentation other than for the purpose of erasure or destruction as set out below you agree to be bound by all the terms and conditions of this Licence Agreement.

If you do not agree to be bound by any one or more of the terms and conditions of this Licence Agreement you must destroy the Software Package, manual and documents and erase the Program and Software from the disk, tape, hard disk or other media on or in which it is incorporated or embedded.

Definitions

1. "Machine" means the single microcomputer, or PC on which you use the Software. Multiple CPU systems require additional licences.

2. "Software" means the set of programs, disks, tapes, documentation and related materials described in and supplied with this manual.

3. "Program" is a part of the Software and means the instructions, codes, messages or other information contained in, or embedded on magnetic disk, tape, hard disk or any other media, or any part of it.

4. "Amstrad" means AMSTRAD PLC, 169 Kings Road, Brentwood, Essex, CM14 4EF.

5. "Licensee" means the purchaser if purchased for own use or, if purchased for company use, means that company and its employees.

Licence

Amstrad grants a non-exclusive Software Licence to Licensee to:

1. Use the supplied Program on a single Machine.

2. Where copy protection is not incorporated, copy the Program into any machine-readable or printed form for backup or modification purposes in support of Licensee's use of the Program on a single Machine. Licensee may make only one (1) copy of the Program for such purposes. Copying of documentation and other printed materials is prohibited. Disassembly, reverse compilation and reverse engineering of the Program or Software is prohibited.

Terms

1. Software supplied by Amstrad is copyright protected. Licensee agrees to uphold these copyrights.

2. This Licence Agreement enters into effect at the time you open or break the seal on the Software package, or enter, use, run, list, copy or otherwise manipulate the Program, and is effective until terminated.

3. Licensee may terminate this Licence Agreement at any time by destroying the Software together with all copies. The benefit derived by Licensee from the Licence will terminate automatically if the terms of this Agreement are violated and Amstrad may demand the return of the Software immediately. Any such termination shall be without prejudice to any accrued rights of the parties.

4. This Licence is personal to Licensee and may not be assigned to any other person, persons or company.

5. The right to "lend", "hire", "rent", "sell", or otherwise transfer the Software in part or in whole is not granted to Licensee.

6. Licensee may not use, copy, modify, or transfer the Software or documents, or any copy, modification or merged portion, in whole or in part, except as expressly provided for in this Licence Agreement.

7. The Program cannot be transferred via any media other than that on which it is supplied. It cannot therefore be transferred via such media as telecommunication lines.

8. Licensee agrees to take all possible steps to protect the Software from unauthorised use, reproduction or distribution.

Limited Warranty

THE SOFTWARE IS PROVIDED AND LICENSED ON AN "AS IS" BASIS. LICENSEE ASSUMES RESPONSIBILITY FOR SELECTION OF A PROGRAM TO ACHIEVE LICENSEE'S INTENDED RESULTS AND LICENSEE IS RESPONSIBLE FOR INSTALLATION, USE AND RESULTS OF USE. EXCEPT AS IS HEREIN EXPRESSLY STATED, AMSTRAD MAKES NO REPRESENTATION, GIVES NO WARRANTY AND ACCEPTS NO CONDITION OF ANY KIND WHATSOEVER EITHER EXPRESS OR IMPLIED, INCLUDING,

BUT NOT LIMITED TO THE IMPLIED WARRANTIES AND CONDITIONS OF MERCHANTABILITY AND FITNESS FOR PURPOSE (SPECIFIC OR GENERAL).

AMSTRAD DOES NOT WARRANT THAT THE FUNCTIONS CONTAINED IN THE SOFTWARE WILL MEET LICENSEE'S REQUIREMENTS OR THAT THE OPERATION OF THE PROGRAM WILL BE UNINTERRUPTED OR ERROR FREE.

AMSTRAD DOES NOT RECOMMEND USE OF THE SOFTWARE FOR LIFE CRITICAL FUNCTIONS OR FOR ANY APPLICATIONS WHERE A SOFTWARE ERROR MAY CAUSE FINANCIAL LOSS, DAMAGE OR EXPENSE.

However, Amstrad gives a limited warranty that the disks, tapes or other non-hardware media on which the Program is embedded and supplied by Amstrad, to be free from defects in materials and workmanship under normal use for a period of ninety (90) days from the date of receipt by, or of delivery to, Licensee as evidenced by a dated copy of Licencee's proof of purchase receipt. In the event that the disks, tapes or other non-hardware media are found to be so defective within the said period, Amstrad will replace them free of charge, if they are returned postage prepaid.

Amstrad will also, AT ITS DISCRETION, by modification or alteration endeavour to remedy any Program errors, attributable to Amstrad, which are provable and demonstrable, and reported to Amstrad in writing within the aforesaid period.

Limitations

UNDER NO CIRCUMSTANCES WILL AMSTRAD, THE AUTHOR, OR THE MANUFACTURER, DEVELOPER OR SUPPLIER OF THE LICENSED SOFTWARE BE LIABLE FOR ANY CONSEQUENTIAL, INCIDENTAL, INDIRECT, SPECIAL OR EXEMPLARY DAMAGES OR OTHER ECONOMIC OR PHYSICAL LOSS, EVEN IF AMSTRAD OR SUCH OTHER PARTY(IES) HAS/HAVE BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES AND LOSS. UNDER NO CIRCUMSTANCES WILL LIABILITY EXCEED THE PURCHASE PRICE OF THE SOFTWARE.

Indemnity

The Licensee shall indemnify Amstrad in respect of any liability incurred by Amstrad or the Software author as a result of a claim brought by Licensee against Amstrad directly or against a third party, for negligence, breach of contract or product liability.

Governing Law

This agreement shall be construed, interpreted and governed in accordance with the Laws of England (or in the case of Microsoft products, Washington, USA).

U.S. Government restricted rights in respect of Microsoft programs

The Program and documentation are provided with RESTRICTED RIGHTS. Use, duplication or disclosure by the US Government is subject to restrictions as set forth in subdivision b(3)(ii) of The Rights in Technical Data and Computer Software clause of 252.227-7013 of the DOD FAR.

Contractor/manufacturer is Microsoft Corporation/160 11 NE 36th Way/Box 9701/Redmond, WA 98073-9717.

General

If any of the above provisions thereof are invalid or unlawful under any applicable Law they are to that extent only deemed omitted.

SOME STATES DO NOT ALLOW EXCLUSION OF IMPLIED WARRANTIES AND CONDITIONS OR LIMITATIONS OF LIABILITY. IN SUCH CIRCUMSTANCES THE ABOVE EXCLUSIONS AND LIMITATIONS MAY NOT APPLY TO LICENSEE. THIS WARRANTY GIVES THE LICENSEE CERTAIN LEGAL RIGHTS BUT LICENSEE MAY ALSO HAVE OTHER LEGAL RIGHTS WHICH VARY FROM STATE TO STATE.

Export of US Technology

No US technology, Program or Software may be exported or sold or transferred directly or indirectly to any person in the knowledge that export may occur without application for and obtaining necessary US Government Export or Re-Export licence issued by the US Department of Commerce, Washington DC 20230.

AMSTRAD PLC
169 Kings Road
Brentwood
Essex CM14 4EF

2. An introduction to PC's for new users

This chapter gives a broad view of the activities which are fundamental to the PC: data security and using an operating system. It also outlines optional activities: using a graphic interface, programming languages, application programs, configuring memory and additional hardware.

Each section tells you where to find more information and instructions for that particular activity.

2.1 Protecting your data

You are advised to keep back-up copies of all the data stored on hard or floppy disks, as it can be lost for a number of reasons; it is almost certainly very inconvenient if this happens to you. You could lose programs and data which are irreplaceable, or at least, you may find that replacing the data means you are going to have to re-type or re-install everything you have lost.

There are various ways of making security copies: see Part One, Chapter 13 for information about copying data stored on a hard disk and refer to Part Two, Chapter 6 for information about copying floppy disks.

The various methods described in this manual for copying data involve using the MS-DOS commands **DISKCOPY, COPY** and **BACKUP**. Full details of these commands are given in Part Two, Chapter 8, where all the MS-DOS commands are listed alphabetically.

2.2 The Operating System (MS-DOS)

The operating system supplied with your PC is called MS-DOS (Microsoft® Disk Operating System). If you are new to computing, you will need to understand what an operating system is.

The computer is a collection of advanced electronics which cannot work without being told what to do. The operating system is a set of programs which you can use to control the PC and tell it what to do.

You issue instructions, called commands, to the operating system, and it, in turn, controls the electronics of the PC.

Once the operating system has been given instructions, it can make the computer perform functions like running programs, storing and retrieving data from files on disks, as well as controlling smaller operations like accepting characters from the keyboard and displaying them on the screen.

You could use an operating system other than MS-DOS, either by loading an alternative operating system from a floppy disk or by installing one on your hard disk. You could also re-configure the hard disk and install one or more operating systems. See Chapter 3 for instructions on how to configure the hard disk; and see Part 2 for a full description of MS-DOS.

2.3 Graphic Interfaces

A graphic user interface displays the operating system's activities, and the contents of your disks in a diagrammatic and pictorial form.

A graphic form of display makes it easier to issue commands; a mouse is used to control a pointer which can be moved around the screen. The pointer is used to select items and operate menus.

A graphic interface, like application programs, has to be used in conjunction with the appropriate operating system. Microsoft Windows is one such graphic interface which has to be used with MS-DOS. In fact, it is written to supplement MS-DOS and to provide additional facilities to those of the operating system.

Once you have learned how to use a graphic interface, you will realise the advantage of being able to use a number of application programs which work with the same interface. It means that you will not have to learn how to control each application program; you will control the interface and it will control the programs.

If you want to use word processing programs, spreadsheets or a database, you will need to install a third level of programs onto your PC. These programs are called "application programs", examples of which are: Wordstar, Lotus 1-2-3, and Infomaster.

2.4 Application Programs

The primary use for your PC will possibly be to run application programs such as word processors, databases, spreadsheets, accounting and invoicing systems and so on.

However, in order to use application programs on a PC, there must also be an operating system installed on the computer (see Section 2.2 above).

There is a huge range of software already available which will work on your PC. When buying application programs, check the specification details of the PC, in Chapter 1, against the specification details of the programs, or ask your dealer for advice on buying suitable programs for your PC.

The PC supports most of the common graphics modes, thus increasing the choice of software that you could use on it.

Instructions on how to install and use application programs should accompany the programs.

2.5 Programming Languages

You may be interested in developing your own PC applications if the type you want is not available. There are many computer languages available that allow you to formulate a series of instructions that make the PC do a specific task: examples of which are BASIC, COBOL and C programming languages.

2.6 Configuring the PC's memory - PC5286 only

All PC models contain Base memory: this is where MS-DOS is normally loaded. Some PC models also contain Expanded and Extended memory, which certain application programs make use of. The amounts of these two types of memory can be adjusted to increase the overall performance of the computer. The way in which you choose to apportion the available memory, will depend upon the application programs that you intend to run: programs may be designed to use memory in different ways.

A full description of these memory types is given in Chapter 8. The recommended memory configuration for use with MS-DOS is given in Section 1.3.

2.7 Expanding the PC

The possibilities for expanding your PC are virtually limitless. You can upgrade and extend the facilities in your PC by adding hardware and using MS-DOS.

The parallel and serial ports will allow you to connect almost any printer to the PC. The serial port may also be used for connecting your PC to another computer, a terminal or modem allowing you to access many large computers via the telephone system.

Within the system unit, there are expansion slots into which you can fit expansion cards: PC5086 can take 8-bit expansion cards and PC5286 can take 16 bit cards. Expansion cards can be used to add various features to your PC: they could be used to provide more memory, a hard disk drive, further serial or parallel interfaces, or an internal modem, for example. See Chapter 11 in Part one, and Chapter 4 in Part two for information.

3. Installation

Introduction

This chapter tells you how to set up and prepare your PC for future use. However experienced you are in using microcomputers, you are advised to follow these instructions. If you rush on to running programs too quickly, you risk corrupting the software supplied with your PC. The consequence of this will be that you will have to obtain new copies of this software from your dealer, at your expense.

3.1 Setting up the PC

To set up your PC, you will need a clear, dust-free area on a desk or table that is at least 4ft wide and 3ft deep.

IMPORTANT: when choosing a position for the PC:

- make sure that all the equipment is installed close to, and within easy access of, the electrical mains supply socket

- make sure that the equipment is NOT situated near an artificial heat source, such as a radiator, near a water supply, in direct sunlight, nor in a humid or damp atmosphere. These elements can damage your PC and destroy data. Avoid a location where the PC will be exposed to dust, dirt, vibration, excessively high or low temperatures or rapid changes in temperature. The operating temperature specification for this PC is between 10°C and 35°C. Do not put the PC near other electrical or magnetic equipment.

There are certain minimum health and safety requirements which relate to working with display screen equipment. These requirements are set by the EC Directive (90/270/EEC) and employers must comply with them.

In order to ensure enjoyable and safe use of your Amstrad PC, it is important that you give full consideration to ergonomics:

- Always sit comfortably at an appropriate height and distance for using your PC. Tilt the screen to suit your needs and adjust the brightness and contrast controls to ambient conditions to avoid any discomfort. Place the keyboard in a comfortable working position to avoid fatigue in the arms or hands. Ensure there is adequate working space.

- Also ensure that there is satisfactory lighting; taking into account the type of work and user's vision requirements. Avoid disturbing glare or reflections. Ensure there is no distracting or disturbing noise or excess heat which could cause discomfort.

- Activities should be planned so that daily work on a display screen is periodically interrupted by breaks or changes of activity. As with all electronic equipment, take regular breaks to avoid eyestrain. It is wise, also, to consider purchasing optional filters and screens.

Important When the PC is switched on, do not obstruct the ventilation of the PC. Vents are located underneath the system unit, so the area around the system unit must be kept clear: that is, do not place books, or papers, or any other objects, underneath, immediately in front of, to the side of, or behind, the system unit or on the monitor. If the unit is obstructed, the air flow will be interrupted which will prevent the system unit from being kept cool.

Before you install the PC, make sure you have unpacked all the contents described in Chapter 1.

3.2 Installation steps

The Installation steps are as follows:

1. **Upgrade, expand or change the hardware configuration**

2. **Connect the keyboard and a mouse to the system unit**

3. **Connect the monitor to the system unit**

4. **Connect a printer to the system unit**

5. **The start up procedure**

6. **Insert the supplied floppy disk**

7. **Hard disk PCs - Prepare the hard disk and install MS-DOS**

   Floppy disk drive PCs - Load MS-DOS

8. **Back up the system disk**

9. **How to reset the PC**

10. **Switching off the PC**

Some of the above steps are optional.

Each step is described in detail in the following pages.

Step 1. Upgrade, expand or change the hardware configuration

If you want to make any adjustments to the way that the computer hardware is set up, you could do so now. Instructions on how to do this are given in the following chapters:

Fitting a maths co-processor - see Chapter 7

Upgrading memory (PC5286 only) - see Chapter 8

Disabling built-in features - see the sections on the SETUP utility in Chapter 4 and option links in Chapter 11

Fitting an expansion card - see Chapter 11

There are a few features built into the PC which are controlled by the use of option links . If you want to install any alternative features supplied on expansion cards, you may need to change the appropriate option link.

If you do add to, or change the PC hardware, you may also need to inform the system that these changes have been made. There is a utility called "SETUP" built into your PC which is used to acknowledge and make use of any changes you may make to the hardware configuration. There are a number of features which are automatically detected by the SETUP utility when changes are made. Instructions on how to use SETUP are given in Chapter 4.

Step 2   Connect the keyboard and the mouse to the system unit

i) Check that your PC is not plugged into the mains supply

ii) **PC5086** - set the switch on the back of the keyboard to the **"XT"** position before you connect the keyboard to the system unit.

PC5286 - check that the switch, on the back of the keyboard, is set to the **"AT"** position before you connect the keyboard to the system unit.

iii) Turn the system unit upside down

iv) Connect the keyboard to the system unit by inserting the plug at the end of the keyboard cable into the keyboard socket.

Underside of system unit

Mouse Connector   Keyboard Connector
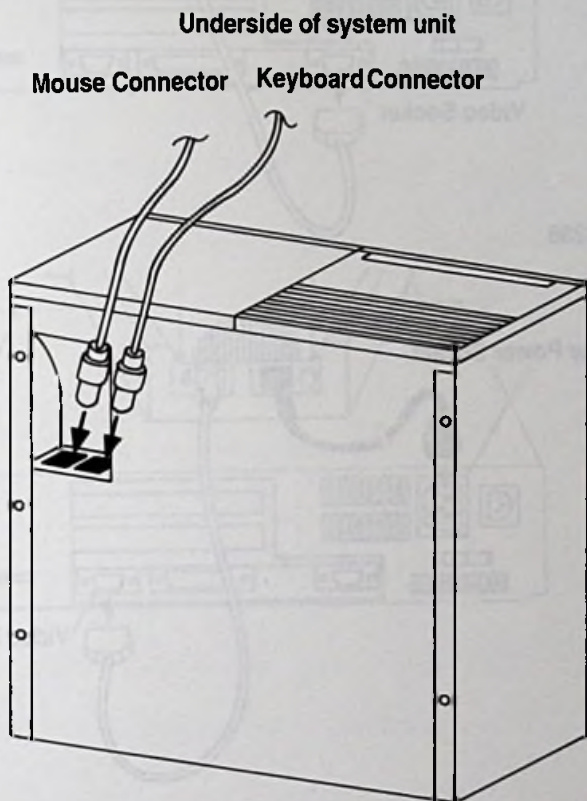
iv) If you have a mouse, connect it to the system unit, by inserting the plug on the end of your mouse lead into the mouse socket.

v) Check that the keyboard and mouse cables are positioned correctly, then turn the system unit the right way up.

Step 3. Connect a monitor to the system unit

To connect a monitor to the system unit, use the following instructions:

PC5086

Monitor Power Socket

Video Socket

PC5286

Monitor Power Socket
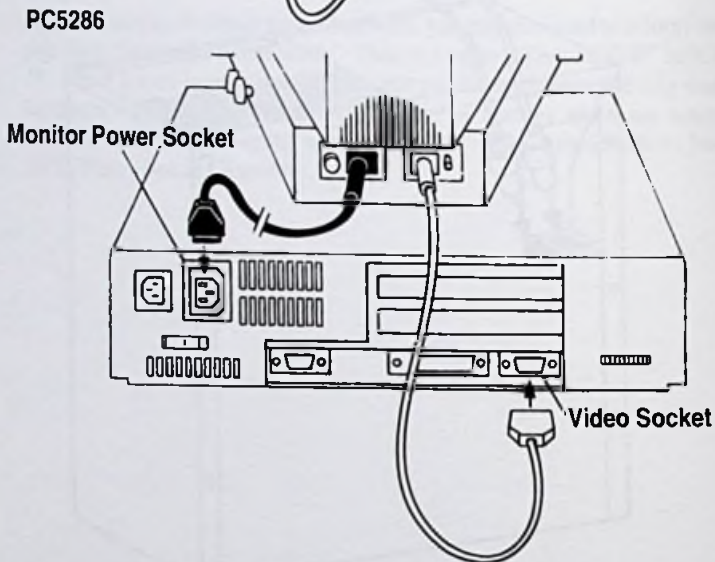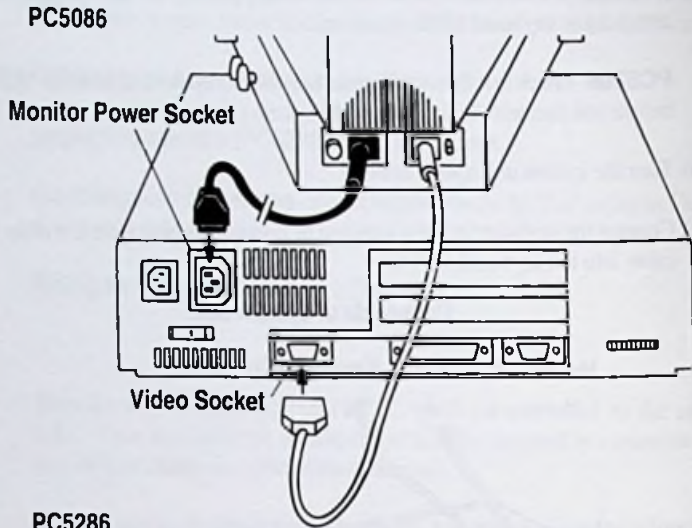
Video Socket

i) Check that the monitor and the system unit are not plugged into the mains supply.

ii) Place the monitor on top of the system unit. Insert the 15-pin plug on the end of the VDU cable leading from the back of the monitor into the video socket on the back panel of the system unit.

iii) The monitor can obtain power via the system unit or from the mains supply. Insert the CEE22 moulded plug, connected to the monitor cable, into the monitor power socket if you want the power to be obtained via the system unit, otherwise, fit the cable with a mains plug as described in Section 1.4 "Safety".

iv) Swivel the monitor so that its screen is at a suitable angle. You can adjust this angle at any time.
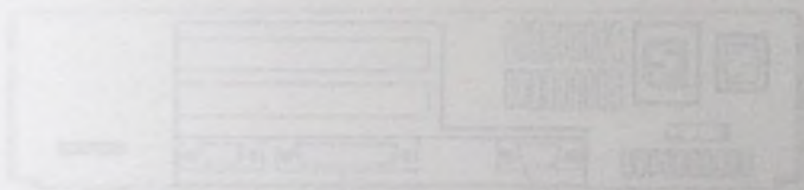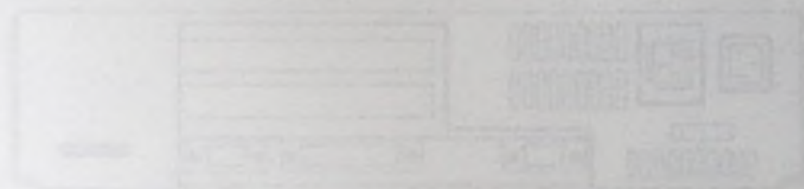
Step 4.   Connect a printer to the system unit

If you have a printer, you may want to connect this to your PC now.

PC5086

Back Panel of System Unit

Parallel Port Serial Port

PC5286
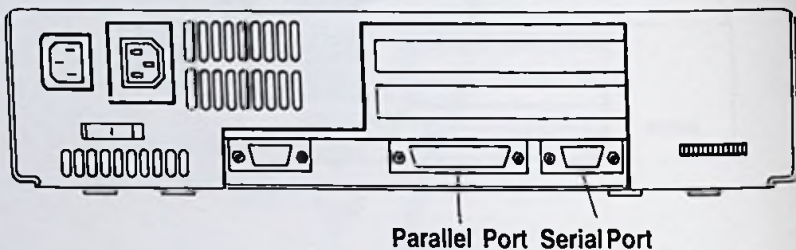
Back Panel of System Unit

Serial Port   Parallel Port
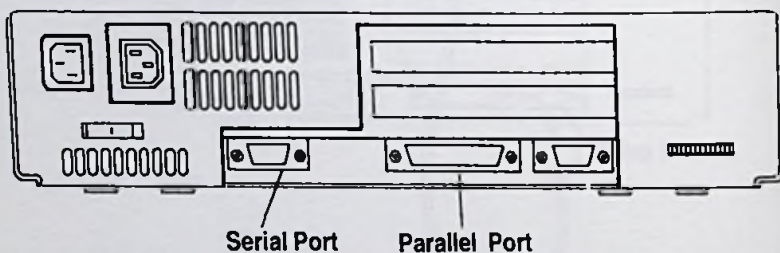
If you have a serial printer, you will need a cable that connects your printer to the serial interface connector on the back of the system unit. Your dealer will be able to tell you what type of cable you need.

If you have a parallel (or Centronics) printer, you will need a cable that connects your printer to the parallel printer connector on the back of the system unit. Your dealer will be able to tell you what type of cable you need.

If your printer is of some other type, you will need to set up your PC specifically for your printer. It would be advisable to contact your dealer for more information.
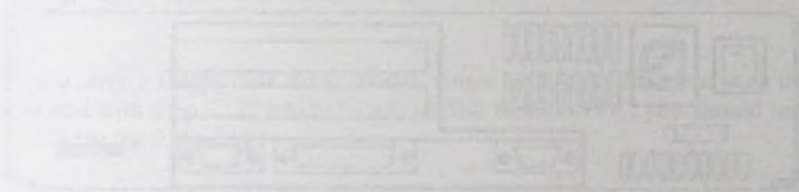
Step 5.   The Start up procedure

If, while you are following these instructions, things happen that are not explained here, or if you see messages that are nothing like those described here, turn to Part 1 Chapter 14, or Part 2 Chapter 10, to see if you can find out what has gone wrong. If you can't, consult your dealer.

Start with:

- the mains plugs out of the supply sockets

- the power switches, on the monitor and the back panel of the system unit, in the OFF position

- no disk in any floppy disk drive

  Then

- plug the system unit into the mains supply

- turn the PC on by pressing the power switches on the monitor and on the back panel of the system unit, in the bottom righthand corner.
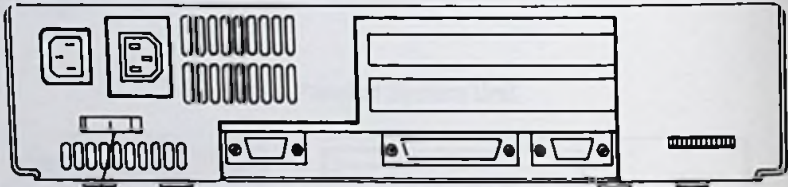
Power Switch

If nothing is seen, try adjusting the brightness and contrast of the messages on the screen to a comfortable level using the Brightness and Contrast controls on your monitor.

If the picture appears to roll, adjust the V-Hold on the monitor, until the display is steady.

While these messages are displayed, the PC is going through a series of built-in system checks.

If a test is not successful, a system error message will appear. See Part 1 Chapter 14, for a list of system error messages, and what you should do.

However, if you see the message,

Keyboard error

Clear away anything resting on the keyboard and check the following:

- that the keyboard is properly connected to the system unit

- that the connector on the end of the keyboard cable is firmly plugged into the socket on the system unit

- that the switch on the back of the keyboard is set correctly for your PC: AT or XT setting. See Step 2 for details.

If you have a floppy disk drive model, single or double drive but with no hard disk, proceed with Step 7. If you have a hard disk model of PC, you should see a message similar to the following:

PC5086

AMSTRAD PC5086

Self test and Initialisation in Progress, Please Wait...
XT Hard Disk BIOS Revision 2.0

Disk Boot Failure - Press any key to retry

If you see this message on PC5086, you can now proceed with Step 6.

AMSTRAD PC5286

00640K System RAM Passed

Diskette error or non system disk
Please insert bootable diskette and press any key

If you see the above message on the screen, you can now proceed with Step 6.

However, if you see the following messages:

AMSTRAD PC5286 -

00640K System RAM Passed

System battery has discharged - Run SETUP

Press <F1> to continue, <F2> to SETUP

you must now use the SETUP utility to check whether the correct hard disk number has been set, and change it if necessary. So, press the [F2] key and the following screen will be displayed:

```
┌────────────────────────────────────────────────────────────────────────────┐
│              AMSTRAD PC5286 System Configuration Utility                      │
├────────────────────────────────────────────────────────────────────────────┤
│  Time:               09:00:00                                                 │
│  Date:               Jan 01, 1991                                             │
│                                                                               │
│  Diskette A:         3.5 Inch, 1.44 MB                                        │
│  Diskette B:         Not Fitted                                               │
│                                      Cyl   Hd   Pre   LZ   Sec   Size         │
│  Fixed Disk C:       Not Fitted                                               │
│  Fixed Disk D:       Not Fitted                                               │
│                                                                               │
│  Base Memory:        640 KB                                                   │
│  384K Relocation:    Enabled                                                  │
│  Extended Memory:    0 KB                  Maximum available:   384 KB        │
│                                                                               │
│  EMS I/O Address:    208h/209h                                                │
│  NumLock:            On                                                       │
│  Display:            EGA or VGA                                               │
├────────────────────────────────────────────────────────────────────────────┤
│  Select the type of the first diskette drive (Drive A)                        │
├────────────────────────────────────────────────────────────────────────────┤
│  ↑↓←→ to select entries                    + and - to change an entry         │
│  ESC to exit without saving                F10 to save then exit              │
└────────────────────────────────────────────────────────────────────────────┘
```

Now look at the back panel of the system unit, and find out the Type number of the hard disk. The Type number should be given on a label on the back panel. Then return to the screen.

Look at the option called "**Fixed Disk C:**" to see what Type number it is set to "**Type xx**". It may already be set to the correct number, as indicated on the label, or it may be set as "**Not Fitted**".

To set the correct Type number, press the cursor down key [↓], until the option called "**Fixed Disk C:**" is selected, then press the plus key [+] or minus key [-] to set a higher or lower number, respectively.

When you have set the correct Type number, press the [F10] key to save your change
and exit from the utility.

The PC will then re-start and the following message will be displayed:

AMSTRAD PC5286

00640K System RAM Passed

Diskette error or non system disk
Please insert bootable diskette and press any key

You can now proceed with Step 6.

Step 6.   Insert the supplied floppy disk

You will need to know how to use floppy disks properly to continue with Step 7:

Hold the disk with the arrow uppermost and pointing away from you.

Gently insert the disk into the floppy disk drive. If you have two floppy drives, insert it into Drive A:, that is, the uppermost disk drive. It should simply slide in and latch into place.

To remove the disk from the drive, press the drive release button. The disk will slide a little way out of the slot. Grip the edge of the disk with your fingertips and remove it from the drive.

Practice inserting and releasing the disk a few times until you feel confident about doing this. Finish with the disk fully inserted into the drive.

Floppy Disk Drive A

Drive Release Button
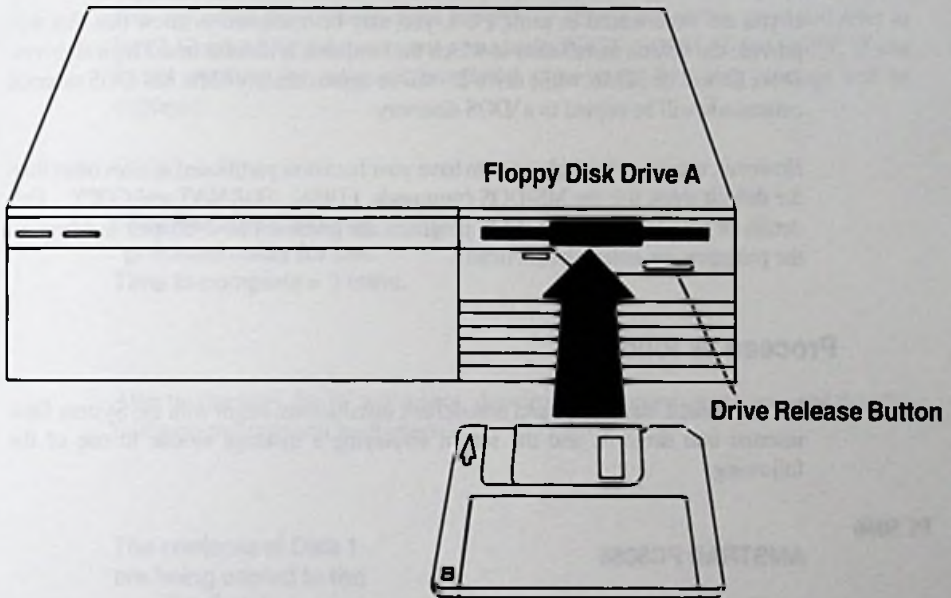
Step 7. Hard disk PCs:

Note If your PC does not have a hard disk, turn to the page headed "**Step 7. Floppy disk drive PCs**".

Prepare the hard disk and install the supplied software

The supplied software includes MS-DOS operating system and Amstrad utilities.

Note This software is supplied strictly subject to the Licence terms and conditions printed in Section 1.5 of this manual. If you do not agree to comply with all the terms and conditions of the relevant Licence Agreement, you must destroy the software concerned. If you do agree to comply with all the terms of the Licence, then by loading, entering, utilizing, running, listing or otherwise manipulating the software in any way, you are deemed to accept the full terms of the conditions of the Licence.

Before your PC can be used, the hard disk must be prepared by being separated into partitions and then formatted. MS-DOS must then be copied onto the hard disk from the floppy disk. Your floppy disk contains programs which allow this whole installation process to work automatically, when you insert them as instructed below.

If you are experienced in using PC's, you may be interested to know that this will provide the default installation in which the hard disk is divided into 2 logical drives. Drive C: will be 32Mb, while drive D: will be approximately 8Mb. MS-DOS external commands will be copied to a \DOS directory

However, if you particularly need to have your hard disk partitioned in sizes other than the default sizes, use the MS-DOS commands, FDISK, FORMAT and COPY. Full details of how to use the MS-DOS programs are given in Part 2 Chapter 8, where all the programs are listed alphabetically.

Proceed as follows:

For the default installation and non-default installations, begin with the System Disk inserted into drive A: and the screen displaying a message similar to one of the following:

PC5086

AMSTRAD PC5086

Self test and Initialisation in Progress, Please Wait...
XT Hard Disk BIOS Revision 2.0

Disk Boot Failure - Press any key to retry

AMSTRAD PC5286

00640K System RAM Passed

Diskette error or non system disk
Please insert bootable diskette and press any key

Press the [Space] bar on the keyboard. MS-DOS will be loaded from the floppy disk and because the hard disk has not been prepared, after a short while, the following message will be displayed for a few seconds, so that you can exit from the automatic installation:

AMSTRAD
Software Installation

If you do not want to use the automatic disk installation process, to prepare the hard disk and install the software, press the [F3] or [ESC] key at this point and refer to Part 2, Chapter 8 for the appropriate commands: FDISK, FORMAT and COPY. If you do not exit from the automatic installation process, the following message will be displayed:

 The Hard Disk is being
  prepared ready for use.
Time to complete = 2 mins.

After two minutes, the PC will reboot, showing a boot-up message again, and then the following message will be displayed:

The contents of Disk 1
are being copied to the
      hard disk.
Time to complete = 2 mins.

When this process is completed, the following message will be displayed:

Installation complete
Remove disk from drive A
Press ⌐ to continue

Press the [⌐] key and the PC will be reset, a boot-up message will be displayed again, and will display an MS-DOS system prompt:

C:\\>

which means that MS-DOS is installed. The prompt is followed by a flashing cursor indicating that anything you type will appear at the position of the cursor.

Now that MS-DOS has been installed on your hard disk, it will be loaded automatically, whenever you switch on your PC. A system prompt **C:\\>** will be displayed on the screen, indicating that MS-DOS is ready to receive instructions. A full description of MS-DOS is given in Part 2 of this manual.

In future, you should not need to use the floppy disk that was supplied with your PC. However, you should keep this disk somewhere safe, in case you accidentally lose the contents of your hard disk, and need to re-install MS-DOS.

You could now install any application programs that you may have bought, following the instructions supplied with the programs.

You should look at the remaining installation steps, 9 and 10, to find out how to reset your PC and switch off properly.

Step 7.   Floppy disk drive PCs:

Load the operating system - MS-DOS

If your PC has no hard disk, you will have to load the operating system from floppy disk every time you use the PC.

Having gone through the Start up procedure in Step 5, the following message, should be displayed on the screen:

PC5086

AMSTRAD PC5086

Self test and Initialisation in Progress, Please Wait...

Diskette error or non system disk
Please insert bootable diskette and press any key

PC5286

AMSTRAD PC5286

00640K System RAM Passed

Diskette error or non system disk
Please insert bootable diskette and press any key

So now you can load the operating system:

- insert the floppy disk, supplied with your PC, into Drive A:, the uppermost drive, if there are two

- then press the space bar

MS-DOS will be loaded into the PC's memory. A system prompt will be displayed on the screen, **A:\>** which means MS-DOS is ready to receive instructions. See Part 2 of this manual for detailed information about MS-DOS.   Before you do look at Part 2, you should continue with the remaining installation steps.

Step 8.   Floppy disk drive PCs:

Back up the system disk

If your PC has no hard disk, you will have to use the same floppy disk to load the operating system every time you switch on your PC. You should keep a copy of this disk, for safety's sake, since it could easily be lost or damaged. If you could not use this disk, you would not be able to use your PC.

Before you start the copying process, open the write-protect shutter on the MS-DOS disk, that is the disk you are going to copy. This will protect the disk from accidents while copying.
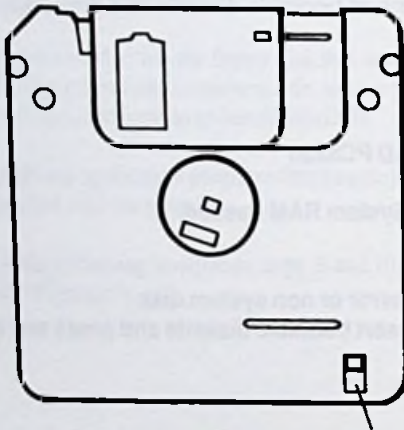
Write-Protect Shutter

Take a blank 3.5 inch 720K floppy disk.

To copy a floppy disk, you need to use an MS-DOS program called "DISKCOPY". The procedure is slightly different for PCs with one floppy disk drive to that of PCs with two floppy disk drives. Proceed with the instructions over the page, as appropriate to your PC.

PCs with one floppy disk drive

Insert the system disk, which contains MS-DOS, into the drive. Make sure that you insert it all the way into the drive, so that it clicks into place.

On your screen you will see an **A:/>** prompt. You should now type the following command and as you do so, you will see it appear next to the prompt:

DISKCOPY A: A:

then press the return [↵] key and the following message will be displayed:

Insert SOURCE diskette in drive A:

Press any key to continue

Press the [↵] and you will see the following:

Copying 80 tracks
9 Sectors/Track, 2 side(s)

followed by:

Insert TARGET diskette in drive A:

Press any key to continue...

Remove the MS-DOS disk from the drive, and insert your blank, floppy disk into the drive, then press the [↵]. The data from the MS-DOS disk will be copied onto your new disk, but you will have to go through this procedure twice to copy the whole disk.

When this data has been copied to the new disk, you will be asked to insert the MS-DOS disk again (the source disk):

Insert SOURCE diskette in drive A:

Press any key to continue...

Remove your new disk from drive A: and insert the MS-DOS disk into the drive again, then press the [⏎]. When the remaining data has been read into the PC, you will see the following message again:

Insert TARGET diskette in drive A:

Press any key to continue...

Remove your MS-DOS disk from the drive and insert your nwe disk for the second time. Then press the return [⏎] key.

When all the data from the MS-DOS disk has been copied to the new disk, you will see the following message:

Copy another diskette (Y/N)?

Press the [**N**] key and the system prompt **A:\>** will be displayed on the screen, ready for use, and you will have completed the disk copying process.

Now that you have backed up your system disk, you could go on to use MS-DOS, which is described in Part 2 of this manual, or you could load any application programs you may have bought, following the instructions supplied with those programs. You should first look at the two remaining installation steps to see how to reset and switch off your PC.

PCs with two floppy disk drives

Insert the system disk, which contains MS-DOS, into drive A:, the uppermost drive. Make sure that you insert it all the way into the drive so that it clicks into place.

Insert a blank, 3.5 inch 720K floppy disk into drive B:, which is below drive A:.

On your screen you will see an **A:/>** prompt. You should now type the following command and as you do so, you will see it appear next to the prompt:

DISKCOPY A: B:

then press the return [⏎] key. You will see the following message on the screen:

Insert SOURCE diskette in drive A:
Insert TARGET diskette in drive B:
Press any key when ready...

Having already inserted both disks, press the return [⏎] key and the following message will be displayed:

Copying 80 tracks
9 Sector/Track, 2 Side(s)

When the copying process is completed, you will be asked if you want to copy another disk:

Copy another diskette (Y/N)?

Type **[N]** and a system prompt will be displayed for you to use. Take both disks out of the drives.

Now that you have backed up your system disk, you could go on to use MS-DOS, which is described in Part 2 of this manual, or you could load any application programs you may have bought, following the instructions supplied with those programs. You should first look at the two remaining installation steps.

Step 9.   How to reset the PC

Resetting your PC clears its memory so that you can start using the machine afresh. It is often used to change from using one application software package to another, or after a program has failed.

Do not reset your PC before you have checked whether there is any information, currently held in its memory, that you want to save to disk. Any information that has not been saved to disk will be lost.

The steps are as follows:

1. Press the drive release button and withdraw the disk from the disk drive.

2. Hold down both the [Ctrl] and [Alt] keys and press the [Del] key.

Note: On hard disk PCs, there is no need to insert a System (MS-DOS) disk, unless you want to override the operating system loaded automatically from the hard disk.

Step 10.   Switching off the PC

1. Check that your PC isn't reading any data from your disks or writing data to them.

2. Press the disk drive release button. This automatically releases the disk from the drive.

3. Withdraw the disk from the drive.

4. Only then, switch off your PC.

ALWAYS REMEMBER TO REMOVE YOUR DISK(S) FROM THE DISK DRIVE(S) BEFORE YOU SWITCH OFF.

ALWAYS WAIT FOR AT LEAST FIVE SECONDS BEFORE SWITCHING BACK ON.

4. Configuration software

Introduction

This chapter describes SCATEMM.SYS, SPEED, DISPLAY and MOUSE programs. These are programs that are used to control the environment in which your programs run. You can modify settings of various features of the hardware, on a temporary basis, to accommodate the particular requirements of your application programs.

This chapter also describes a built-in utility called SETUP, which informs the system of the hardware configuration.

If you modify the hardware, by changing the hard disk for example, you must use the built-in SETUP utility to make the system aware of the changes you have made. This information will be remembered when the PC is switched off.

The software is written especially for each model of PC, so refer to the programs which relate to your particular model of PC:

- PC5086 programs and utilities are described in section 4.1

- PC5286 programs and utilities are described in section 4.2

It is possible to set up your PC to execute a number of configuration instructions automatically, every time you switch on your PC, by storing the configuration information in the AUTOEXEC.BAT file and the CONFIG.SYS file. These files are described in section 4.3 and 4.4.

Note

Many of the command forms given in this chapter contain square brackets [ ] and bar | symbols e.g. **DISPLAY [V I E IMI C I H I F]**. These square brackets and bars should not be typed-in when issuing a command. Square brackets are used to show which parts of the command are optional and vertical bars indicate that one option should be chosen. For a full explanation of the symbols used in command descriptions see the Guide to MS-DOS in Part 2, Chapter 1.

4.1 PC5086 programs and utilities

You can modify some features, on a temporary basis, using the SPEED, DISPLAY and MOUSE programs. Some features may be modified on a permanent basis using the SETUP utility: some changes made to the hardware must be recorded using SETUP. An outline of each of the above programs is as follows:

- SPEED   controls the speed of the processor.

- DISPLAY   controls the mode of the display adaptor to accommodate the requirements of your programs.

- MOUSE   can be used to change the horizontal and vertical sensitivity of the mouse

- SETUP   use to define the type of video adaptor fitted; the type of floppy disk drive(s) fitted and to set the time and date.

These programs are described in detail in the following pages.

The SPEED command - PC5086

Use the SPEED command to change the speed of your PC's processor: PC5086 has a maximum speed of 8MHz and can be reduced to 4.77MHz

You may want to do this because a program you wish to use, for example, some games software, only operates at a speed of 4.77MHz.

Form SPEED [8| 4| ?]

where:

8 - changes the speed of the processor to 8MHz, from a slower speed

4 - changes the speed of the processor to 4.77MHz

If you enter the command **SPEED** with a question mark, **?**, the current speed of the processor will be displayed.

If you enter the command SPEED with no parameters, or the wrong parameters, a message will be displayed which tells you what the correct options are. The message will begin with "**Usage...**".

The DISPLAY command - PC5086

Use this command if you wish to use software that assumes an EGA, MDA/Hercules, or CGA card is fitted.

Use the following form to set the six internal display adaptor options:

Form DISPLAY V|E|M|C| H| F

The DISPLAY command options select the following display adaptor modes

V	sets VGA (Video Graphics Adaptor) emulation mode
E	sets EGA (Enhanced Graphics Adaptor) emulation mode
M	sets MDA (Monochrome Display Adaptor) emulation mode
C	sets CGA (Colour Graphics Adaptor) emulation mode
H	sets Hercules HALF mode
F	sets Hercules FULL mode

When you enter a parameter that DISPLAY does not understand as an option, or you enter DISPLAY with no parameters you will receive a prompt like the following:

Usage: DISPLAY [V|E|M|C |H |F]

See Chapter 6 for an explanation of the use of software with video adaptors.

Example

If you have a colour VGA monitor and want to use some software that requires a monochrome configuration, use the following command line

DISPLAY M

The MOUSE command - PC5086

The MOUSE command is included in your AUTOEXEC.BAT file, which means the mouse driver software is loaded automatically, when you switch on your PC.

However, there are some options with this command which can be used to specify the following:

- sensitivity of the mouse

- set the interrupt rate for the Bus (Inport device) interface only

- tell the mouse driver to look for a particular type of Microsoft Mouse at a particular I/O port.

These options can be included in the MOUSE command line in your AUTOEXEC.BAT file or you can issue the MOUSE command, and the options you require, at the MS-DOS prompt.

- **To set the sensitivity of the mouse**

Form

MOUSE [/S*n***] [/H***n***] [/V***n***]**

where

/S - sets horizontal and vertical sensitivity

/H - sets horizontal sensitivity only

/V - sets vertical sensitivity only

n - is a number in the range 5 - 100, in increments of 5.

Example

To set the horizontal and vertical sensitivities to 75, at the system prompt, you should type:

MOUSE /S75

- **Set the interrupt rate for the Bus (Inport device) interface only:**

    This option is useful only if you buy a Bus mouse to work with your PC. It does not apply to the supplied Amstrad MS-2 mouse.

Form

MOUSE /R*n*

where *n* is:

1   which sets the interrupt rate to 30Hz

2   which sets the interrupt rate to 50Hz

3   which sets the interrupt rate to 100Hz

4   which sets the interrupt rate to 200Hz

The default setting is 30Hz.

Example If you want to set the horizontal sensitivity level to 45 and the interrupt rate to 50Hz for an Inport mouse, you should type:

MOUSE /H45 /R2

- **Mouse hardware configuration options**

    You can use the following options to tell the mouse driver to bypass its usual automatic search to determine the mouse hardware configuration and to look for a particular type of Microsoft Mouse, Bus mouse or Serial mouse, at a particular I/O port. This option is useful only if you buy a Bus mouse or a Serial mouse to work with your PC. It does not apply to the supplied Amstrad MS-2 mouse.

Form

MOUSE [/I1] [/I2] [/C1] [/C2]

where:

/I1   the mouse is connected to primary InPort address

/I2   indicates that the mouse is connected to the secondary InPort address

/C1   indicates that the mouse is connected to serial port 1 (COM1)

/C2   indicates that the mouse is connected to serial port 2 (COM2)

Example If you buy a serial mouse and want to use this mouse driver, you could specify that the
mouse serial interface cable is connected to COM2 by using the following command:

MOUSE /C2

Your PC contains a clock chip which will remember the date and time while the machine is switched off, so that you do not have to enter this information each time you switch on your PC.

The chip is powered by a small, long-life battery in the system unit which maintains the contents of the chip even when the main power supply is turned off.

In addition to recording the date and time, the clock chip is also used to store information which defines your PC's configuration. This information is read when the machine is first switched on. The memory within the chip which stores this information is called "CMOS RAM". It is sometimes referred to as just "NVR", "Non-Volatile RAM" or "battery-backed RAM".

The CMOS RAM in PC5086 records the type of video adaptor fitted and the type of floppy disk drive(s) fitted. An explanation of these options is given below.

The BIOS ROMs within the PC contain a SETUP utility which can be used to display and change the values held in the computer's CMOS RAM. These values will define the PC's configuration when it is next switched on. The utility can also detect some changes to the hardware and record them, if required. This feature is described below, as "Auto-configuration".

There are two ways to start the SETUP utility:

• by typing the command DOSETUP at the DOS prompt

   and

• during the power-on self-tests, which start when the PC is switched on. While the self-tests are taking place, the messages over the page will appear on the screen:

Amstrad PC5086 - BIOS VERSION AM50 v.xxx

0640K RAM passed

Self tests in progress, Please Wait...

To configure the system with SETUP, press CTRL-ALT-S now

During this power-up process, the computer checks its internal memory and then the
above messages appear for about 10 seconds. SETUP must be started during these ten
seconds. So, while the above messages are on the screen, press CTRL-ALT-S to start
SETUP. CTRL-ALT-S means hold down the [Ctrl] and [Alt] keys and press the [S]
key.

The screen should then display a report something like this:

```
┌─────────────────────────────────────────────────────────────────────┐
│              AMSTRAD PC5086 System Configuration Utility              │
├─────────────────────────────────────────────────────────────────────┤
│                                                                       │
│    Time:                09:07:42                                      │
│    Date:                Mar 27, 1991                                  │
│                                                                       │
│    Diskette A:          3.5 Inch, 720 KB                             │
│    Diskette B:          Not Installed                                 │
│                                                                       │
│    Base Memory:         640 KB                                        │
│    Display:             EGA or VGA                                    │
│                                                                       │
│                                                                       │
│                                                                       │
├─────────────────────────────────────────────────────────────────────┤
│    Select the type of the first diskette drive (Drive A)             │
├─────────────────────────────────────────────────────────────────────┤
│    ↑↓←→ to select entries                                             │
│    +- to change an entry                                              │
│    ESC to exit without saving              F10 to save then exit      │
└─────────────────────────────────────────────────────────────────────┘
```

The above report indicates:

- The time and the date recorded in the CMOS RAM

- There is a single 3.5 inch 720K floppy disk drive

- There is 640K of Base memory available in the PC

- The built-in VGA adaptor is the primary display

If the information in the CMOS RAM is invalid in some way, either because it has never been set or because a new clock chip and battery has been fitted, you must ensure that all the information held in the CMOS RAM is reset correctly to configure the machine in the way that you normally use it.

You must also update the information if you change the system configuration, for example by installing a second floppy disk drive in a single floppy disk drive PC.

To change any of the parameters, position the cursor over the required entry, using the cursor keys, then press the [+] or [-] key until the required value is displayed. When you have finished, press either the [ESC] key to abandon the changes or the [F10] key to confirm your choices and to reset your PC. The PC has to be reset at this point so that MS-DOS can incorporate the changes.

The following defaults will be assumed until the CMOS RAM is set up.

- 640K allocated as Base Memory

- Primary display is VGA/EGA (that is, the built-in VGA adaptor)

- A single 720Kb floppy disk drive is fitted

Each of these options is described below

Note: Certain values may have already been set in your CMOS RAM.

The options which may be changed using SETUP are :

Display

Normally, you will want the PC to use its built-in VGA/EGA adaptor to display text and graphics when it is first switched on. However, if you fit a CGA or monochrome adaptor card in the expansion bus and disable the on-board video adaptor using the option links, you will then need to instruct the system to use the new type of adaptor as the primary display.

Floppy Drive Type
Diskette A
Diskette B

There is no reason to change these settings on PC5086. This option is only included in the utility to be consistent with other Amstrad products.

Note The time and date can also be set with the MS-DOS TIME and DATE commands. (See Part 2, Chapter 8).

Press the [F10] key and the PC will reset, in order to make use of the new configuration.

Auto-configuration

The power-on self-tests have a facility which detects and records the presence of some external peripherals on the expansion bus.

In addition, this facility can also re-map the PCs own internal peripherals around the external peripherals to prevent any conflict in the configuration. For example, if an external COM1 (serial) port is plugged onto the expansion bus, the external COM1 port will be detected and the internal port will be reconfigured. In this case, you would receive the following message during the start-up procedure:

External COM port detected, internal port configured as COM2
Press F1 to confirm

The second part of the message, **Press F1 to confirm**, will disappear after eight seconds.

If you press the [F1] key, to accept this configuration, before the second part of the message disappears, another message will be displayed to tell you that your confirmation is acknowledged:

New configuration confirmed

The change in the configuration will be recorded and you will not be asked to confirm this configuration next time you switch on the PC.

However, if you do not press the [F1] key to accept this configuration, and the message, **Press F1 to confirm**, disappears after eight seconds, the change in the configuration will not have been recorded and when you switch on the PC on susbsequent occasions, you will receive the following message, until it is confirmed:

External COM port detected, internal port configured as COM2
Press F1 to confirm

If you do confirm a new configuration, and then change the configuration again, another message will appear during the start-up procedure. For example, if the external COM1 (serial) port, described earlier, is removed, the following message will appear:

External COM port removed or changed, internal port configured as COM1
Press F1 to confirm

Once again you will have eight seconds to confirm this change, before the message **Press F1 to confirm** disappears. If you do confirm it, the change will be recorded and the message will not appear when you next switch on the PC. If you do not confirm the change, the message will reappear every time you switch on the PC, until you confirm the change in configuration.

Notes

* This auto-configuration applies to serial (COM) ports and parallel (LPT) ports.

   If you do not press F1 to confirm the changed configuration, the change will still be implemented. The confirmation is simply to ensure that the user is aware that the internal configuration has changed to accomodate the expansion cards.

* If you plug in an external COM2 (serial) port, none of the above messages will be produced, as no internal peripherals will need to be remapped to accomodate it.

- It is important to understand that if you have, for example, a modem connected to the serial connector on the back of the machine and you insert an external COM1 (serial) port, the modem can no longer be addressed via COM1 through the internal machine port. This is because the internal port has been remapped to COM2, so the modem would be addressed as COM2.

  Alternatively, if you move the modem serial cable from the PC's serial port to the new COM1 serial port connector card, this would allow the modem to function normally.

- Auto-configuration will also disable the internal floppy disk controller if an expansion bus controller is fitted.

4.2 PC5286 Programs and Utilities

You can modify some features, on a temporary basis, using the SPEED, DISPLAY SCATEMM.SYS and MOUSE programs. Some features may be modified on a permanent basis using the SETUP utility: some changes to the hardware must be recorded using SETUP. An outline of each of the above programs is as follows:

- SPEED   controls the speed of the processor.

- DISPLAY   controls the mode of the display adaptor to accommodate the requirements of your programs.

- SCATEMM.SYS   is a device driver which provides expanded memory by using the special Amstrad EMS hardware.

- MOUSE   is used to change the horizontal and vertical sensitivity of the mouse; to set the Bus (InPort) interrupt rate and redirect the mouse driver to a particular I/O port.

- SETUP   is used to record, in the CMOS RAM, the type of video adaptor fitted; the type of floppy disk drive(s) fitted; the type number of the hard disk; the base I/O address for the expanded memory control register and the PC memory configuration.

These commands are described in detail in the following pages.

The SPEED command - PC5286

Use the SPEED command to change the speed of your PC's processor: PC5286 has a maximum speed of 16MHz and can be reduced to 8MHz, 4MHz or 2MHz.

You may want to change the processor speed because you wish to use a program which does not run properly at high speed, such as games software, for example.

Form **SPEED** [16| 8| 4| 2| ?]

where:

16 - changes the speed of the processor to 16MHz, from a slower speed

8 - changes the speed of the processor to 8MHz

4 - changes the speed of the processor to 4MHz

2 - changes the speed of the processor to 2MHz

If you enter the command, **SPEED ?**, the current speed of the processor will be displayed.

If you enter a wrong parameter, or no parameters, the SPEED command will respond with a message which tells you what the correct options are. The message will begin with the word "**Usage...**".

The DISPLAY command - PC5286

Use this command if you wish to use software that assumes an EGA, MDA/Hercules, or CGA card is fitted.

Use the following form to set the six internal display adaptor options:

Form DISPLAY V|E|M|C| H| F

The DISPLAY command options select the following display adaptor modes

V	sets VGA (Video Graphics Adaptor) emulation mode
E	sets EGA (Enhanced Graphics Adaptor) emulation mode
M	sets MDA (Monochrome Display Adaptor) emulation mode
C	sets CGA (Colour Graphics Adaptor) emulation mode
H	sets Hercules HALF mode
F	sets Hercules FULL mode

When you enter a parameter that DISPLAY does not understand as an option, or you enter DISPLAY with no parameters you will receive a prompt like the following:

Usage: DISPLAY [V|E|M|C| H|F]

See Chapter 6 for an explanation of the use of software with video adaptors.

Example

If you have a colour VGA monitor and want to use some software that requires a monochrome configuration, use the following command line

DISPLAY M

DEVICE=SCATEMM.SYS - Expanded memory device driver - PC5286

SCATEMM.SYS is an installable device driver which provides support for LIM (Lotus/Intel/Microsoft) Expanded Memory.

Before you use SCATEMM.SYS, you should run the SETUP utility to see whether there is enough memory allocated as expanded memory for your needs, and adjust it if necessary. SETUP is described in Chapter 4.

You can make MS-DOS load this device driver automatically, every time you switch on your PC, by including the following line in your CONFIG.SYS file:

DEVICE=SCATEMM.SYS

you can use any text editor to edit the CONFIG.SYS file. RPED is a simple screen editor that can be used for this purpose. It is described in Part 2 of this manual.

You may well find the **DEVICE=SCATEMM.SYS** command, without options, is sufficient for your use of expanded memory. However, there are a number of options available which allow you to specify the exact requirements of expanded memory, that your application programs may need to work.

Form

DEVICE = *d:[path]***SCATEMM.SYS** [*options*]

where:

d:[path]   represent the location of the driver - you must replace *d:[path]* with the appropriate drive letter and path. See Part two if you do not understand how to use command placeholders.

options   can be replaced with one or more of the options listed below, if required. It is possible to use the first two characters of an option, rather than the whole option name, for example, FR instead of FRAME. Options should be separated by one or more spaces. Spaces are optional before and after the "-" and "=" characters. The options are as follows:

FRAME = *aaaa*   - specifies the page frame address, that is, the address through which expanded memory is mapped. aaaa must be either D000 or E000. Specifying FRAME will override the automatic choice of page frame by the driver.

EXCLUDE = *xxxx* [- *cccc*]   - specifies an area of memory which should not be under the control of the SCATEMM.SYS driver. *xxxx* and *cccc* specify the address or range of addresses of memory to be excluded and should be in multiples of 16K, that is, ending in 00). EXCLUDE may be used several times on the driver command line to exclude multiple blocks of memory, though at least 64K of memory should remain above 640K (A000). The driver will find all RAM/ROM in the range and will adjust for them.

INCLUDE = *xxxx* [- *cccc*]   - specifies memory to be included under the control of the SCATEMM.SYS driver. *xxxx* and *cccc* specify the address or range of addresses of memory to be included and should be in multiples of 16K, that is, ending in 00). INCLUDE may be used several times on the driver command line to include multiple blocks of memory, though at least 64K of memory should remain above 640K (A000). The driver will find all RAM/ROM in the range and will adjust for them.

HANDLES = *hhh*   -specifies the number of handles and names available. *hhh* must be in the range of **16** to **255**. The default value is 64.

IOADDR = *aaa*   Overrides the default base I/O address at which EMS hardware should be configured. *aaa* must be either **208** or **218**.

DIAGS = *xxx*   - specifies whether EMS memory diagnostics are performed during initialisation of the driver. *xxx* must be **ON** or **OFF**. The default setting is **OFF**.

Notes:

LIM Expanded memory needs a 'window' of at least 1000 hex (64K) through which it locates a Page Frame. SCATEMM.SYS sets the Page Frame address to D000 by default, thus filling the memory area to DFFF. If you suspect a conflict with an expansion card, or require a Page Frame greater than 64K then the Page Frame address must be manually adjusted using the Frame option, taking care to select a contiguously available 'window' into which the required size of Page Frame is to be located. The area above F000 is not available. There may be occasions when there will not be sufficient address space for the Page Frame. See the address map of your PC in Chapter 8.

• You should be sure that SCATEMM.SYS is installed before any other device drivers (such as RAMDRIVE /A or SMARTDRV /A) that require LIM Expanded Memory.

Error messages

Initialization error. Memory Manager not installed

This is a generic error message that is accompanied by another error message. This means that the EMM driver could not be installed correctly, because of the reason indicated by the accompanying message.

Cannot detect mapping hardware

The EMM driver could not find the correct EMS hardware in the system. Make sure that there is at least one contiguous 64K segment of unused memory space above 640K (A000).

Interrupt 67 Vector already allocated

Some other driver has already allocated the EMS interrupt vector. Remove all other EMS drivers from your CONFIG.SYS file.

I/O address specified is not one of the permitted values

The EMS mapper I/O address you indicated, using the IOADDR command line option, is an invalid address. Make sure that it is either **208** or **218**.

An equals (=) sign was expected

One of your SCATEMM.SYS command line options was not immediately followed by an equals (=) sign. Check your CONFIG.SYS file to make sure the SCATEMM.SYS command line is formatted correctly.

Invalid HEX number or not divisible by 16

One of your INCLUDE or EXCLUDE.xxxx command line arguments is incorrect. Each xxxx argument for these options must be divisible by 16 (ending in 00).

Number of handles invalid or out of range

The value you specified for the HANDLES command line option is invalid. Make sure it is a decimal number between 16 and 255.

Invalid Page Frame Address

The page frame address you specified is invalid. The page frame must start at either D000 or E000.

No working memory can be found. EMM aborted

The driver cannot find any memory set aside as expanded memory. Run the SETUP utility, described in Chapter 4, and allocate sufficient memory as expanded memory.

Unrecognized command/option in command line

The string displayed after this error message was found to be invalid. Edit your CONFIG.SYS file and correct the invalid option.

End address is less than starting address
One of the *cccc* addresses specified for either the INCLUDE or EXCLUDE options is less than *xxxx* value for that option.

The command line is incomplete
The options on the SCATEMM.SYS command line are incomplete. Make sure that all command line options are correctly formatted.

Problems encountered in setting default page frame address
The default page frame address found in your system CMOS is invalid. This is not a fatal error, if this occurs the driver will use the default base address. Run the SETUP utility and make sure your EMS base address is valid.

Decimal number input overflow error
The number of handles specified is an invalid number. Edit your CONFIG.SYS file and make sure that the parameter or handles is correctly formatted.

Error EMS I/O not enabled
EMS has not been enabled. Run your SETUP utility and make sure that EMS has been enabled.

The EMS hardware is disabled or not functional
This is a generic error message that is accompanied by another error message. This means that the EMS hardware is not operating properly because of the reason indicated by the accompanying error message.

The MOUSE command - PC5286

The MOUSE command is included in your AUTOEXEC.BAT file, which means the mouse driver software is loaded automatically, when you switch on your PC.

However, there are some options with this command which can be used to specify the following:

- sensitivity of the mouse

- set the interrupt rate for the Bus (Inport device) interface only

- tell the mouse driver to look for a particular type of Microsoft Mouse at a particular I/O port.

These options can be included in the MOUSE command line in your AUTOEXEC.BAT file or you can issue the MOUSE command, and the options you require, at the MS-DOS prompt.

- **To set the sensitivity of the mouse**

Form

MOUSE [/Sn] [/Hn] [/Vn]

where

/S - sets horizontal and vertical sensitivity

/H - sets horizontal sensitivity only

/V - sets vertical sensitivity only

n - is a number in the range 5 - 100 in increments of 5.

Example

To set the horizontal and vertical sensitivities to 75, at the system prompt, you should type:

MOUSE /S75

- **Set the interrupt rate for the Bus (Inport device) interface only:**

  This option is useful only if you buy a Bus mouse to work with your PC. It does not apply to the supplied Amstrad MS-2 mouse.

Form

MOUSE /Rn

where n is:

1   which sets the interrupt rate to 30Hz

2   which sets the interrupt rate to 50Hz

3   which sets the interrupt rate to 100Hz

4   which sets the interrupt rate to 200Hz

The default setting is 1, 30Hz.

Example If you want to set the horizontal sensitivity level of 45 and the interrupt rate to 50Hz for an Inport mouse, you should type:

MOUSE /H45 /R2

- **Mouse hardware configuration options**

  You can use the following options to tell the mouse driver to bypass its usual automatic search to determine the mouse hardware configuration and to look for a particular type of Microsoft Mouse, Bus or Serial, at a particular I/O port. This option is useful only if you buy a Bus mouse or a Serial mouse to work with your PC. It does not apply to the supplied Amstrad MS-2 mouse.

Form

MOUSE [/I1] [/I2] [/C1] [/C2]

where:

/I1   the mouse is connected to primary InPort address

/I2   indicates that the mouse is connected to the secondary InPort address

/C1   indicates that the mouse is connected to serial port 1 (COM1)

/C2   indicates that the mouse is connected to serial port 2 (COM2)

Example If you buy a serial mouse and want to use this mouse driver, you could specify that the mouse serial interface cable is connected to COM2 by using the following command:

MOUSE /C2

The SETUP utility - PC5286

Your PC contains a clock which will remember the date and time while the machine is switched off, so that you do not have to enter this information each time you switch on your PC.

The clock is powered by a small, rechargeable battery in the system unit which maintains the setting even when the main power supply is turned off. If the PC is left switched off for an extended period of 2 months or more, the battery may become discharged. In this case, you should leave the PC on for a few hours to recharge.

In addition to recording the date and time, the clock chip is also used to store information which defines your PC's configuration. This information is read when the machine is first switched on. The memory within the chip which stores this information is called "CMOS RAM". It is sometimes referred to as just "NVR", "Non-Volatile RAM" or "battery-backed RAM".

The CMOS RAM records the type of video adaptor fitted; the type of floppy disk drive(s) fitted and, very importantly, the type number of the hard disk. It also records the base I/O address for the expanded memory control register.

The information held in the CMOS RAM also includes the PC memory configuration: that is, how much Base, Extended and Expanded memory is in the computer. See Chapters 1 and 8 for information about the PC's memory.

An explanation of these various options is given below.

The BIOS ROMs within the PC contain a SETUP utility which can be used to display and change the values held in the computer's CMOS RAM. These values will define the PC's configuration when it is next switched on. The utility can also detect some changes to the hardware and record them, if required. This feature is described below, as "Auto-configuration".

There are two ways to start the SETUP utility:

- by typing the command DOSETUP at the DOS prompt

and

- during the power-on self-tests, which start when the PC is switched on. While the self-tests are taking place, messages similar to the following will appear on the screen:

Amstrad PC5286 - BIOS VERSION AM52 v.xxx

0640K BASE RAM passed

384K Extended RAM passed

To configure the system with SETUP, press CTRL-ALT-S now

During this power-up process, the computer checks its internal memory and then the screen, with the above messages, appears for about 10 seconds. SETUP must be started during these ten seconds. So, while the above messages are on the screen, press CTRL-ALT-S to start SETUP. CTRL-ALT-S means hold down the [Ctrl] and [Alt] keys and press the [S] key.

The screen should then display a report something like this:

```
┌──────────────────────────────────────────────────────────────────────┐
│              AMSTRAD PC5286 System Configuration Utility               │
├──────────────────────────────────────────────────────────────────────┤
│ Time:                 09:00:00                                         │
│ Date:                 Jan 01, 1991                                     │
│                                                                        │
│ Diskette A:           3.5 Inch, 1.44 MB                                │
│ Diskette B:           Not Fitted                                       │
│                                                                        │
│ Fixed Disk C:         Not Fitted        Cyl   Hd   Pre  LZ   Sec  Size │
│ Fixed Disk D:         Not Fitted                                       │
│                                                                        │
│ Base Memory:          640 KB                                           │
│ 384K Relocation:      Enabled                                          │
│ Extended Memory:      0 KB                                             │
│                                         Maximum available:    384 KB   │
│ EMS I/O Address:      208h/209h                                        │
│ NumLock:              On                                               │
│ Display:              EGA or VGA                                       │
├──────────────────────────────────────────────────────────────────────┤
│ Select the type of the first diskette drive (Drive A)                  │
├──────────────────────────────────────────────────────────────────────┤
│ ↑↓←→ to select entries                      + and - to change an entry │
│ ESC to exit without saving                  F10 to save then exit      │
└──────────────────────────────────────────────────────────────────────┘
```

The above report indicates:

- 640K of memory is allocated to Base and none as Extended. All remaining on-board RAM is available for use as LIM Expanded Memory.

- the built-in VGA adaptor is the primary display.

- there is a single 1.44Mb floppy disk drive.

- there are no hard disk drives fitted.

If the information in the CMOS RAM is invalid in some way, either because it has never been set or because a new clock chip and battery has been fitted, you must ensure that all the information held in the CMOS RAM is reset correctly to configure the machine in the way that you normally use it.

You must also update the information if you change the system configuration, for example, by replacing the built-in video adaptor with an alternative one fitted in an expansion slot.

The following defaults will be assumed until the CMOS RAM is set up:

- Time and Date set on the internal clock: starting from 0:00, January 1, 1991

- Floppy Disk Drive A: 3.5 Inch, 1.44MB

- Floppy Disk Drive B: Not Fitted

- Hard Disk Drive C: Not fitted

- Hard Disk Drive D: Not fitted

- Base Memory: 640K

- 384K Relocation: Enabled

- Extended Memory: 0KB (Thus all of the remaining PagePool is available for use as LIM Expanded Memory)

- EMS I/O Address: 208h/209h

- Numlock: On

- Primary display: VGA/EGA (that is, the built-in VGA adaptor)

Each of these options is described below.

Note: Certain values may have already been set in your CMOS RAM.

To change any of the parameters, position the cursor over the required entry, using the cursor keys, then press the [+] or [-] key until the required value is displayed. When you have finished, press either the [ESC] key to abandon the changes or the [F10] key to confirm your choices and to reset your PC. The PC has to be reset at this point so that MS-DOS can incorporate the changes.

You should set up the Extended Memory as recommended in Section 1.3. Base memory will always be 640K. The amount of Extended Memory to be set is determined by the amount of RAM in the PC:

1Mb PC can be set to 0K, 256K or 384K of Extended memory

PCs with more than 1Mb or RAM can set 0K, 256K, 512K, 1Mb or any greater amount of Extended memory in 1Mb increments.

Details on the options which may be changed using SETUP are :

BASE memory	This is the amount of memory available for DOS to occupy. This setting is for information only and cannot be changed.
384K Relocation	If the system has exactly 1024K (1M) of memory, and the user does not wish to use the Shadow RAM feature, then that region (640K - 1M) can be remapped so that it appears as 384K of extended memory, starting at address 10000h
EXTENDED Memory	Once the base and shadow memory have been allocated, any memory that remains may be used for one of two purposes. You may either use this option to assign some, or all, of it to be used as Extended memory which may be used for such things as RAMDRIVE.SYS, SMARTDRV.SYS. Any memory not assigned to either BASE or EXTENDED memory will be left available as EXPANDED memory if the SCATEMM.SYS driver is used in your CONFIG.SYS file. A full description of these various types of memory is given in Chapter 8. SCATEMM.SYS is described earlier in Chapter 4.

Drive C:

The correct hard disk type number should be entered here. If it is not already set, or is set incorrectly, you should find the correct number marked on the back panel of the system unit. If it is not marked, consult your dealer for advice. The hard disk will be partially, or completely, inaccessible if the incorrect type number is selected. However, if the disk was already loaded with software, that software will be available after the correct type has been selected and the PC has been reset.

When the hard disk drive type number is set incorrectly, the system may behave as though there is no disk fitted in the PC. This is a common cause of confusion when using hard disk drive PCs, as a message will be displayed asking for a system disk to be inserted into drive A:, when you know that a hard disk is fitted.

If you select one of the standard drive types, the parameters will be set automatically. However, if you want to install a hard disk drive that requires parameters to be entered which are not accommodated by any of the standard types, you can enter your own drive parameters by specifying **Type 48** or **Type 49** . An option box will be displayed which asks for the values of these parameters:

CYLS - the number of cylinders

Hd - the number of heads

Pre - the Write Precompensation starting cylinder number

LZ - the landing zone cylinder number

Sec - the number of sectors per track

Size - the size of the disk in megabytes

Notes:
- Cylinder numbers start at 0.
- Entering the wrong parameters will, at least, prevent the drive from working, but may even damage the drive. Therefore, only use **Type 48** and **Type 49** if you are fully conversant with the operation of hard disk drives.

EMS Base I/O Address   The operation of LIM EMS Expanded memory requires access to pages of RAM through a small "window" in the PC's address map. Blocks of Expanded memory are switched, to appear through the window, by sending control commands to an EMS I/O address. By default this address is chosen to be 208h on your PC but if you find this clashes with other hardware (other EMS cards for example) you may change this setting to one of the other possible addresses.

Display   Normally, you will want the PC to use its built-in VGA/EGA adaptor to display text and graphics when it is first switched on. However, if you fit a CGA or monochrome adaptor card in the expansion bus and disable the on-board video adaptor using the option links, you will then need to instruct the system to use the new type of adaptor as the primary display.

Note The time and date can also be set with the MS-DOS TIME and DATE commands. (See Part 2, Chapter 8).

You should also set up the Extended Memory size as recommended in Section 1.3.

Press the [F10] key and the PC will reset, in order to make use of the new configuration.

Auto-configuration

The power-on self-tests have a facility which detects and records the presence of some external peripherals on the expansion bus.

In addition, this facility can also re-map the PCs own internal peripherals around the external peripherals to prevent any conflict in the configuration. For example, if an external COM1 (serial) port is plugged onto the expansion bus, the external COM1 port will be detected and the internal port will be reconfigured. In this case, you would receive the following message during the start-up procedure:

External COM port detected, internal port configured as COM2
Press F1 to confirm

The second part of the message, **Press F1 to confirm**, will disappear after eight seconds.

If you press the [F1] key, to accept this configuration, before the second part of the message disappears, another message will be displayed to tell you that your confirmation is acknowledged:

New configuration confirmed

The change in the configuration will be recorded and you will not be asked to confirm this configuration next time you switch on the PC.

However, if you do not press the [F1] key to accept this configuration, and the message, **Press F1 to confirm**, disappears after eight seconds, the change in the configuration will not have been recorded and when you switch on the PC on susbsequent occasions, you will receive the following message, until it is confirmed:

External COM port detected, internal port configured as COM2
Press F1 to confirm

If you do confirm a new configuration, and then change the configuration again, another message will appear during the start-up procedure. For example, if the external COM1 (serial) port, described earlier, is removed, the following message will appear:

External COM port removed or changed, internal port configured as COM1
Press F1 to confirm

Once again you will have eight seconds to confirm this change. before the message **Press F1 to confirm** disappears. If you do confirm it, the change will be recorded and the message will not appear when you next switch on the PC. If you do not confirm the change. the message will reappear every time you switch on the PC, until you confirm the change in configuration.

Notes

- This auto-configuration applies to serial (COM) ports and parallel (LPT) ports.

- If you do not press [F1] to confirm the changed configuration, the change will still be implemented. The confirmation is simply to ensure that you are aware of the change in the internal configuration which is accomodating the expansion cards.

- If you plug in an external COM2 (serial) port, none of the above messages will be produced, as no internal peripherals will need to be remapped to accomodate it.

- It is important to understand that if you have, for example, a modem connected to the serial connector on the back of the machine and you insert an external COM1 (serial) port. the modem can no longer be addressed via COM1 through the internal machine port. This is because the internal port has been remapped to COM2, so the modem would be addressed as COM2.

  Alternatively, if you move the modem serial cable from the PC's serial port to the new COM1 serial port connector card, this would allow the modem to function normally.

  Auto-configuration will also disable the internal floppy disk controller if an expansion bus controller is fitted.

4.3 The AUTOEXEC.BAT File

When MS-DOS is first loaded into your PC, it looks for a text file called "AUTOEXEC.BAT". MS-DOS expects this file to contain a sequence of commands which it should read as its first operational instructions.

Any of the MS-DOS commands described in Part 2 may be included in this file. Chapter 4, in Part 2, describes many of the useful options. You could also include the commands necessary to run your favourite application program so that they are automatically loaded every time MS-DOS is loaded into your PC.

Normally, AUTOEXEC.BAT would at least contain the necessary KEYB command to instruct MS-DOS as to which type of keyboard is being used. It will, therefore, know which characters are represented by which keys.

The contents of the AUTOEXEC.BAT file will be similar to the following list of commands:

```
@ECHO OFF
PATH C:\DOS;C:\
KEYB UK 437 C:\DOS\KEYBOARD.SYS
PROMPT $P$G
CLS
VER
```

The Install program, SELECT, is often supplied with MS-DOS 3.3 but it is not supplied with your PC. To change the installation, edit the AUTOEXEC.BAT and CONFIG.SYS files.

Changes to this file can be made with any text editor. The simple screen editor RPED is ideal for the purpose. See Part 2 for instructions on how to use RPED.

4.4 The CONFIG.SYS file

As MS-DOS loads from disk into your PC, it examines a text file on the disk called "CONFIG.SYS". There are several special commands, summarised below and explained in detail in Part 2 Chapter 8, that can appear in this file. These commands instruct MS-DOS to change certain default options for things like the letter used for the last drive or how much space it should reserve for buffering information from disk.

Command	Description
BREAK=	Extended BREAK checking [Ctrl][C] and [Ctrl][Break]
BUFFERS=	Number of sector buffers.
COUNTRY=	Country Specific parameter selection.
DEVICE=	Device driver installations.
DRIVPARM=	Override the drive parameters for a logical drive.
FCBS=	Maximum number of file control blocks available concurrently.
FILES=	Maximum number of file handles open concurrently.
LASTDRIVE=	Maximum drive letter allowable.
SHELL=	Top level command processor specification.
STACKS=	Override the default DOS stack resources.

The CONFIG.SYS file can be created/edited with any text editor and the simple screen editor RPED is ideal for this purpose. RPED is described in Part 2 of this manual.

The CONFIG.SYS file contains a list of commands similar to the following:

```
COUNTRY=044,437,C:\DOS\COUNTRY.SYS
FILES=20
BUFFERS=20
```

The commands contained in the supplied files are chosen, simply, to provide a configuration that is a compromise between memory usage and functionality which most people should find suitable. None of the commands in either the CONFIG.SYS file or the AUTOEXEC.BAT file is absolutely necessary, and there are many other commands that could also be used.

However, if the system is not tailored at all, performance can be impaired.

Changes to this file can be made with any text editor. The simple screen editor RPED is ideal for the purpose. See Part 2 for instructions on how to use RPED.

5. The Keyboard

5.1 The keyboard switch

At the back of your keyboard there is a switch labelled **XT** and **AT**. It is used to set the correct style of keyboard for your PC:

- if you have a PC5086, make sure the switch is set to **XT**

- if you have a PC5286, make sure the switch is set to **AT**

If the switch is not set correctly, the PC will not respond to keystrokes and the message, "**Keyboard Error**", will be produced when the PC is switched on.

5.2 Functions of the keys

The keyboard is used to enter two types of information into your PC: data which is to be stored and manipulated, for example letters, reports and accounts; and instructions which tell the computer how to process the data, for example, MS-DOS command lines. Both types of information require the use of character keys and numeric keys.

Character keys	In the centre of the keyboard, the character keys are organised in the QWERTY layout, that is, the most usual typewriter layout. Press to enter lower case characters (a - z) and the character on the lower half of the key, where there are two. Use the shift key [⇧] to enter upper case characters (A - Z) or the character on the upper half of the key.
[Caps Lock]	A toggle-switch key. Press once to produce upper case letters with the character keys; press once again to return to producing lower case letters with the character keys.
[⇧]	Hold down whilst pressing character keys, A - Z, to produce upper case letters; hold down whilst pressing [Alt] or [Ctrl] to give special characters or computer codes.

4.4 The CONFIG.SYS file

As MS-DOS loads from disk into your PC, it examines a text file on the disk called "CONFIG.SYS". There are several special commands, summarised below and explained in detail in Part 2 Chapter 8, that can appear in this file. These commands instruct MS-DOS to change certain default options for things like the letter used for the last drive or how much space it should reserve for buffering information from disk.

Command	Description
BREAK=	Extended BREAK checking [Ctrl][C] and [Ctrl][Break]
BUFFERS=	Number of sector buffers.
COUNTRY=	Country Specific parameter selection.
DEVICE=	Device driver installations.
DRIVPARM=	Override the drive parameters for a logical drive.
FCBS=	Maximum number of file control blocks available concurrently.
FILES=	Maximum number of file handles open concurrently.
LASTDRIVE=	Maximum drive letter allowable.
SHELL=	Top level command processor specification.
STACKS=	Override the default DOS stack resources.

The CONFIG.SYS file can be created/edited with any text editor and the simple screen editor RPED is ideal for this purpose. RPED is described in Part 2 of this manual.

The CONFIG.SYS file contains a list of commands similar to the following:

```
COUNTRY=044,437,C:\DOS\COUNTRY.SYS
FILES=20
BUFFERS=20
```

The commands contained in the supplied files are chosen, simply, to provide a configuration that is a compromise between memory usage and functionality which most people should find suitable. None of the commands in either the CONFIG.SYS file or the AUTOEXEC.BAT file is absolutely necessary, and there are many other commands that could also be used.

However, if the system is not tailored at all, performance can be impaired.

Changes to this file can be made with any text editor. The simple screen editor RPED is ideal for the purpose. See Part 2 for instructions on how to use RPED.

5. The Keyboard

5.1 The keyboard switch

At the back of your keyboard there is a switch labelled **XT** and **AT**. It is used to set the correct style of keyboard for your PC:

- if you have a PC5086, make sure the switch is set to **XT**

- if you have a PC5286, make sure the switch is set to **AT**

If the switch is not set correctly, the PC will not respond to keystrokes and the message, "**Keyboard Error**", will be produced when the PC is switched on.

5.2 Functions of the keys

The keyboard is used to enter two types of information into your PC: data which is to be stored and manipulated, for example letters, reports and accounts; and instructions which tell the computer how to process the data, for example, MS-DOS command lines. Both types of information require the use of character keys and numeric keys.

Character keys	In the centre of the keyboard, the character keys are organised in the QWERTY layout, that is, the most usual typewriter layout. Press to enter lower case characters (a - z) and the character on the lower half of the key, where there are two. Use the shift key [⇑] to enter upper case characters (A - Z) or the character on the upper half of the key.
[Caps Lock]	A toggle-switch key. Press once to produce upper case letters with the character keys; press once again to return to producing lower case letters with the character keys.
[⇑]	Hold down whilst pressing character keys, A - Z, to produce upper case letters; hold down whilst pressing [Alt] or [Ctrl] to give special characters or computer codes.

[Ctrl] [Alt]	"Ctrl" stands for Control; "Alt" stands for Alternative. Hold down whilst pressing other keys to give special characters or special computer codes.
[Alt gr]	Press this key together with the first key on the second row of the keyboard, to produce a vertical bar symbol.
Space bar	Enters a space character.
[Num Lock]	A toggle-switch key. Press this key once to switch to and from using the [Home] [End] [Pg Up] [Pg Dn] and the cursor keys, to using the numbers on the numeric keypad.
[Home][End] [Page Up] [Page Down]	These keys are used by text editing programs to move the cursor to the beginning of a document, the end of a document, one page further up in the document, and one page further down.
[↑] [←] [→] [↓] Cursor keys	Pressing these four keys moves the cursor on the screen in the direction shown by the arrow. Note that there are two sets of cursor keys on the keyboard: one set is on the numerical keypad and is disabled when [Num Lock] is pressed. The second set, to the left of the numerical keypad, can be used at all times.
[←]	This key deletes the character to the left of the cursor.
[Del]	Deletes the character under/to the right of the cursor. It is also used with [Ctrl] and [Alt] to reset the PC.
[Insert]	A toggle-switch key. Press once to switch to overwriting existing text. Press again to return to inserting text.
[Scroll lock]	This key is for use with word processors. It enables the cursor keys to move the text on the screen behind the cursor, rather than move the cursor over the text. With some programs it has no effect.
[Break]	Use with the [Ctrl] key to abandon the program that is currently being run. Note that [Break] will sometimes abort everything you are using, and with some programs, will not work at all.

Esc]	Esc stands for escape. Whilst using programs, you can often press the [Esc] key to return to the previous level of the program, and eventually to exit the program.
[Pause]	Pressing [Pause] once will stop the program you are using. Pressing any other key will allow the program to continue.
[Print Screen]	Use this key to print out an image of the screen on your printer. It must not be pressed if there is not a printer connected to your PC.
[Sys Rq]	Use this key by holding down [Alt] and pressing [Print Screen]. The key may be used by an operating system to switch back to command level.
Function keys [F1] [F2] etc.	These keys are defined with specific actions for individual programs. That is, each operating system and each application program will assign specific functions to each key. It is unlikely that these functions will be the same from program to program, though [F1] is often used to access a program's help function.
[→l]	The Tab key moves the cursor to the next Tab stop, inserting spaces as necessary.
[⏎]	Pressing the Return key has two effects. One places the cursor on a new line, like the carriage return key of a typewriter; the other enters information you have just typed, sending an instruction to your computer. The effect this key has, depends on the context in which it is used: if you press this key whilst typing a letter, using a word processor, the cursor will simply move to the beginning of the next line; if you type an MS-DOS command line for example, you must then press the [⏎] key to make MS-DOS read the instruction you have typed.
[Enter]	The Enter key functions in the same ways as the [⏎] key; when using the numeric keypad, it is easier to use than the [⏎]. Note that some programs give this key and the [⏎] key separate functions.
[-]	Grey minus key - used to produce a minus sign character. In some software it will subtract figures.
[+]	Grey plus key - used to produce a plus sign character. In some software it will add figures together.

Notes on using the keyboard

• The number 0, on the top row of the keyboard between 9 and -, is not interchangeable with the letter O between the characters P and I, even though these characters look the same.

• Not all programs use the keys in the same way. For example, [←] sometimes just moves the cursor back one position; [Del] sometimes deletes the character under/to the right of the cursor. With some programs, the cursor keys and the [Home] [End] [Page Up] [Page Down] [→|] [Ins] and [Break] keys may have no effect.

• The numeric keypad, which is enabled by pressing the [Num Lock] key, has a similar layout to an adding machine, with numeric keys, [+] and [-] keys and an [Enter] key. It is therefore useful for fast entry of figures.

• The cursor keys were added to the keyboard when the need for them became apparent. Before then, an application program would control the cursor's movements by the use of, for example, the [Ctrl] key with the [E] [S] [D] [X] keys. The positions of these keys on the keyboard indicates the direction the cursor should move:

$$E$$
$$S \qquad D$$
$$X$$

To move the cursor further in these directions the following keys were used:

$$R$$
$$A \qquad F$$
$$C$$

Combinations of keys

Combinations of keys are used to provide many extra functions. The [Ctrl] and [Alt] keys can be pressed together with a character key or a function key for different functions. So, although your keyboard has 102 keys, it is able to effect more than 102 functions through various combined keystrokes. Operating systems and application programs all assign different functions to these combined keystrokes: the meaning can change from program to program.

However, some programs will use keystrokes that are used by other programs, so it is useful to be aware of patterns in key usage. You may find mnemonical uses of keys, that some keys are relevant in some way to the functions, for example pressing the [B] key for a backwards movement.

Your keyboard can also produce more characters than those marked on the keys. Although the keyboard appears to offer 72 characters, as on a usual QWERTY keyboard, it can actually produce 256 characters, that is, 184 more than are marked on the keyboard. The following table shows all the characters that can be produced, using the United States code page. (This is the default setting for your keyboard). For an explanation of code pages and how to use them, see Part 2, Section 4.4.

The table on the following page shows all the characters available on your PC (unless you have switched to a different code page). A number of the characters are directly available by pressing the appropriate key on the keyboard. For those characters that are not on the keyboard you may type them in as follows: hold down the [Alt] key and at the same time, using the numeric keypad, type the number of the character that you require. When you release the [Alt] key the chosen character should appear. You can work out the number for the character you wish to type by adding together the decimal row and column numbers shown in the following table.

Table of all characters

Hex Digits	0-	1-	2-	3-	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0			(space)	0	@	P	`	p	Ç	É	á	░	└	╨	α	≡
-1	☺	►	!	1	A	Q	a	q	ü	æ	í	▒	┴	╤	ß	±
-2	☻	◄	"	2	B	R	b	r	é	Æ	ó	▓	┬	╥	Γ	≥
-3	♥	↕	#	3	C	S	c	s	â	ô	ú	│	├	╙	π	≤
-4	♦	‼	$	4	D	T	d	t	ä	ö	ñ	┤	─	╘	Σ	⌠
-5	♣	¶	%	5	E	U	e	u	à	ò	Ñ	╡	┼	╒	σ	⌡
-6	♠	§	&	6	F	V	f	v	å	û	ª	╢	╞	╓	µ	÷
-7	•	▬	'	7	G	W	g	w	ç	ù	º	╖	╟	╫	τ	≈
-8	◘	↨	(	8	H	X	h	x	ê	ÿ	¿	╕	╚	╪	Φ	°
-9	○	↑	)	9	I	Y	i	y	ë	Ö	⌐	╣	╔	┘	Θ	∙
-A	◙	↓	*	:	J	Z	j	z	è	Ü	¬	║	╩	┌	Ω	·
-B	♂	→	+	;	K	[	k	{	ï	¢	½	╗	╦	█	δ	√
-C	♀	←	,	<	L	\	l			î	£	¼	╝	╠	▄	∞	ⁿ
-D	♪	∟	-	=	M	]	m	}	ì	¥	¡	╜	═	▌	φ	²
-E	♫	▲	.	>	N	^	n	~	Ä	₧	«	╛	╬	▐	ε	■
-F	☼	▼	/	?	O	_	o	⌂	Å	ƒ	»	┐	╧	▀	∩	

| DEC | 0 | 16 | 32 | 48 | 64 | 80 | 96 | 112 | 128 | 144 | 160 | 176 | 192 | 208 | 224 | 240 |

Character sets

You can use combinations of keys to produce single characters because the computer differentiates between characters by giving them each a numerical value: each character has a numerical value to represent it, even though it may have been input/produced using more than one key.

The value which represents each character is different for each set of characters. A character set contains 256 characters with values appropriate to that particular set.

The internal code is always written either as a Decimal number or as a Hexadecimal number (numbers to the base 16).

ASCII - American Standard Code for Information Interchange

ASCII is the name of a common character set that has been used for many computers.

The numerical values assigned to the 128 characters in the first half of each code page (see Part 2, Section 4.4) are the same as those in the ASCII character set. The full 256 characters in code page 437 is sometimes referred to as the 8-bit ASCII table.

ASCII Table

DEC	Hex Digits	0-	1-	2-	3-	4-	5-	6-	7=
		16	**32**	**48**	**64**	**80**	**96**	**112**	
0	- 0	NUL	DLE		0	@	P		p
1	- 1	SOH	DC1	!	1	A	Q	a	q
2	- 2	STX	DC2	"	2	B	R	b	r
3	- 3	ETX	DC3	#	3	C	S	c	\
4	- 4	EOT	DC4	$	4	D	T	d	t
5	- 5	ENQ	NAK	%	5	E	U	e	u
6	- 6	ACK	SYN	&	6	F	V	f	v
7	- 7	BEL	ETB	'	7	G	W	g	w
8	- 8	BS	CAN	(	8	H	X	h	x
9	- 9	HT	EM	)	9	I	Y	i	y
10	- A	LF	SUB	*	:	J	Z	j	z
11	- B	VT	ESC	+	;	K	[	k	{
12	- C	FF	FS	,	<	L	\	l		
13	- D	CR	GS	-	=	M	]	m	}
14	- E	SO	RS	.	>	N	^	n	~
15	- F	SI	US	/	?	O	_	o	△

The order of the first 128 characters is, therefore, the same order as character sets used on many other non-PC computers.

When data is read from a disk produced on, say, a CP/M machine, the characters 0..127 appear exactly right and thus allow data to be transferred from one machine to the other.

Note, however, that most computers have a character set consisting of 256 characters and the ASCII character set only sets a standard for the first 128 characters - so it is very unlikely that data from other computers, which contains characters with codes above 128, will make any sense on your PC.

5.3 Keycodes

The 8-bit keyboard data is capable of 128 'make' codes which correspond to 128 'break' codes. For any key that is pressed, the 'make' keycode produced is in the range of 0 - 127 (decimal). When a key is released, the 'break' keycode produced is the same as the 'make' keycode except that the MS bit is set so that the value is in the range of 128 - 511 (decimal). A number of keys, such as the dedicated keypad keys, send an extended keycode sequence. This identifies them uniquely as dedicated keys, rather than the numeric keypad set. The typical extended keycode sequence consists of an extended keycode identifier, 224 (0E0h), followed by the keycode.

After a key is pressed and the keycode has been sent to the main board electronics, if no new keys are pressed and the key has remained pressed, then the keyboard microcontroller re-sends the keycode. The delay before repeating and the repeat rate are both programmable. The [Pause/Break] key does not repeat.

Keyboard Interrupt

The ROM BIOS Keyboard hardware interrupt reads a key code from the keyboard interface, translates it into a 16-bit key token using an internal translation table and puts this token into the key token buffer. If the buffer is full, the key token is discarded and a bleep is output on the speaker. The key tokenization for the most part consists of the high byte being the key number and the lower byte being the ASCII for the keycap. For those keys which have no ASCII equivalent, the token consists of a unique high byte value with the lower byte cleared. In the case of the new 101/102 key keyboard there are quite a few extra keys. There are extra [ALT] and [CTRL] keys as well as a dedicated cursor keypad. These keys basically return exactly the same keycode as the originals except that preceding the keycode, an extra code is sent to signify that the key pressed is one of the new keys.

The table on the following pages shows the 16 bit keycodes produced by the various keys on the keyboard. This information should be useful to programmers using the ROM BIOS keyboard interrupt.

Key Code	Key Name	Normal	ALT	CTRL	SHIFT	Num Lock
01	ESC	011B	01F0	011B	011B	N/A
02	1 and !	0231	7800	Ignored	0221	N/A
03	2 and @	0332	7900	0300	0340	N/A
04	3 and #	0433	7A00	Ignored	0423	N/A
05	4 and S	0534	7B00	Ignored	0524	N/A
06	5 and %	0635	7C00	Ignored	0625	N/A
07	6 and ^	0736	7D00	071E	075E	N/A
08	7 and &	0837	7E00	Ignored	0826	N/A
09	8 and *	0938	7F00	Ignored	092A	N/A
0A	9 and (	0A39	8000	Ignored	0A28	N/A
0B	0 and)	0B30	8100	Ignored	0B29	N/A
0C	- and	0C2D	8200	0C1F	0C5F	N/A
0D	= and +	0D3D	8300	Ignored	0D2B	N/A
0E	←DEL	0E08	0EF0	0E7F	0E08	N/A
0F	TAB	0F09	A500	9400	0F00	N/A
10	Q	1071	1000	1011	1051	N/A
11	W	1177	1100	1117	1157	N/A
12	E	1265	1200	1205	1245	N/A
13	R	1372	1300	1312	1352	N/A
14	T	1474	1400	1414	1454	N/A
15	Y	1579	1500	1519	1559	N/A
16	U	1675	1600	1615	1655	N/A
17	I	1769	17000	1709	1749	N/A
18	O	186F	1800	180F	184F	N/A
19	P	1970	1900	1910	1950	N/A
1A	[and {	1A5B	1AF0	1A1B	1A7B	N/A
1B	] and }	1B5D	1BF0	1B1D	1B7D	N/A
1C	CR	1C0D	1CF0	1C0A	1C0D	N/A
1D	Ctrl	Ignored	Ignored	Ignored	Ignored	N/A
1E	A	1E61	1E00	1E01	1E41	N/A
1F	S	1F73	1F00	1F13	1F53	N/A
20	D	2064	2000	2004	2044	N/A
21	F	2166	2100	2106	2146	N/A
22	G	2267	2200	2207	2247	N/A

Key Code	Key Name	Normal	ALT	CTRL	SHIFT	Num Lock
23	H	2368	2300	2308	2348	N/A
24	J	246A	2400	240A	244A	N/A
25	K	256B	2500	250B	254B	N/A
26	L	266C	2600	260C	264C	N/A
27	; and :	273B	27F0	Ignored	273A	N/A
28	' and "	2827	28F0	Ignored	2822	N/A
29	# and ~	2960	29F0	Ignored	297E	N/A
2A	Left SHIFT	Ignored	Ignored	Ignored	Ignored	N/A
2B	\ and I	2B5C	2BF0	2B1C	2B7C	N/A
2C	Z	2C7A	2C00	2C1A	2C5A	N/A
2D	X	2D78	2D00	2D18	2D58	N/A
2E	C	2E63	2E00	2E03	2E43	N/A
2F	V	2F76	2F00	2F16	2F56	N/A
30	B	3062	3000	3002	3042	N/A
31	N	316E	3100	310E	314E	N/A
32	M	326D	3200	320D	324D	N/A
33		and <	332C	33F0	Ignored	333C
34	. and >	342E	34F0	Ignored	343E	N/A
35	/ and ?	352F	35F0	Ignored	353F	N/A
36	Right SHIFT	Ignored	Ignored	Ignored	Ignored	N/A
37	*	372A	37F0	9600	372A	N/A
38	Alt	Ignored	Ignored	Ignored	Ignored	N/A
39	SPACE	3920	3920	3920	3920	N/A
3A	Caps Lock	Ignored	Ignored	Ignored	Ignored	N/A
3B	F1	3B00	6800	5E00	5400	N/A
3C	F2	3C00	6900	5F00	5500	N/A
3D	F3	3D00	6A00	6000	5600	N/A
3E	F4	3E00	6B00	6100	5700	N/A
3F	F5	3F00	6C00	6200	5800	N/A
40	F6	4000	6D00	6300	5900	N/A
41	F7	4100	6E00	6400	5A00	N/A
42	F8	4200	6F00	6500	5B00	N/A
43	F9	4300	7000	6600	5C00	N/A
44	F10	4400	7100	6700	5D00	N/A

Key Code	Key Name	Normal	ALT	CTRL	SHIFT	Num Lock
45	Num Lock	Ignored	Ignored	PAUSE	Ignored	N/A
46	Scroll Lock	Ignored	Ignored	Ignored	Ignored	N/A
47	Key Pad 7	4700	Ignored	7700	NOTE 1	4737
48	Key Pad 8	4800	Ignored	8D00	NOTE 1	4838
49	Key Pad 9	4900	Ignored	8400	NOTE 1	4939
4A	Key Pad -	4A2D	Ignored	8E00	NOTE 1	4A2D
4B	Key Pad 4	4B00	Ignored	7300	NOTE 1	4B34
4C	Key Pad 5	Ignored	Ignored	8F00	NOTE 1	4C35
4D	Key Pad 6	4D00	Ignored	7400	NOTE 1	4D36
4E	Key Pad +	4E2B	Ignored	9000	NOTE 1	4E2B
4F	Key Pad 1	4F00	Ignored	7500	NOTE 1	4F31
50	Key Pad 2	5000	Ignored	9100	NOTE 1	5032
51	Key Pad 3	5100	Ignored	7600	NOTE 1	5133
52	Key Pad 0	5200	Ignored	9200	NOTE 1	5230
53	Key Pad .	5300	Ignored	9300	NOTE 1	532E
54	Alt PrtScr	Ignored	Sys Req	Ignored	Ignored	N/A
55	Undefined	Ignored	Ignored	Ignored	Ignored	Ignored
+56	\ and l	565C	Ignored	Ignored	567C	N/A
57	F11	8500	8B00	8900	8700	N/A
58	F12	8600	8C00	8A00	8800	N/A
59 - 7F	Undefined	Ignored	Ignored	Ignored	Ignored	Ignored

The numeric keypad will produce a different token depending on the states of [Numlock] and the [Shift] keys. With [Numlock] on and [Shift] down, the num lock function is cancelled and the Normal column tokens are produced. With [Numlock] off and [Shift] down the tokens in the Num lock column are produced.

Keycode 56 (marked with a '+' above) is handled by the ROM operating system but cannot be produced by the US, 101 key version of the keyboard.

The table below shows the extra keys and their keycodes that is, those keys which are additional to the XT keyboard:

Key Code	Key Name	Normal	ALT	CTRL	SHIFT	Num Lock
E0,1C	Enter	E00D	A600	E00A	E00D	N/A
E0,1D	Right CTRL	Ignored	Ignored	Ignored	Ignored	Ignored
E0,35	Key Pad /	E02F	A400	9500	E02F	N/A
E0,38	Right ALT	Ignored	Ignored	Ignored	Ignored	N/A
E0,37	Prt Scrn	Ignored	Ignored	Ignored	Ignored	N/A
E0,47	Home	47E0	9700	77E0	47E0	N/A
E0,48	↑	48E0	9800	8DE0	48E0	N/A
E0,49	Pg Up	49E0	9900	77E0	49E0	N/A
E0,4B	←	4BE0	9B00	73E0	4BE0	N/A
E0,4D	→	4DE0	9D00	74E0	4DE0	N/A
E0,4F	End	4FE0	9F00	75E0	4FE0	N/A
E0,50	↓	50E0	A000	91E0	50E0	N /A
E0,51	Pg Down	51E0	A100	76E0	51E0	N/A
E0,52	Ins	52E0	A200	92E0	52E0	N/A
E0,53	Del	53E0	A300	93E0	53E0	N/A

The keys from [Print Screen] up to [Del], above, are the dedicated cursor keys. They produce different sequences of keycodes depending on the state of the [Shift] and [Numlock] keys.

In the base and [Shift] + [Numlock] state the key sequence consists of the keycode expected from the corresponding key on the numeric keypad (with the [Numlock] off) preceded by the extra key keycode (ie 0E0h).

With only [Numlock] on ,the key sequence consists of the base sequence preceded by 0E0h, 2Ah so there are now four keycodes in the sequence.

The last variation is if the [Shift] key only is down. In this case the sequence is as shown in the base case preceded by 0E0h, 0AAh and again there are four keycodes in the sequence.
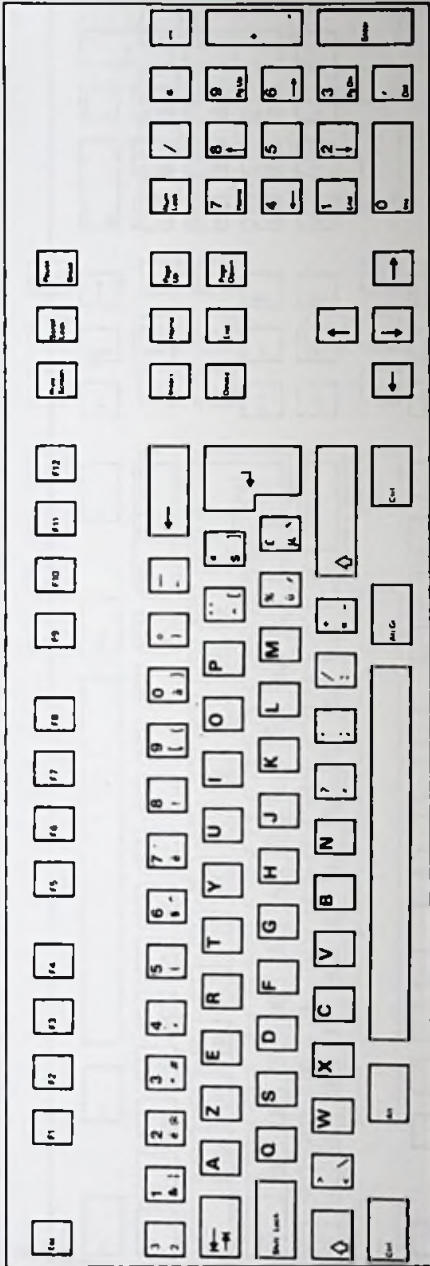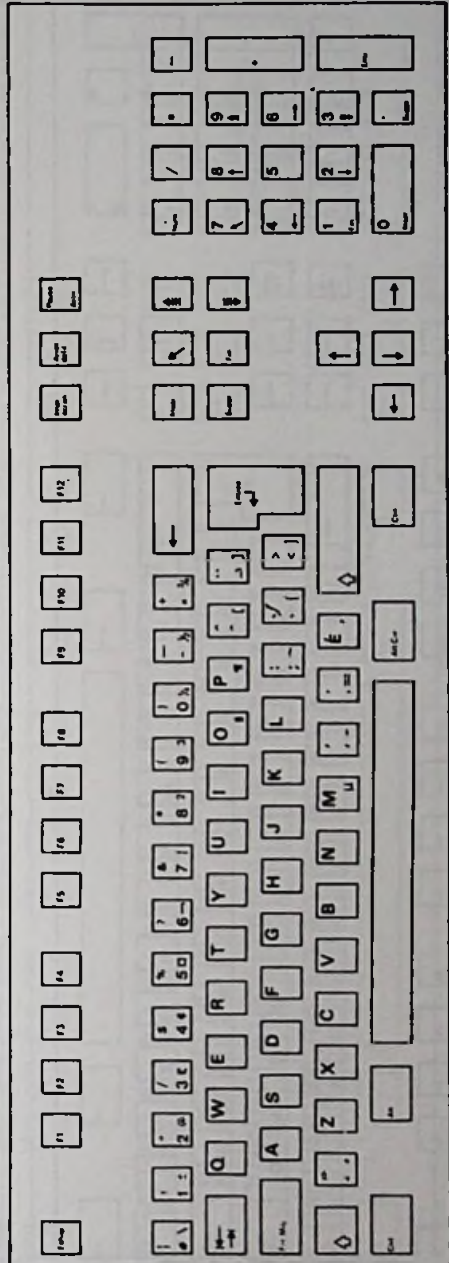
5.4 Enhanced PC keyboards

UK

USA
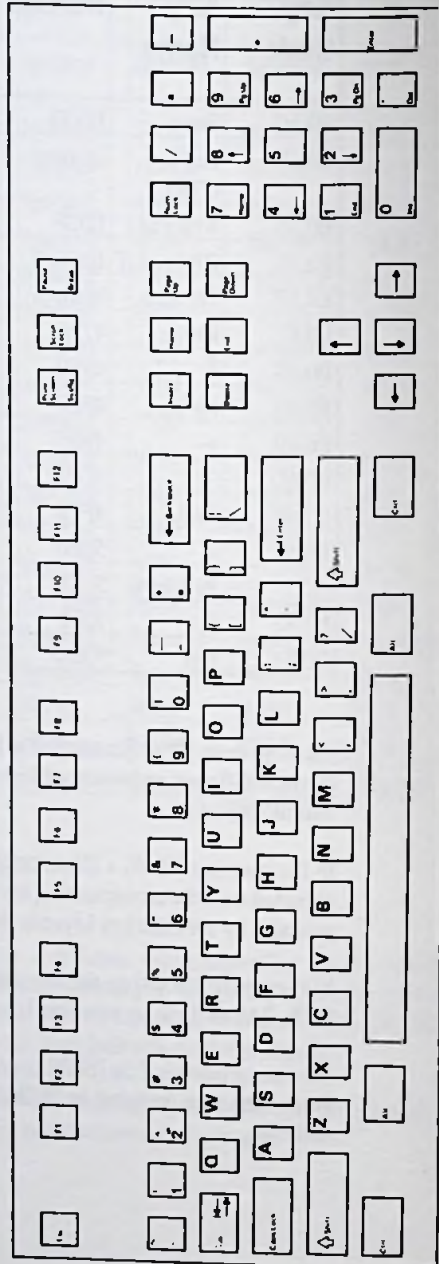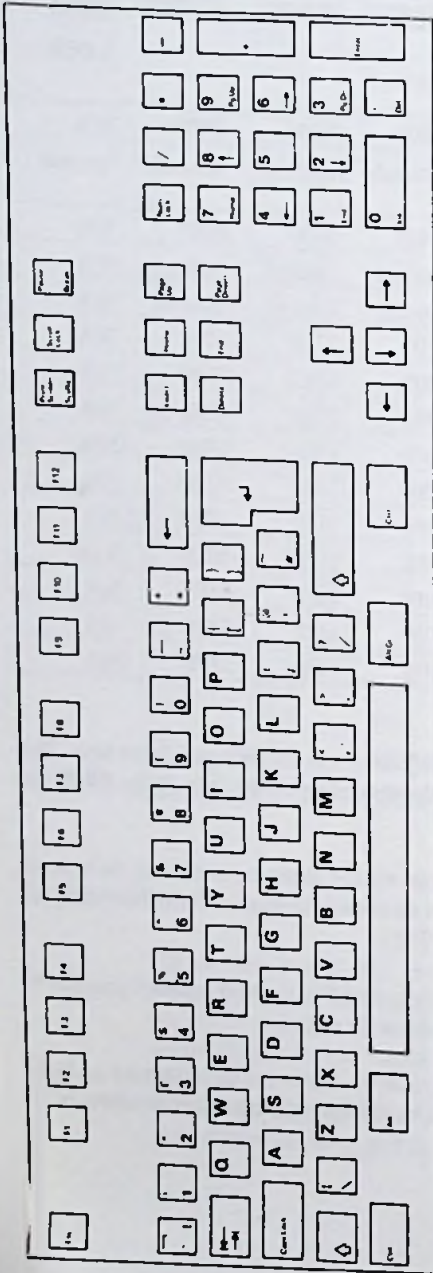
Belgium

Canada

Denmark
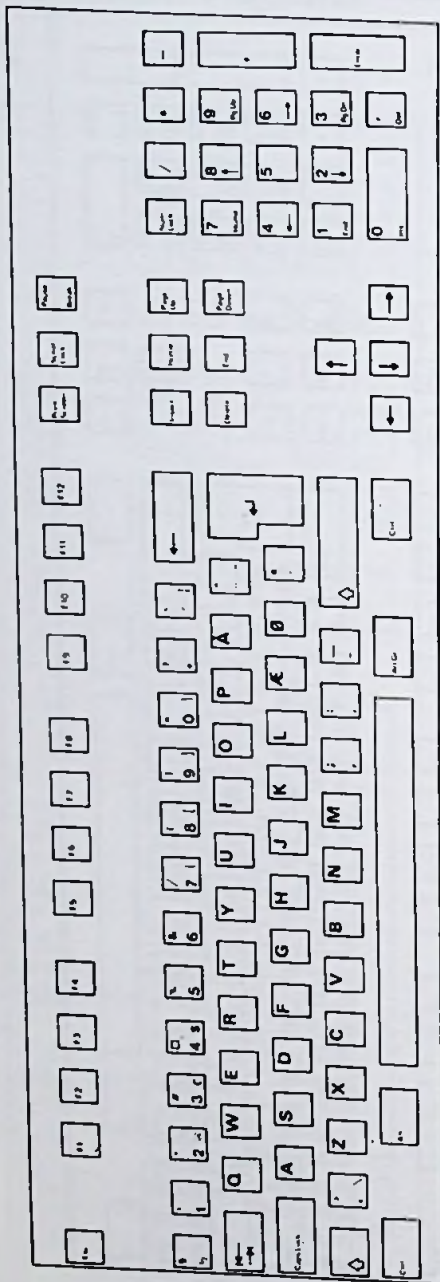
France
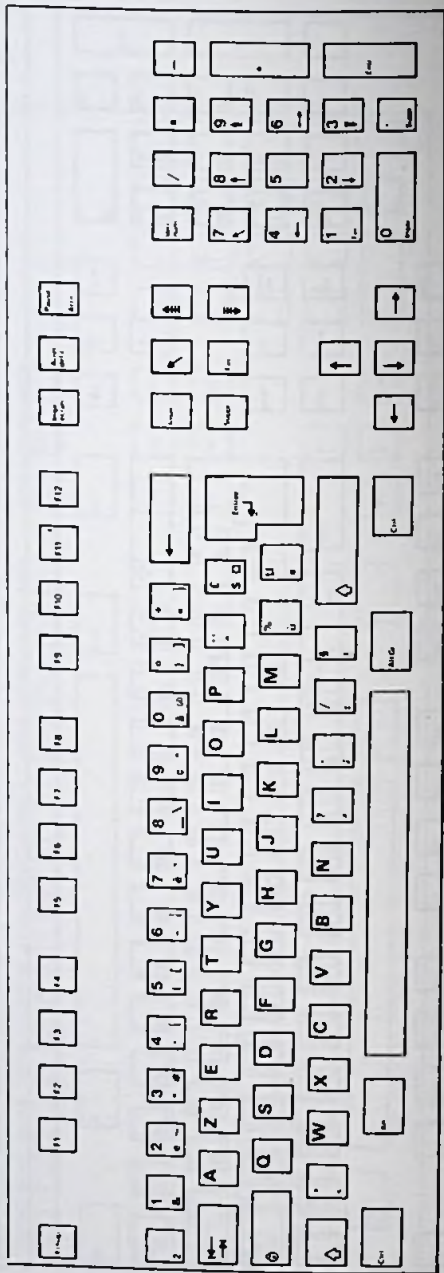
Germany
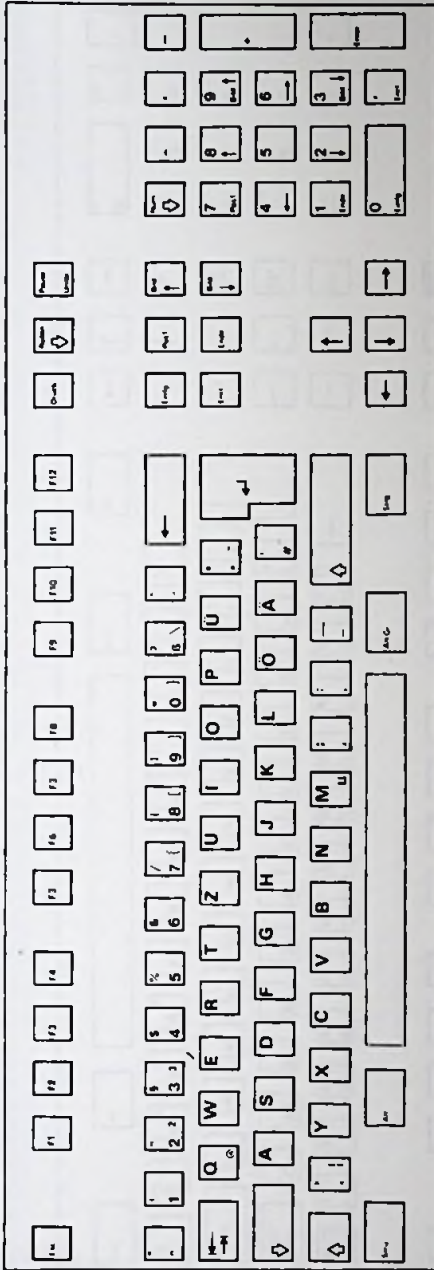
Italy
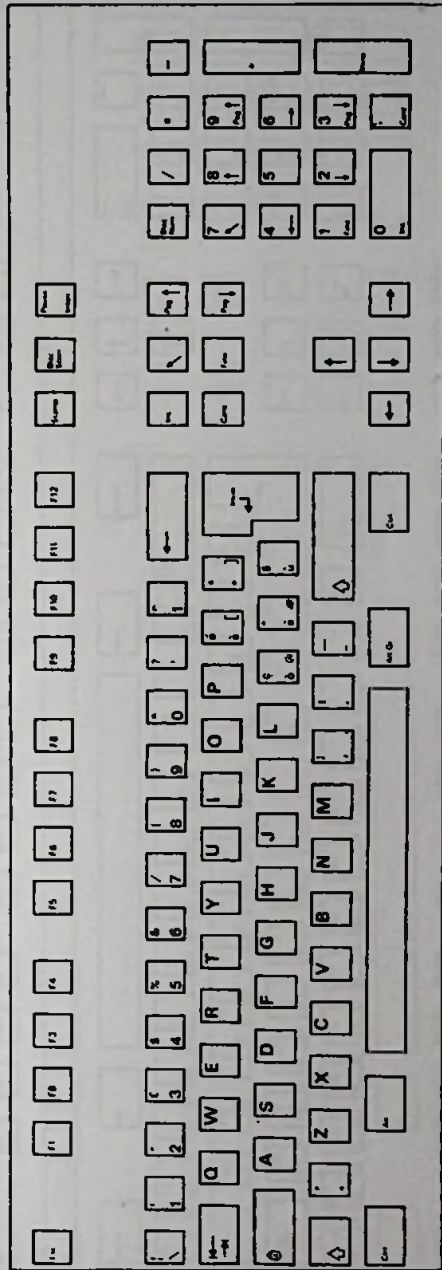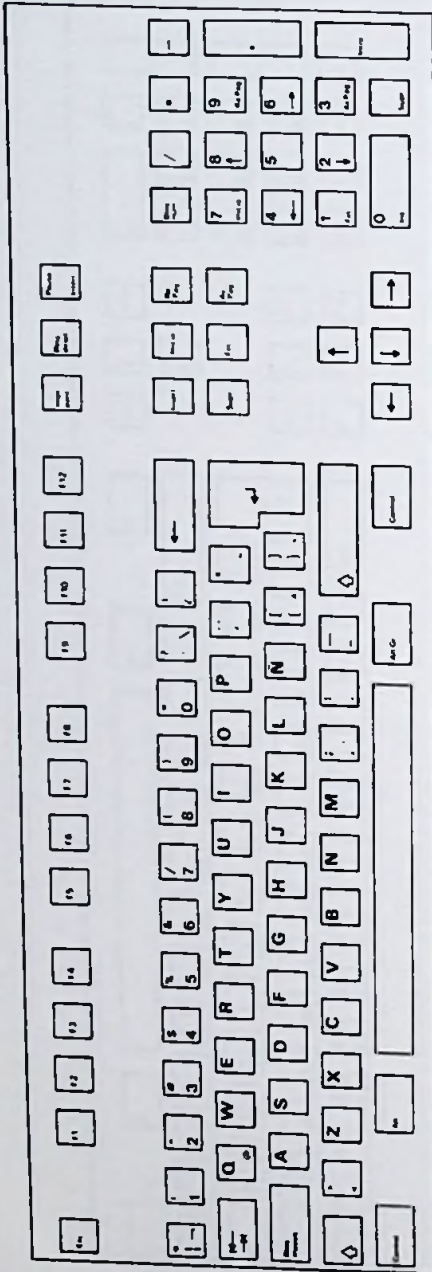
Latin America   Netherlands
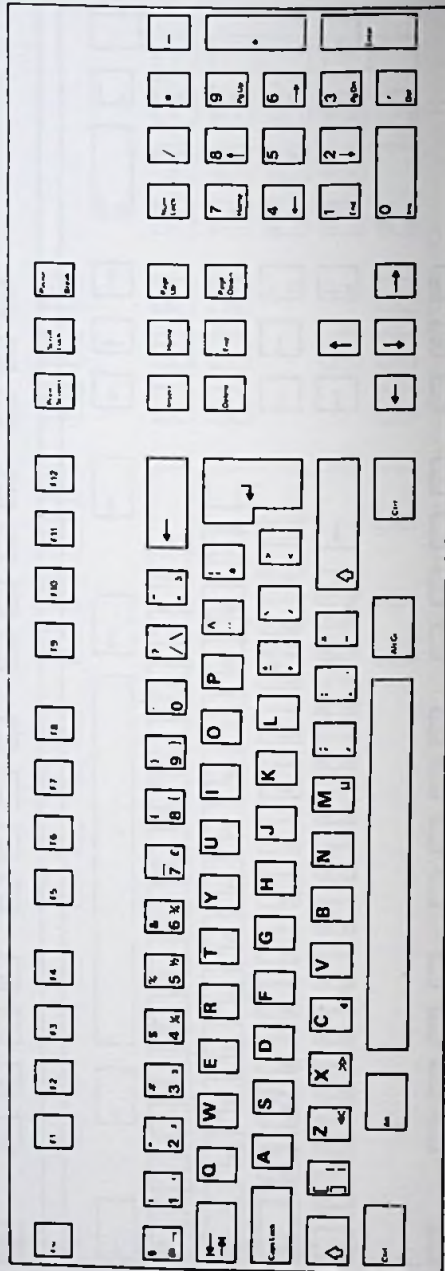
Norway
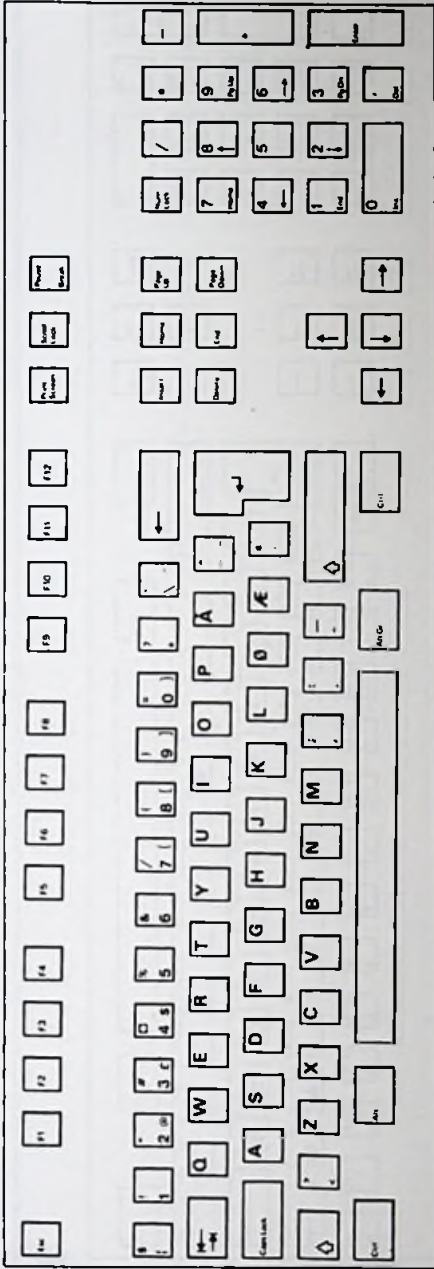
Portugal
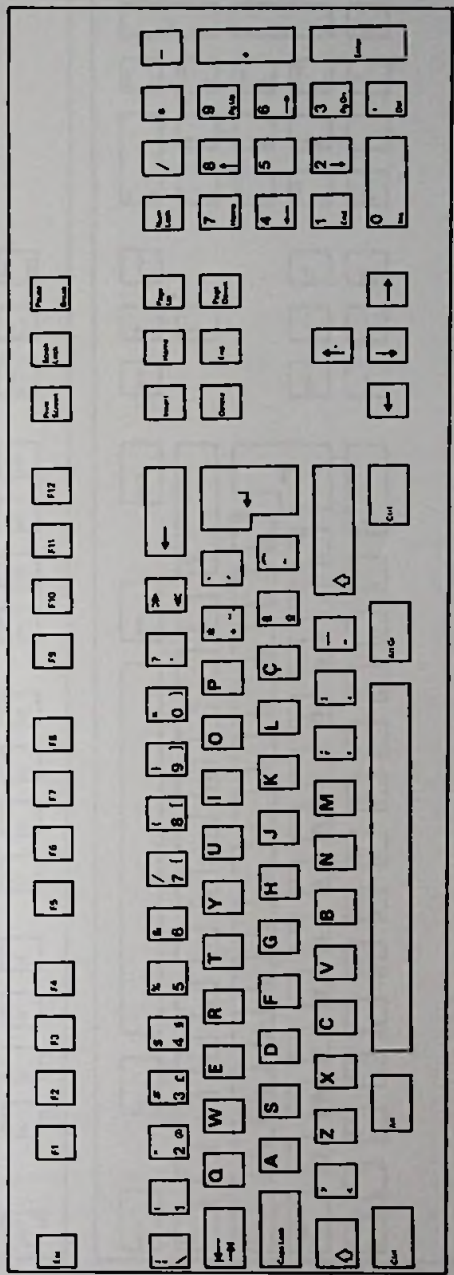
Spain
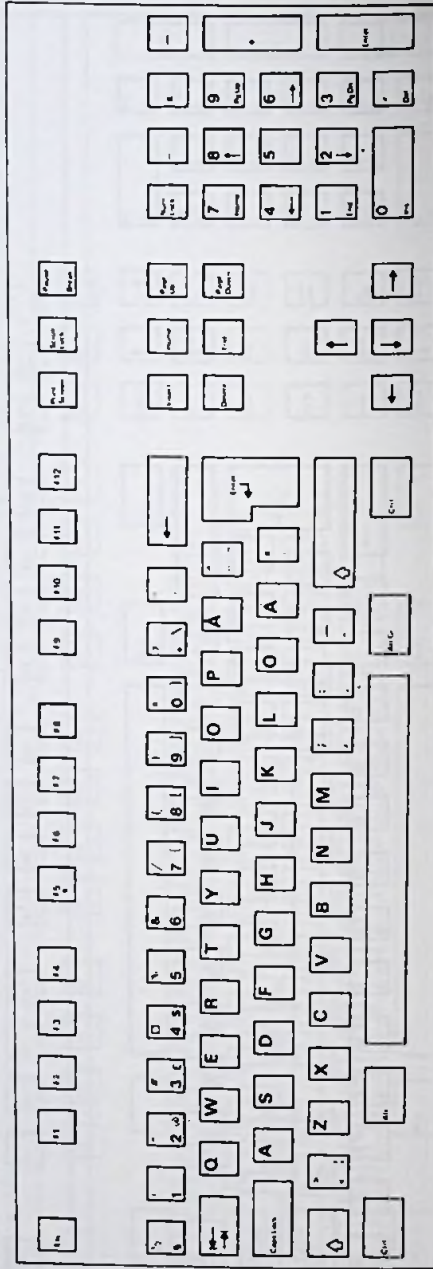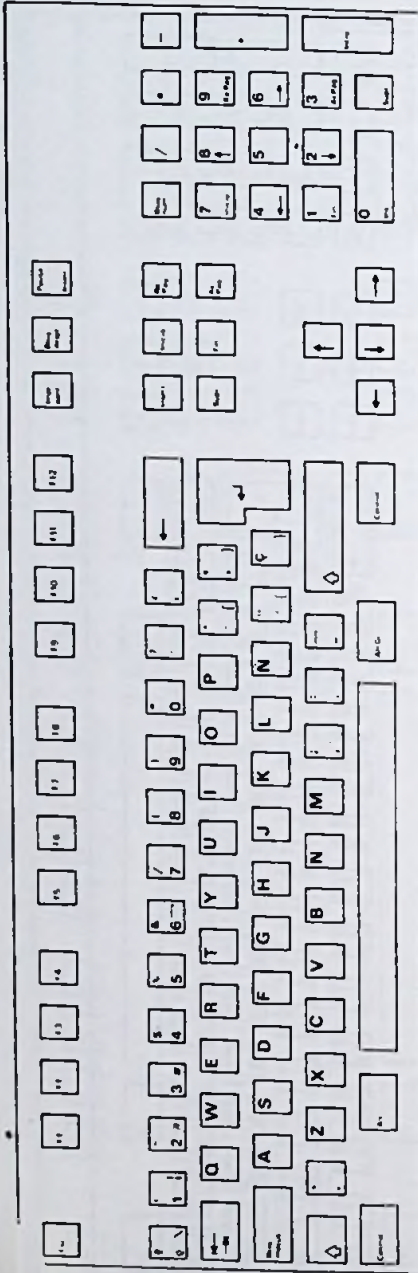
Sweden/Finland
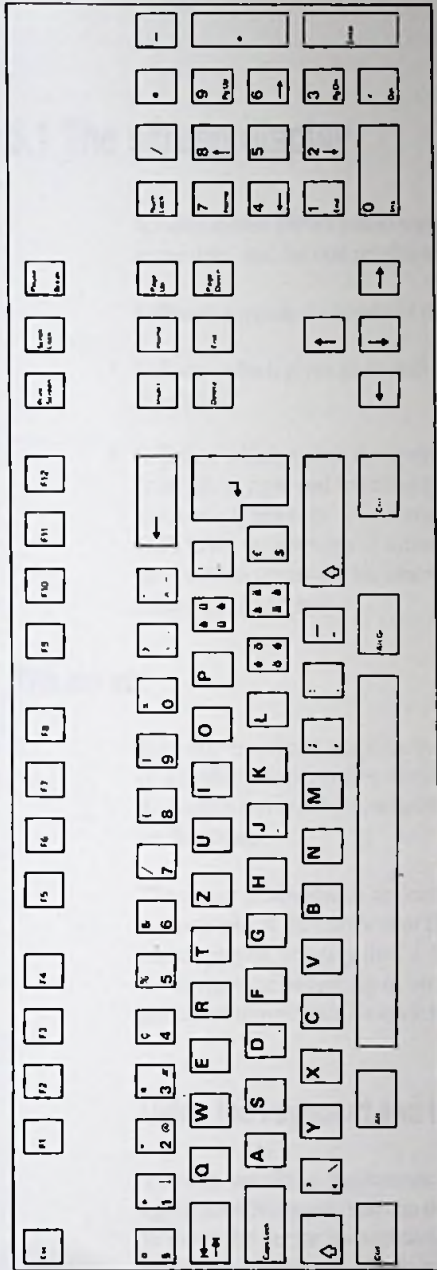
6. Monitors and Video Adaptors

6.1 The screen display

A video screen allows you to see the data you are typing in, the changes you are making to the data, and the end results of the data manipulation.

Software controls the layout of the data on the screen. There are two types of software:

- Software which gives an overall display of text and/or graphics, for example Microsoft Windows.

- Software which makes the screen work in electronic analogue mode: text is displayed from left to right and from top to bottom, in the same way that text is produced on an electronic typewriter. For example, MS-DOS allows you to type a command, such as DIR, to list the contents of a directory on the screen. The list is displayed with the first item written across the top line of the screen, from left to right, and the last item at the bottom of the screen.

The cursor

Both text-based and graphics-based software often use a cursor. It may be in the form of a flashing horizontal or vertical line, to attract your attention. A cursor provides a distinctive mark on the screen which indicates where the next item you type, will appear on the screen.

The cursor's movements are controlled so that the cursor is always in a sensible place: for example, if the cursor is at the top of the screen, and there are three paragraphs of text displayed, pressing the [↓] key a number of times will probably make the cursor move from the beginning of one paragraph to the end of the paragraph; repeating the pattern of movements for each subsequent paragraph.

Using the keyboard and the mouse to control the cursor

There is usually a mechanism for moving the cursor around the screen: in most application programs, you can use both the cursor keys [↑] [↓] [←] [→] and a mouse to move the cursor up and down, to the left and to the right, on the screen. Mouse software and a mouse driver relate the movements of the mouse on the table to the movements of the cursor on the screen.

In text-based programs, you will probably find it easier to control the cursor using the cursor keys, whereas in graphics-based programs, a mouse is usually most useful.

Using just the mouse, or the [Enter] and [Esc] keys, will allow you to do a considerable amount of work: text-based software is often designed so that the [Esc] and [Enter] keys are very powerful keys. The [Enter] key usually takes you to a deeper level of the program, while [Esc] takes you back to the previous level of the program. Similarly, graphics-based software will often use the left mouse button to take you to a deeper level of the program.

Using the cursor and the pointer in graphics based applications

In graphics based applications, like Digital Research Gem, for example, there is a pointer as well as a cursor. In the same way that the mouse moves the rectangular cursor on a text screen, it moves the pointer on a graphics display. Pressing the mouse buttons issues instructions to act on the information on that part of the screen. In practice, this function is normally obvious. It is also possible to move the pointer using the cursor keys, though this is much slower than using the mouse.

As well as the mouse, the tab key [→|] can be used to move the cursor from one field to another.

In addition, a graphics program such as Microsoft Windows will allow the tab key and the mouse to move the text cursor while you are typing in text. For example, the Windows program uses "dialog" boxes to display a menu of options, leaving spaces where you are required to type in information, here you can use the mouse to move the pointer to select the option and then the tab key to move the cursor to the fields within the box.

6.2 The Video Adaptor

Your PC contains a sophisticated multi-mode video adaptor, called VGA (Video Graphics Array) as a built-in feature.

Your video adaptor can produce extended VGA which effects higher resolution modes. Most application programs require the use of an additional device driver to use these extended VGA modes. Refer to your dealer for the device driver you require. The modes supported by the video adaptor are given in section 6.3.

The built-in video adaptor has hardware and video BIOS software that conforms to the industry standards. Programmers should consult the industry standard publications for details of the video hardware and BIOS support.

The video adaptor and software compatibility

The video adaptor in your PC can work with colour and monochrome software and software that was written for use with older types of adaptors, namely, CGA, EGA, MDA and Hercules.

Use of CGA, EGA, MDA or Hercules software with VGA

Your PC has a VGA graphics adaptor which can also emulate older EGA, CGA, MDA and Hercules adaptors, whilst still using a VGA monitor. Older software written for these adaptors will, therefore, work.

Some software will use the video BIOS to control the display: this software should run without any problems.

However, some software exists that assumes that an EGA, CGA, MDA or Hercules card is fitted, and controls the hardware directly. You will find that this type of software will not work correctly with the built-in VGA adaptor until the appropriate command is given. The video hardware will then be instructed to emulate the type of video adaptor that the software was written to use.

The commands are as follows:

DISPLAY E - to use EGA software

DISPLAY C - to use CGA software

DISPLAY M - to use MDA or Hercules software

DISPLAY H - to use Hercules Half mode

DISPLAY F - to use Hercules Full mode

Once you have issued the command at the MS-DOS prompt, load your program and you should find that it now works as expected.

Note that this is a temporary configuration. The next time the PC is switched off and on again, the VGA video adaptor will once again be in use. A full description of the DISPLAY command is given in Chapter 4.

To return to VGA operation, without switching off the PC, use the command

DISPLAY V

When installing software, you may be asked to specify which video adaptor you are using from a list of possibilities. Choose the best one that your hardware supports. The order in which you should choose is:

VGA
EGA
Hercules
CGA
MDA

Programming the built-in VGA

Your Disk Operating System provides a standard interface to the screen. Consult the reference publications for that software. Many programmers, however, prefer more direct access to the video adaptor; or require facilities which are not otherwise provided, normally.

The ROM BIOS includes routines for reading and writing the screen. Programmers should consult the relevant Industry Standard publications for details of the video hardware and BIOS support (including palettes and bitwise memory mapping) in VGA, EGA, CGA and MDA modes.

Light-pen functionality is only available if a "real" CGA card is installed. It will not be supported by the on-board VGA adaptor when it is emulating a CGA card.

6.3 Monitors

The monitors which are suitable for use with your PC are:

- Any analogue, fixed-frequency, VGA (31.5kHz) monitor, for example the Amstrad VGA monitor. VGA monitors are available with a monochrome or colour display and with a choice of screen sizes and resolution.

- IBM 8514-compatible monitors

- Multi-frequency monitors with analogue inputs

The resolution of colour displays is expressed in the dot pitch size. The screen is composed of red, green and blue dots. The distance between these dots is called the "dot pitch". The dot pitch is measured in fractions of a millimetre (e.g. 0.32mm). The closer the dots are together, the sharper the image. On a high resolution monitor, the dot pitch will be low, and vice versa.

Whichever monitor you use, you must have a 15-way connector of the following type:
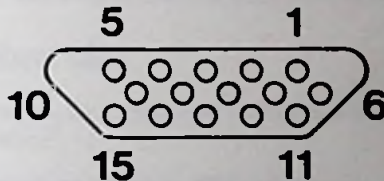
PIN No.	SIGNAL
1	RED
2	GREEN
3	BLUE
4	reserved (no connection)
5	GND
6	RED-RETURN
7	GREEN-RETURN
8	BLUE-RETURN
9	not used
10	SYNC-RETURN
11	reserved (no connection)
12	reserved (no connection)
13	HORIZONTAL-SYNC
14	VERTICAL-SYNC
15	reserved (no connection)

The display modes available with VGA monitors

Mode No.	No. of colours	Char. x Row	Char Cell	Screen Format	Video Mode	Display Mode	Dot CLK MHz	H. Freq. KHz	V. Freq. Hz	Buff Start
0	4/256K	40x25	8x8	320x200	CGA	Text	25	31.5	70.1	B8000
0*	16/256K	40x25	8x14	320x350	EGA	Text	25	31.5	70.1	B8000
0/1+	16/256K	40x25	9x16	360x400	VGA	Text	28	31.5	70.1	B8000
1	4/256K	40x25	8x8	320x200	CGA	Text	25	31.5	70.1	B8000
1*	16/256K	40x25	8x14	320x350	EGA	Text	25	31.5	70.1	B8000
2	4/256K	80x25	8x8	640x200	CGA	Text	25	31.5	70.1	B8000
2*	16/256K	80x25	8x14	640x350	EGA	Text	25	31.5	70.1	B8000
2/3+	16/256K	80x25	9x16	720x400	VGA	Text	28	31.5	70.1	B8000
3	4/256K	80x25	8x8	640x200	CGA	Text	25	31.5	70.1	B8000
3*	16/256K	80x25	8x14	640x350	EGA	Text	25	31.5	70.1	B8000
4	4/256K	40x25		320x200	CGA	Graphics	25	31.5	70.1	B8000
5	4/256K	40x25		320x200	CGA	Graphics	25	31.5	70.1	B8000
6	2/256K	80x25		640x200	CGA	Graphics	25	31.5	70.1	B8000
7	4	80x25	9x14	720x350	HGC/ MDA	Text	28	31.5	70.1	B0000
7+	4	80x25	9x16	720x400	VGA	Text	28	31.5	70.1	B0000
D	16/256K	40x25	8x8	320x200	EGA	Graphics	25	31.5	70.1	A0000
E	16/256K	80x25	8x8	640x200	EGA	Graphics	25	31.5	70.1	A0000
F*	4	80x25	8x14	640x350	EGA	Graphics	25	31.5	70.1	A0000
10*	16x256K	80x25	8x14	640x350	EGA	Graphics	25	31.5	70.1	A0000
11	2/256K	80x30	8x16	640x480	VGA	Graphics	25	31.5	59.9	A0000
12	16/256K	50x30	8x16	640x480	VGA	Graphics	25	31.5	59.9	A0000
13	256/ 256K	40x25	8x8	320x200	VGA	Graphics	25	31.5	70.1	A0000
HGC	2			720x348	HGC	Graphics	32	31.5	70.0	B8000
63	16/256K	90x33	8x16	720x540	Extended	Graphics	32	31.3	56.1	A0000
64	16/256K	100x37	8x16	800x600	Extended	Graphics	32	31.5	51.3	A8000

Notes to the above table

In monochrome modes, the 4 colours are defined as Black, White, "Blinking White" and "Intensified White".

The * and + symbols are part of the IBM mode names:

* means EGA modes
+ means VGA modes

Modes greater than 13 are extended text or graphics modes.

6.4 Adding a Video Adaptor to the PC

You may wish to replace the built-in video adaptor with an expansion card. In which case, the on-board adaptor should be disabled using option link LK1. See Chapter 11 for details of the option links. Once you have adjusted the option link and fitted the expansion card, you must use the SETUP utility to inform the system of the changes.

Some software can use two displays at once. If you want to use two displays at once, you need to add a display adaptor on an expansion card which would be used as well as the built-in adaptor.

7. Processors

Introduction

The processor is central to the PC: it is a sophisticated calculating device. It is set apart from a simple calculator by its ability to conditionally process a sequence of instructions, that is, to only perform certain functions on the successful completion of another calculation.

The processor is fundamental to the computer: the design of any Personal Computer is based on the type of processor used. PC5086 uses an 8086 processor and PC5286 uses an 80286 processor.

7.1 Processor speed

The speed of the computer's clock sets the rate at which the processor operates; the processor's speed gives an indication of its computing power. For example, a processor which operates at a speed of 4 megahertz will execute approximately one million instructions per second: it receives 4 million ticks of the clock per second and it takes an average of 4 ticks to complete an instruction.

Changing the processor's speed

The speed of the processor can be changed temporarily, using the SPEED program. See Chapter 4 for a description of this program. This may be necessary if some peripheral equipment or software you are using appears to be working too fast, or if it simply requires a slower processor speed.

Processor efficiency

The more data a processor can transfer at once, the faster it will be.

The 8086 and 80286 processors are both 16-bit processors.

7.2 8087 and 80287 Maths co-processors

The effective speed of the 8086 can be increased by adding an 8MHz 8087 (8087-2) maths co-processor to the PC. Likewise, the effective speed of the 80286 can be increased by adding a 10MHz 80287 processor (80287-10). Maths co-processors are sometimes referred to as NDP chips (Numeric Data Processor) or FPU chips (Floating Point Unit).

Your PC is not supplied with a maths co-processor chip. However, there is an empty socket on the circuit board where one can be fitted. See below for instructions on how to fit a co-processor, or ask your dealer to fit one for you if you require it.

The co-processor is effectively a second processor that will take some of the existing processor's workload. It is designed to perform certain mathematical functions far quicker than the processor alone could achieve.

Not all software can make use of a co-processor; but if software which performs a lot of arithmetic (for example spreadsheets, CAD/3D programs, etc) has been designed to make use of it, the program will run faster.

Fitting a maths co-processor

It is not necessary to run the SETUP utility, nor adjust any option links, when fitting a maths co-processor.

The socket for a maths co-processor is located on the motherboard inside the system unit.

To fit a maths co-processor:

- firstly, make sure that the power to the system unit is not connected to a mains power supply

- referring to the diagram on the following page, open the system unit by undoing the screws on the bottom panel of the system unit, then slide the cover forwards, off the machine.

Open the system unit

Underside of System Unit

Front Panel of System Unit
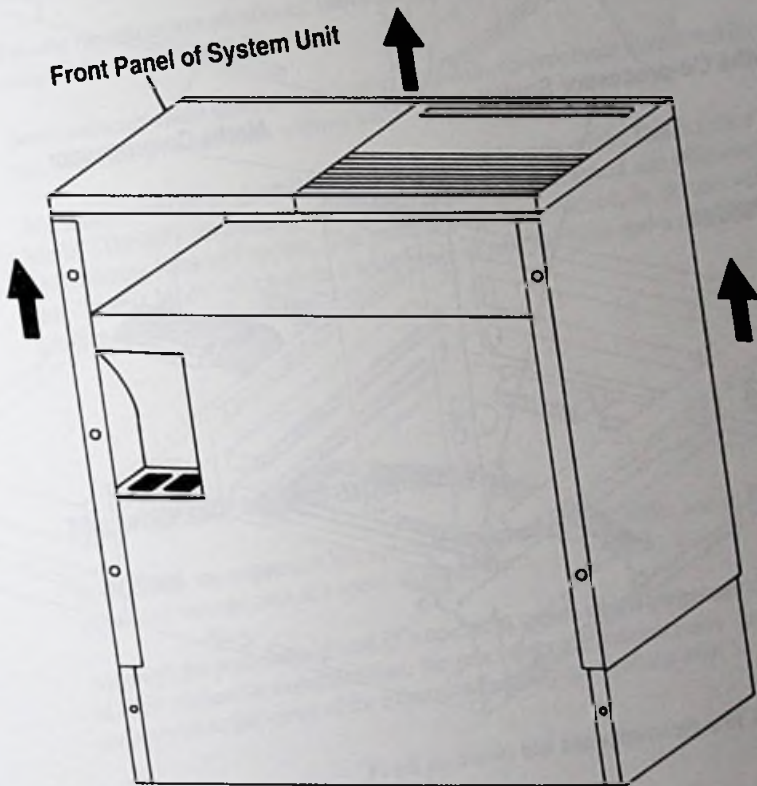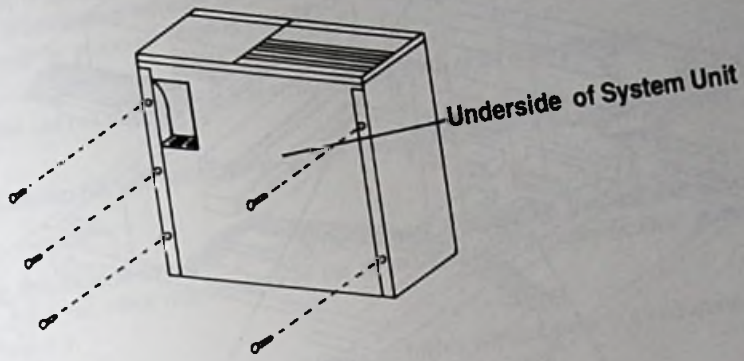
Plug the maths co-processor chip into the empty socket.

PC5086

Maths Co-processor Socket

Maths Co-processor

PC5286
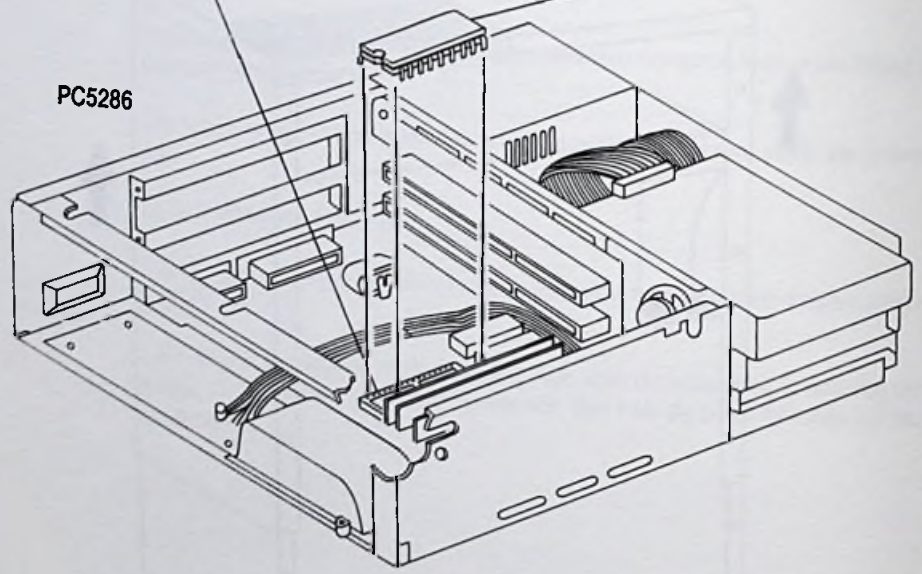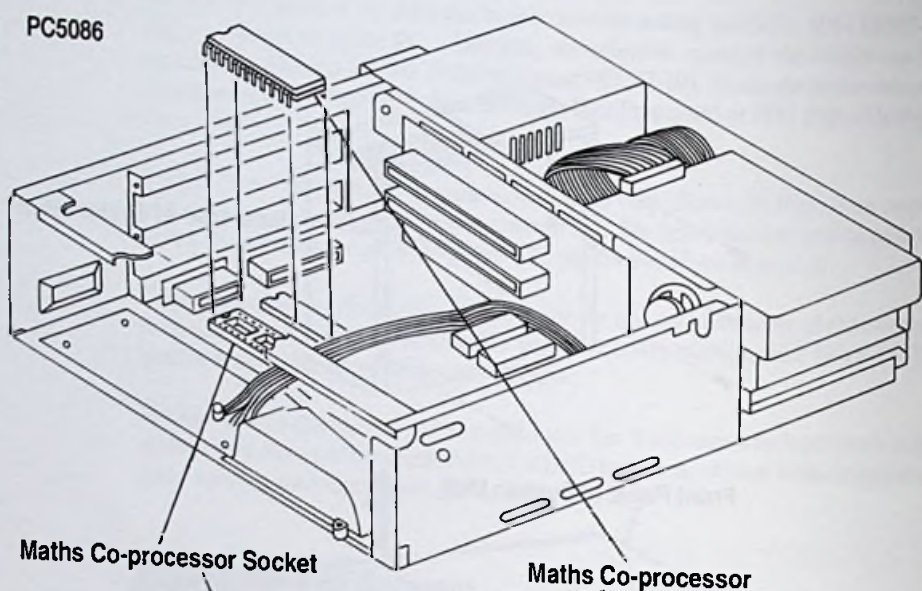
Close the system unit and switch on the PC.

7.3 Processor and software compatibility

Software is specified according to the type of processor with which it is designed to work. When buying software for your PC, you must ensure that it has been written to work with the processor fitted in your PC:

- PC5086 can run software that was written for an 8088 or an 8086 processor

- PC5286 can run software that was written for an 8088, 8086 or an 80286 processor

The specification should be given on the software's packaging. It would also be wise to check the other requirements of the software against the specification given in Chapter 1.

Because the processors mentioned above are highly popular, there is a vast amount of compatible software available.

Some software would benefit considerably if a maths co-processor were fitted for it to use, even though it can work without one.

When first switched on, the 80286 operates as an 8086-compatible. This is called "Real Mode". The only advantage over the 8086 is the increased speed and efficiency. The 1Mb address limit still applies. The processor can be switched, by certain software, into 'Protect Mode' which gives a wide range of new facilities and a much increased address range.

The processor and the expansion bus

In **PC5086**, the expansion bus operates at a speed of 4.77 MHz, and in **PC5286** the expansion bus operates at a speed of 8 megahertz.

Although the processors in both PCs operate at speeds which are greater than the speed of their respective expansion bus, the processors are automatically synchronized to accommodate the speed of the expansion bus they are working with.

8. RAM

Introduction

A computer is a calculating device: within its ambit it can handle

- instructions given to it
- information to be manipulated

The area which stores information, while it is being processed, is the RAM (Random Access Memory). The RAM is specially designed so that information stored in the RAM can be accessed and manipulated quickly and easily by the processor.

All the information contained in the RAM is lost once the computer is switched off.

Data is loaded from disk into RAM to be used. It can also be loaded from floppy disk to hard disk and then to RAM, and from floppy disk to RAM.

8.1 Memory management - swapping data from disk to RAM

The process of loading data from a permanent storage to the RAM will fail when the RAM is full. Many programs will then give you a message telling you that the memory is full.

The RAM's maximum storage capacity is finite, so when the operating system and application programs have been loaded, there may not be enough space left to hold all the data that needs to be processed.

However, some programs use a technique of loading only that data which is being processed, then as soon as the processing is finished, this data is put back onto the disk and the next item of data to be processed is loaded into RAM.

This process of moving data, as it is needed, from hard or floppy disk to RAM is called "swapping". Swapping is not the same as simply loading data into RAM, it is a memory management activity: the RAM holds only the data that is currently being processed, then as soon as it is finished, it is put back on the disk, and the next unit of data to be processed is loaded.

The swapping facilities within UNIX, OS/2, Desqview and WINDOWS for example, are not apparent to the user: the programs handle data transfer from hard disk to RAM and back again, without instructions from the user.

It takes a lot of time to swap data from RAM to floppy disk and back and it is therefore impractical to attempt to use software that makes use of swapping techniques with floppy disks.

8.2 Types of memory

Base memory

The 8086 microprocessor, on which the Industry Standard PC architecture is based, can only access the contents of 1Mb of Memory. Long ago, decisions were made to apportion that 1Mb of address space between RAM (for programs and video adaptors) and ROM. This resulted in the maximum amount of RAM available for application programs being 640K. This area of RAM is known as the Base Memory.

640K of Base memory is available in all PC models.

It is not possible to fit additional or substitute base memory on an expansion card.

PC5286 Shadow RAM facility

Most of the PC's memory can be assigned to Base memory and Extended memory. In addition, a fixed amount of 384K, can be set aside to be used to increase the speed of access to any ROM-based code in your PC.

In the standard PC design, the area of memory between 640K and 1Mb is not normally filled with system RAM but with RAM and ROMs on adaptor cards, such as video cards, hard disks, networks and so on. This 384K region of memory can be "shadowed" in up to twenty-four, 16K divisions.

The BIOS copies the contents of the PC's ROM into the RAM. This copy then becomes the shadow RAM. The processor must then be instructed to read this copy rather than the original ROM. Shadow RAM can be accessed faster than the ROM, so the speed at which the programs run is increased.

The system BIOS and VGA BIOS are automatically shadowed if:

- your PC has more than 1 megabyte of RAM

or

- your PC has just 1 megabyte of RAM fitted and the 384K relocation feature is turned off in the SETUP utility.

LIM Expanded memory

Although the amount of the 8086's 1Mb of address space apportioned to RAM (the base memory), in the industry standard PC architecture, is perceived as inadequate at 640K, there is normally a significant amount of the address space apportioned to ROM that is actually unused. This has led to a number of schemes for plugging those unused gaps with bank-switched RAM, that is, with small units of memory, which can then be used by suitably written applications.

The term "Expanded" is derived from the idea of "expanding" the 640K of base memory and should not be confused with the term "extended" which is described later. To make it easier to differentiate between these two terms, this section will refer to "LIM expanded memory".

LIM Expanded Memory is implemented by having an installable device driver which re-programs special hardware registers to switch selected sections (or pages) of 16K RAM into specified areas of the 1Mb address space.

Normally, you will not have to know the mechanisms involved nor the addresses used, as these are selected automatically.

The address space into which the pages are normally switched is called the "Page Frame". It is situated above the address space used by the graphics adaptor, and beneath the address space used by the ROM BIOS. Although the page frame is normally only 64K long, a large amount of RAM (maybe a few megabytes) can be accessed by this switching process.

PC5286 can use both LIM expanded memory and extended memory. The electronics for expanded memory is already built onto the motherboard, and it is controlled using the SCATEMM.SYS device driver. See Chapter 4 for details of SCATEMM.SYS.

If you wish to use LIM expanded memory in PC5086, you need to fit a LIM expansion card.

It is important, however, to realise that different LIM expanded memory cards have different schemes of hardware registers and require their own customized installable device driver.

As well as swapping pages of LIM expanded memory in and out of the normal page frame, some application programs and operating systems are also designed to switch pages of LIM expanded memory into the address space of base memory. If you want to switch LIM expanded memory into base memory in your PC, select the appropriate parameters in an EMM device driver.

Extended memory - PC5286 only

In PC5286, the 80286 microprocessor can address 16 megabytes of address space. The memory in the first 1 megabyte of address space is compatible with 8086-based PC's. The other 15 megabytes of address space is only accessible by the 80286 in "Protect Mode", and is not normally available for use by DOS. RAM above the first 1 megabyte of address space is called "Extended Memory".

MS-DOS and MS-DOS application programs as well as all software that uses 8086 Real Mode, can make only limited use of extended memory as they are restricted to the 1Mb address space of the 8086. More recent operating systems such as OS/2, UNIX and XENIX do make full use of extended memory. The installable device drivers HIMEM, SMARTDRV and RAMDRIVE make use of a special trick to use extended memory for storage of data only; additionally, HIMEM will also allow a small area for program use.

To increase the amount of extended memory, you can add to that which is provided on the motherboard by adding an expansion card containing extended memory, or by fitting bigger SIMMs.

The extended memory, built into the motherboard of your PC, has a better performance than would be possible on an expansion card because it is accessed at the full computer speed, not restricted by interfacing through a slower expansion bus.

8.3 Memory allocation

PC5086

The diagram below shows where the various types of memory are found in the microprocessor's address space in PC5086:

PC5086 MEMORY MAP

BLOCK SIZE		HEX ADDRESS
		0FFFFF
64K	SYSTEM BIOS	
		0F0000
		0EFFFF
152K	0CA000 - 0EFFFF AVAILABLE FOR EXPANSION	
		0CA000
8K	HARD DISK BIOS (DISABLE WITH LK7)	0C9FFF
		0C8000
32K	VIDEO BIOS (DISABLE WITH LK1)	0C7FFF
		0C0000
		0BFFFF
128K	VIDEO RAM	
		0A0000
		09FFFF
640K	BASE RAM	

Memory map for PC5086

640K RAM

00000 - 9FFFF	640K	Base RAM
A0000 - BFFFF	Varies	VGA RAM
C0000 - C7FFF	32K	VGA BIOS
C8000 -C9FFF	8K	HDD BIOS
F0000 - FFFFF	64K	System BIOS

The diagram below shows where the various types of memory are found in the microprocessor's address space in the default configuration of PC5286:

MEMORY MAP

FFFFFF	BIOS ROM
FC0000	
FBFFFF	
	AVAILABLE FOR EXTENDED RAM
	0 TO 3072K
	AS SELECTED BY SETUP
100000	
0FFFFF	BOTTOM 1MB
000000	

ON-BOARD SYSTEM BIOS		0FFFFF
		0F0000
AVAILABLE FOR LIM-EMS PAGEFRAME AND EXPANSION CARD BIOS ROMS		0EFFFF
		0C8000
ON-BOARD VIDEO BIOS		0C7FFF
		0C0000
VIDEO RAM AREA		0BFFFF
		0A0000
		09FFFF
BASE RAM 640K		
		000000
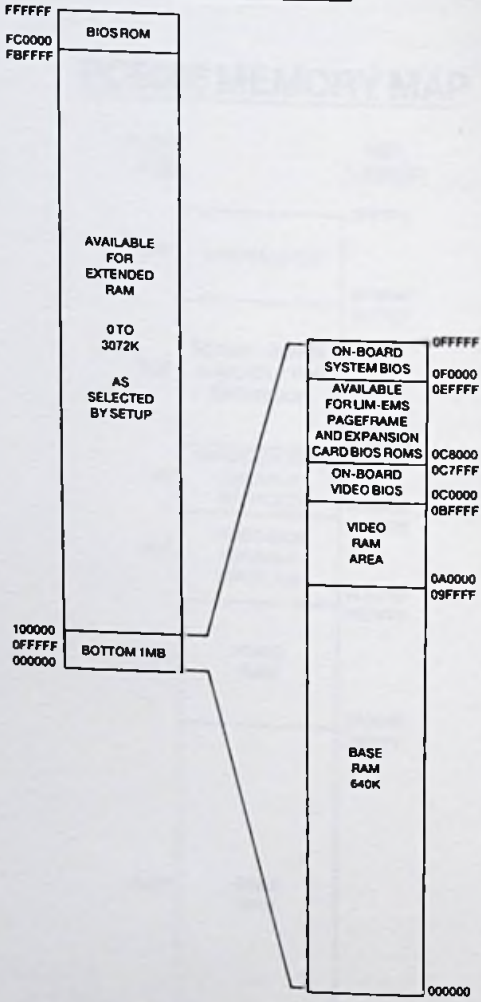
Different memory configurations result in memory being mapped into processor address space in a number of ways, as shown on the next page.

All possible memory maps for PC5286

512Kilobytes (2 x 256K SIMM)

000000-07FFFF	512K	Base RAM
0A0000-0BFFFF	variable	VGA RAM
0C0000-0C7FFF	32K	VGA BIOS ROM
0F0000-0FFFFF	64K	System BIOS ROM
FC0000-FFFFFF	256K	BIOS ROM

1Megabyte with 384K relocation disabled (4 x 256K SIMM)

000000-09FFFF	640K	Base RAM
0A0000-0BFFFF	variable	VGA RAM
0C0000-0C7FFF	32K	VGA BIOS ROM/Shadow RAM
0F0000-0FFFFF	64K	System BIOS ROM/Shadow RAM
FC0000-FFFFFF	256K	BIOS ROM

1Megabyte with 384K relocation enabled (4 x 256K SIMM)

000000-09FFFF	640K	Base RAM
0A0000-0BFFFF	variable	VGA RAM
0C0000-0C7FFF	32K	VGA BIOS ROM
0F0000-0FFFFF	64K	System BIOS ROM
100000-15FFFF	384K	Extended RAM
FC0000-FFFFFF	256K	BIOS ROM

2Megabyte (2 x 1M SIMM)

000000-09FFFF	640K	Base RAM
0A0000-0BFFFF	variable	VGA RAM
0C0000-0C7FFF	32K	VGA BIOS ROM/Shadow RAM
0F0000-0FFFFF	64K	System BIOS ROM/Shadow RAM
100000-1FFFFF	1M	Extended RAM
FC0000-FFFFFF	256K	BIOS ROM

4Megabyte (4 x 1M SIMM)

000000-09FFFF	640K	Base RAM
0A0000-0BFFFF	variable	VGA RAM
0C0000-0C7FFF	32K	VGA BIOS ROM/Shadow RAM
0F0000-0FFFFF	64K	System BIOS ROM/Shadow RAM
100000-3FFFFF	3M	Extended RAM
FC0000-FFFFFF	256K	BIOS ROM

8.4 Upgrading memory - PC5286 only

PC5286 is supplied with 1 megabyte of memory. If you wish to upgrade memory to a maximum of 4Mb, you can do this by replacing the SIMMs (Single Inline Memory Modules) in the sockets provided on the motherboard, inside the system unit. The sockets are numbered, on the motherboard, IC52 to IC55. When fitting SIMMs, you should obey the following rules:

- Two or four modules of the same type must be fitted. These types can be 256K x 8 or 1Mb x 8. They must be 80ns SIMMs.

  If only two modules are fitted, they must be fitted in IC52 and IC53.

- Beware, the size of SIMM may not be the same as the DRAM chips fitted to it. For example, a 256K SIMM stores 256K x 8 bits of information, that is, 256 kilobytes. Therefore, a 256 kilobyte SIMM could be constructed from 8 sets of (256 bit x 1 DRAM chips) or from 2 x 1 megabit DRAM chips. Each megabit DRAM chip will store 4 x 256 kilobits.

  After you have fitted the SIMMs, and switched on the PC, You must run the SETUP utility, described in Chapter 4, to inform the system of the changes you have made.

  Instructions on how to open the system unit and fit SIMMs to the motherboard are given on the following pages.

Fitting SIMMs onto the motherboard

Firstly, make sure the power to the system unit is switched OFF. Disconnect the mouse and keyboard cables from the connectors on the underside of the sytem unit. Then open the system unit by undoing the screws on the bottom panel of the system unit. Slide the top cover forwards, off the unit.

Underside of System Unit

Front Panel of System Unit
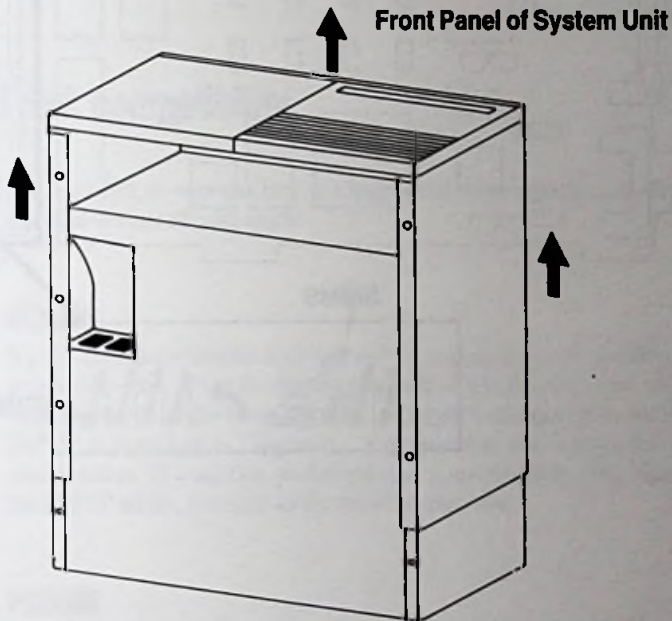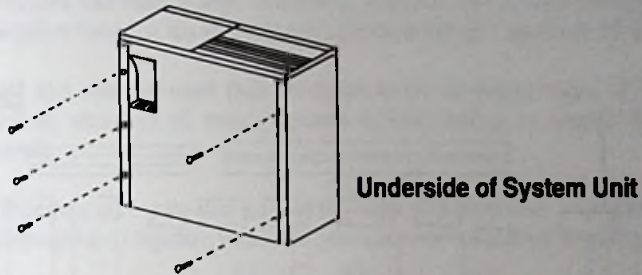
You should now have full access to the motherboard. You should be able to see the SIMM sockets on the board, as illustrated below.

PC5286 SIMM sockets
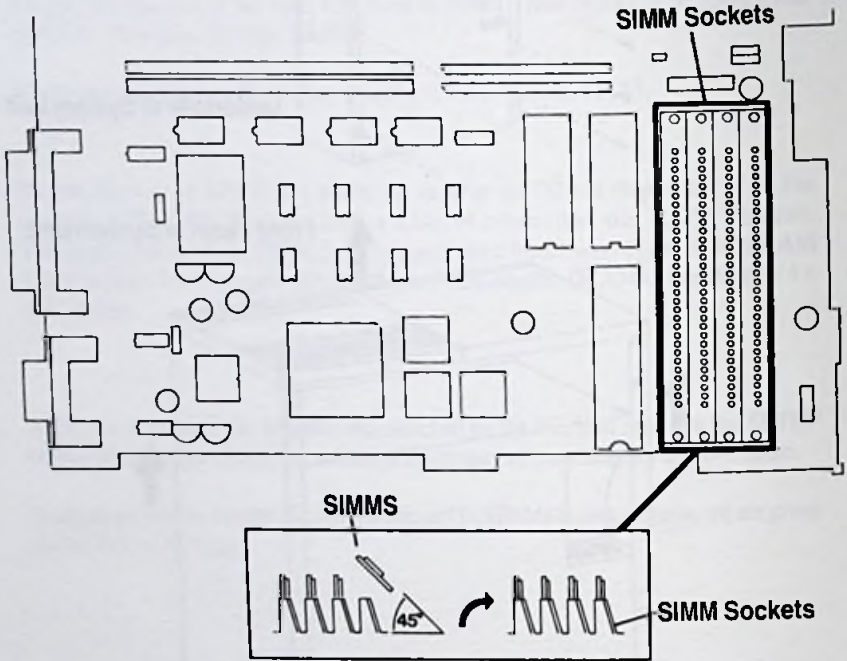
If only two SIMMs are to be fitted, use the two sockets nearest the front of the machine.

Once the SIMMs are fitted, close the system unit and replace the screws in the bottom panel.

Switch on the PC and run the SETUP utility to inform the system of the changes you have made. SETUP is described in Chapter 4.

9. Hard Disks

Introduction

A hard disk can store a large number of programs and a large amount of data: a 40 megabyte hard disk has approximately the same storage capacity as 28 floppy disks.

A hard disk operates more than ten times as fast as floppy disks. It also allows immediate access to all your programs without having to change floppy disks frequently.

It is important to keep the data on your hard disk well organised, with related data and programs grouped together; otherwise your data will be difficult to manage.

9.1 Hard disk compatibility

The hard disk in your machine is a high speed, high capacity (40 megabyte) drive, intended to meet all your needs.

PC5286

It is not anticipated that the hard disk will be upgraded, except, possibly, by the use of an interface card. If you do upgrade your hard disk in this way, find out the disk drive Type number from the following table, and enter it as required by the SETUP utility. SETUP is described in Chapter 4. You must use it to inform the system of the configuration. If a suitable, predefined type is not available, enter Type 48 or 49, in the SETUP utility, and enter all the drive's parameters.

PC5086

If you want to fit a second hard disk into PC5086, you can only use a hard card (a hard disk fitted on an expansion card). It must be configured as drive D:. If you are not sure how to fit a hard card, ask your dealer to fit one for you.

Hard disk drive type numbers - PC5286

Type	Cyls	Hd	Pre	LZ	Sec	Size
0	================= Not Fitted =================					
1	306	4	128	305	17	10
2	615	4	300	615	17	20
3	615	6	300	615	17	30
4	940	8	512	940	17	62
5	940	6	512	940	17	46
6	615	4	None	615	17	20
7	462	8	256	511	17	30
8	733	5	None	733	17	30
9	900	15	None	901	17	112
10	820	3	None	820	17	20
11	855	5	None	855	17	35
12	855	7	None	855	17	49
13	306	8	128	319	17	20
14	733	7	None	733	17	42
15	================ RESERVED =================					
16	612	4	All Cyls	663	17	20
17	977	5	300	977	17	40
18	977	7	None	977	17	56
19	1024	7	512	1023	17	59
20	733	5	300	732	17	30
21	733	7	300.	732	17	42
22	733	5	300	733	17	30
23	965	10	None	970	17	80
24	612	4	305	663	17	20
25	1024	4	None	1029	17	119

Hard disk drive type numbers continued

Type	Cyls	Hd	Pre	LZ	Sec	Size
26	614	4	None	614	17	20
27	820	6	None	820	17	40
28	977	5	None	977	17	40
29	1023	9	None	1023	17	76
30	1024	5	None	1024	17	42
31	1024	8	None	1024	17	68
32	809	6	128	809	17	40
33	830	7	None	830	17	48
34	830	10	None	830	17	68
35	776	8	0	775	33	100
36	1024	8	None	1024	17	68
37	615	8	128	615	17	40
38	615	8	None	615	17	40
39	925	9	None	925	17	69
40	1024	9	None	1023	17	76
41	0	0	0	0	0	0
42	0	0	0	0	0	0
43	0	0	0	0	0	0
44	0	0	0	0	0	0
45	940	5	None	945	17	39
46	0	0	0	0	0	0
47	0	0	0	0	0	0
48	=======	User	Definable	=====		
49	=======	User	Definable	=====		

Abbreviations:

Type - hard disk type number
Cyls - the number of cylinders
Hd - the number of heads
Pre - the Write-Precompensation starting cylinder number
LZ - landing zone
Sec - sectors per track
Size - size of disk in megabytes

9.2 Preparation of a hard disk

This section explains the various stages involved in preparing a hard disk.

It then goes on to explain alternative configurations; why you may want to use a different configuration and how to reconfigure the disk.

Note If you wish to use any hard disk other than the one supplied with your PC, you should pay particular attention to the manufacturer's instructions when formatting.

Instructions are given in the installation section for the PC, which prepare the disk to use MS-DOS as the operating system.

If you want to use the disk with any other operating system, you will need to follow the hard disk format and system installation instructions supplied with that software.

Often it will be possible to partition the disk to accommodate two operating systems simultaneously - selecting which is to be used when the computer is switched on.

The hard disk configuration suggested in the Installation section

The hard disk is larger than 32 megabytes. MS-DOS can only recognise drives up to 32Mb. This means that the hard disk has to be divided into at least two drives. When disks are divided in this way, the divisions are called "logical drives". Firstly, MS-DOS separates the hard disk into two partitions: a Primary Partition, and an Extended Partition. The Primary Partition contains Drive C: and the Extended Partition drive D:. Directory structures are created and finally, the DOS files are copied onto the hard disk.

A root directory is created and the hard disk is checked for bad sections. Special entries are made in the directory, if any bad sectors are found, they are marked so that these sectors are never used.

Reconfiguring the hard disk

It is possible that the default configuration, given in the installation section, is not the most suitable to your requirements. Or, perhaps you wish to change your current configuration. This section outlines alternative configurations.

You will need to reconfigure the hard disk if you wish to use any of the following:

* an operating system other than MS-DOS

* a version of MS-DOS other than the one supplied with the PC

- additional logical drives

- other operating systems as well as MS-DOS

Note If you decide to reconfigure your hard disk using FDISK, be sure to have copies of any files existing on the hard disk, that you want to keep, as the FDISK program destroys all existing files.

First of all, you must use the command HDWIPE. This is a low-level format that wipes the disk of any data, effectively producing a clean disk. It does this by writing blank information onto the disk. It is stored in a subdirectory on the floppy disk supplied with your PC: \HD

If you intend to use an operating system other than the supplied MS-DOS, use that operating system to configure the disk.

Otherwise, FDISK is the MS-DOS command which is used next, to define the layout of the disk by defining the number and size of the partitions.

FDISK provides a number of options which are summarised below. A series of menus is displayed to help you create and delete partitions. The reason for creating partitions is to separate the hard disk into individual areas to use as separate drives or for use by other operating systems.

Before you use the FDISK command, you should decide how many partitions you want and what sizes you want the logical drives to be.

For detailed instructions on how to reconfigure the hard disk, using MS-DOS, see the FDISK command in Part 2, Chapter 8.

Using logical drives

Logical drives provide a means of breaking up a physical hard disk into distinct areas which may be treated as if they were separate physical storage units.

This is useful for keeping different types of data apart. If, for example, application programs are kept in one logical drive and data files in another, it would be easy to manipulate collections of data: the contents of a logical drive could be wiped off the disk by reformatting just that drive, but the contents of the whole hard disk would not be lost: you can re-format a disk or a logical drive, but not a directory.

This is, therefore, a more powerful division than that provided by subdirectories, which is another way of organising and separating data on a hard disk.

Any size of disk can use logical drives.

You can apportion disk space to the logical drives as appropriate to your requirements. For example, if you have an 80Mb hard disk you could apportion the space with three logical drives: two with 30Mb, and one with 20Mb; or four logical drives with 20Mb each, and so on.

First, you should create a primary DOS partition and then an extended DOS partition and then logical drives.

You can create up to 16 logical drives. Given that drives A and B refer to the floppy disk drive; the letter 'C' will be assigned to the first logical drive in the Primary Partition, then "D" to the second logical drive, then "E" and so on to the logical drives in the Extended Partition.

Using more than one operating system

If, for some reason, you wish to use more than one operating system, you will find that it is supplied with a program equivalent to the MS-DOS FDISK command. Partitions on the hard disk reserved by such a program will be described by FDISK as "non-DOS partition".

A summary of the FDISK options

You can use FDISK to:

- Check whether a hard disk is configured or formatted

- Create a primary or single DOS partition

- Create an extended DOS partition

- Create logical drives in extended partitions

- Change the active partition

- Delete a primary DOS partition

- Delete an extended DOS partition

- Delete logical drive in an extended DOS partition

- Display partition information

- Select the next hard disk drive for partitioning on a system with multiple fixed disks

When you have configured the hard disk, you must format the disk. You must format each logical drive separately. If you have added a second hard disk, you must also format that separately.

When formatting Drive C:, use the FORMAT command with the /S option, to copy the appropriate system files onto the drive. When formatting subsequent drives, use the FORMAT command without the /S option.

The FORMAT command checks the hard disk for bad sectors and marks entries in the directory so that these sectors (areas) will not be used.

10. Floppy disks

Introduction

Floppy disks have undergone an enormous amount of technological development. At the same time they have accumulated a good deal of jargon terms.

In simple terms, disks are described according to their storage capacity which is measured in thousands or millions of bytes. The disk capacity is often called the disk size. These measurements provide a means for identifying disks of one generation of computing technology, from another generation.

10.1 Types of floppy disks

There are four generations of floppy disk technology:

1st generation   - low density 8 inch disks with 160 kilobytes of storage space.

2nd generation - low density 5.25 inch disks with 360 kilobytes of storage space and 3.5 inch disks with 720 kilobytes of storage space.

3rd generation - high density 5.25 inch disks with 1.2 megabytes of storage space

4th generation - high density 3.5 inch disks with 1.4 megabytes of storage space

All PC models can use the 2nd generation 3.5 inch disks, and PC5286 can also use the 4th generation.

The functions of floppy disks are to provide the means of transporting software and data from one PC to another. They are used to store programs that you buy; you can then use the disks to load the programs into your PC, or copy the programs from the floppy disks to a hard disk.

One advantage floppy disks have is that they are easier to use than hard disks, initially: hard disks need to undergo a complicated preparation process, involving formatting and configuring with information which will be used whenever the hard disk is used. This involves making decisions about how you intend to use the disk for all your future work. If you should need to change this at a later date, you would have to save all the work held on the disk and re-format and re-configure the disk.

However, processing and using floppy disks is time consuming: formatting, loading and saving data is much slower using floppy disks.

Although you still need to use floppy disks with hard disk PCs, the majority of your work will be done on the hard disk.

10.2 Buying floppy disks

The type of floppy disk you should buy to use on your PC is :

- 3.5 inch
- double-sided
- soft-sectored
- 720 kilobyte formatted capacity
   or 1.44 megabyte formatted capacity if you are using PC5286

10.3 Preparing floppy disks

Before you can use a new disk for the first time you must format it. If you are using MS-DOS as the operating system on your PC, see Part 2 for instructions on how to do this. The command you will need to use is the MS-DOS FORMAT command which is listed alphabetically with all the other commands in Chapter 8.

PC5286 only - Be sure to use the correct syntax of the FORMAT command. If you intend to store 1.44 Mb of data you should buy disks designed for this amount. Such disks are identified as High Density disks (HD).

If, however, you buy non-High Density disks, it is unwise to attempt to format them to store 1.44Mb of data. You should always format such disks to store 720K of data.

The command to use to format the disk to store 720K is as follows:

FORMAT A: /T:80 /N:9

Note PC5086 will always format the disk to store 720K

This command will format the disk with 9 sectors per track, rather than the FORMAT command's default value which would be 18 sectors per track.

Once formatted for high-density, it is unwise to re-format for low density.

10.4 Care of disks

You should take care of your disks by not putting them near any magnetic sources such as televisions, telephones or hi-fi loudspeakers.

Disks should not be subjected to excessive heat or cold and should not be left in direct sunlight.

Take care not to allow your disks to become dusty, and never touch the magnetic surface beneath the protective metal shutter of the disk.

If you want to write-protect the data on a floppy disk to prevent the contents from being accidentally wiped off or overwritten OPEN the write-protect shutter. This is the small. slider at the bottom righthand corner of the disk.

Write-Protect Shutter.

11. Expansion Slots and Option Links

11.1 Expansion Slots

Expansion slots are used to connect expansion cards to the main motherboard.

Expansion cards are sections of electronic circuitry, each on a single piece of printed circuit board. They are used to provide a PC system with extra functions.

The expansion bus of PC5086 operates at a speed of 4.77 megahertz, and the expansion bus of PC5286 operates at a speed of 8 megahertz.

Note Although the processor operates at greater speeds, it is automatically synchronized to accommodate the speed of the expansion bus.

Industry standard PCs are designed, normally, to be flexible and expandable, leaving room for features to be added according to individual requirements.

Some features are necessary for fundamental use of the PC. Those features which are necessary or most popular have been built into your PC:

- floppy disk controller

- video controller (video adaptor)

- mouse adaptor

- parallel interface

- serial interface (asynchronous communications adaptor)

- hard disk interface

Your PC contains two additional expansion slots which allow the PC to be upgraded for more specialised requirements, for example, a modem expansion card could be added, or an LAN (Local Area Network) to allow the PC to be incorporated in a network of computers.

In PC5086, there are two 8 bit ISA half length expansion slots and in PC5286 there are two 16 bit ISA half length expansion. (ISA stands for Industry Standard Architecture).

Expansion card specification

Top slot:

100mm

200mm

Bottom slot:

100mm

170mm
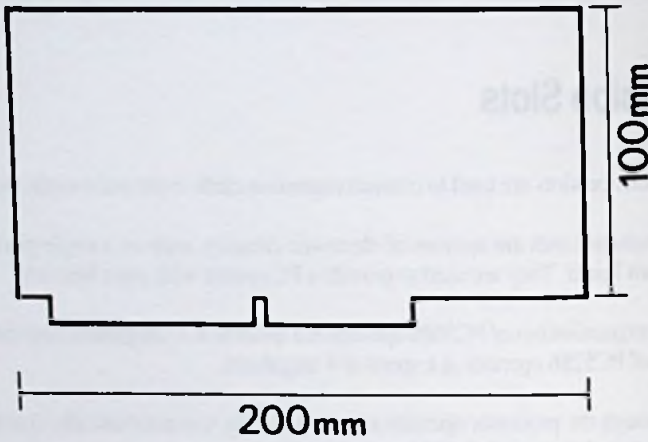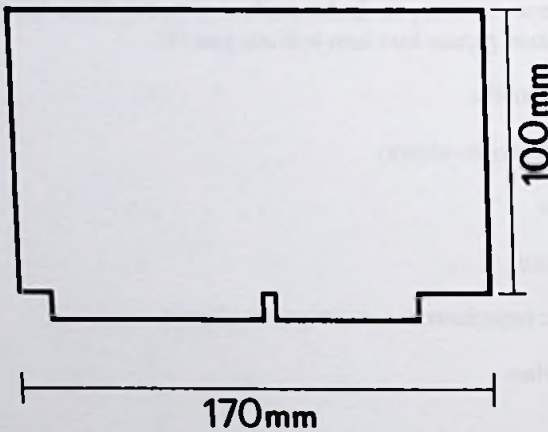
The total power available to the expansion slots is:

+5V± 5%: 2A max

+12V± 5%: 0.5A max

-12V± 10%: 0.1A max

-5V±10%: 0.1A max

If you want to exchange a built-in feature for one supplied on an expansion card, you must first disable the built-in feature. For example, if you want to replace the built-in graphics adaptor or hard disk controller, with another of your choice, supplied on an expansion card, change the appropriate option link and use the SETUP utility, for that feature. Details of the option links are given in Section 11.2 and of the SETUP utility in Chapter 4.

Note When a COM1 serial card has been plugged into the expansion bus, the PC can detect that one has been fitted and will automatically reconfigure the internal port as COM2. See the SETUP utility in Chapter 4 for more information.

Instructions on how to fit an expansion card are given on the following pages.

Fitting an expansion card

- Make sure the power to the PC is switched OFF.

- Disconnect the mouse and keyboard cables from the connectors on the underside of the system unit.

- Then open the system unit by undoing the screws on the bottom panel of the system unit and then slide the top cover forwards, off the unit.
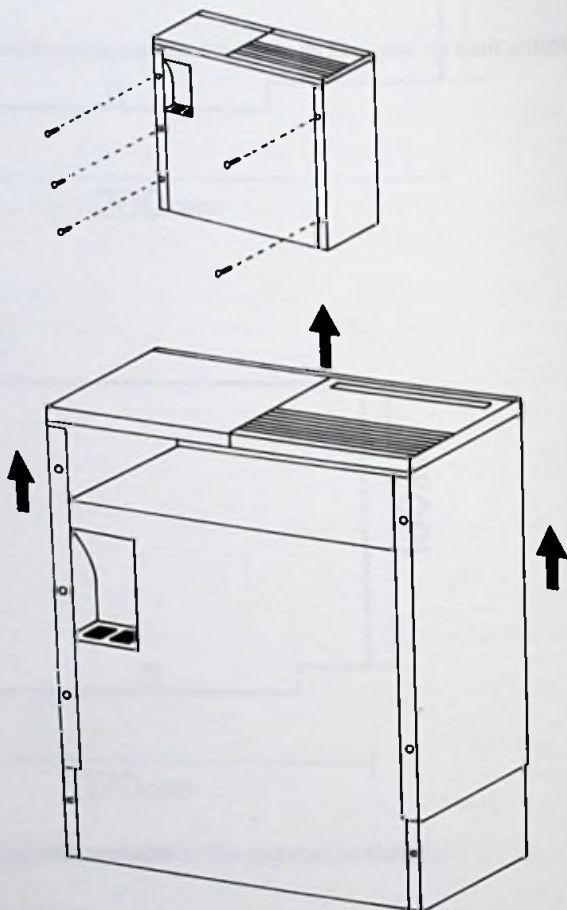
You should now have full access to the motherboard. See the diagram on the following page.

Expansion Card Sockets
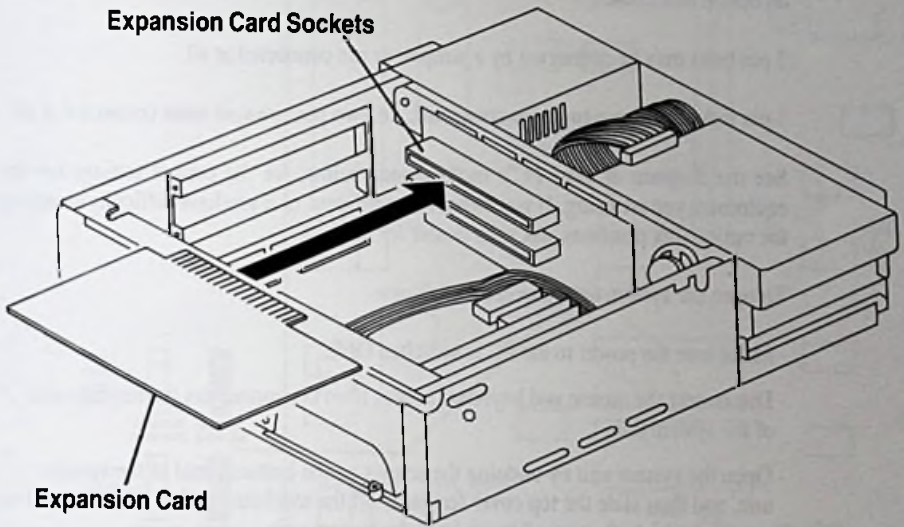
Expansion Card

11.2 Option Links

A number of features are built into your PC that would normally have to be fitted on expansion cards. If you want to use alternative peripherals, the built-in features must be disabled. Such features can be disabled by changing the positions of the option links. The option links will not otherwise require any attention.

The option links are built onto the motherboard inside the PC system unit.

The links consist of 2 or 3 metal pins which can be connected using plastic jumpers. Fitting or removing a jumper, as appropriate, enables or disables the feature to which an option link relates.

2 pin links may be connected by a jumper, or not connected at all.

3 pin links may have two pins connected, i.e. two positions, or none connected at all.

See the diagram of your PC's motherboard below, for the correct settings for the equipment you are using. If you do not feel confident, or if you have difficulty changing the option link positions, ask your dealer for help.

To open the system unit, proceed as follows:

- Make sure the power to the PC is switched OFF.

- Disconnect the mouse and keyboard cables from the connectors on the underside of the system unit.

- Open the system unit by undoing the screws on the bottom panel of the system unit, and then slide the top cover forwards off the machine. Refer to the diagram on page 11-4 which illustrates how to open the system unit.

You should now have full access to the motherboard. Once you have opened the cover of the system unit, keep one hand on the PC cabinet at all times to prevent static charges.

PC5086 - Built-in Peripheral Option Links

The motherboard inside the PC will look something like this:

LK1
INTERNAL
VIDEO
ADAPTOR

DISABLE   ENABLE
(LINK OFF) (LINK ON)

LK7
HARD
DISK

DISABLE   ENABLE
(LINK OFF) (LINK ON)
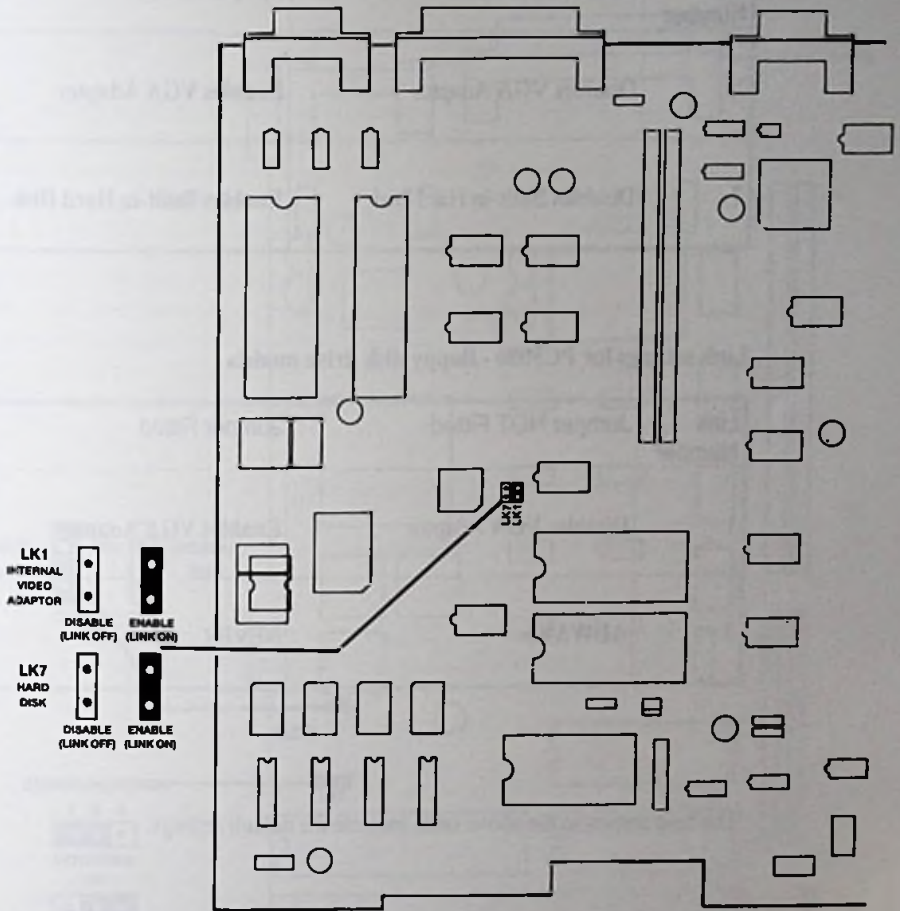
Note that the shaded links are those which have a jumper fitted as the default setting.

The default link settings vary depending on whether a hard disk drive is fitted in the PC:

Link settings for PC5086 - hard disk model

Link Number	Jumper NOT Fitted	Jumper Fitted
1	Disables VGA Adaptor	**Enables VGA Adaptor**
7	Disables Built-in Hard Disk	**Enables Built-in Hard Disk**

Link settings for PC5086 - floppy disk drive models

Link Number	Jumper NOT Fitted	Jumper Fitted
1	Disables VGA Adaptor	**Enables VGA Adaptor**
7	**ALWAYS**	NEVER

The bold entries in the above table indicate the default settings.

PC5286 Built-in Peripheral Option Links

The motherboard inside the PC will look something like this:

ENABLE VGA   OR   DISABLE VGA
ON   OFF

LK1

CMOS RAM POWER — LK7

1 2 3
POWERED
OR
1 2 3
DISCHARGED
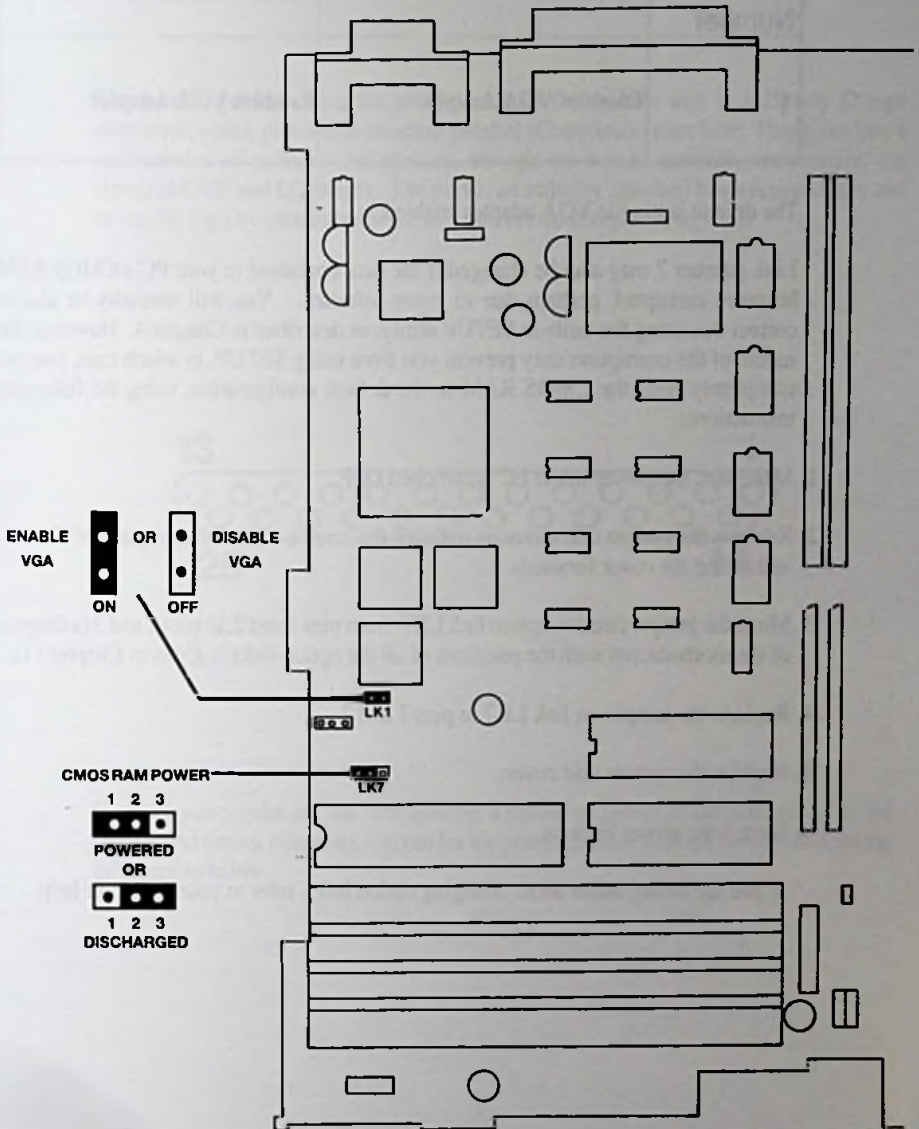
PC5286 Link settings

The option link in PC5286 is used to control the VGA adaptor, as follows:

Link Number	Jumper NOT Fitted	Jumper Fitted
1	Disables VGA Adaptor	**Enables VGA Adaptor**

The default setting is VGA adaptor enabled.

Link number 7 may also be changed if the data contained in your PC's CMOS RAM becomes corrupted, perhaps due to rogue software. You will normally be able to correct this using the built-in SETUP utility, as described in Chapter 4. However, the nature of the corruption may prevent you from using SETUP, in which case, you can completely reset the CMOS RAM to the default configuration, using the following instructions:

1. Make sure the power to the PC is switched OFF.

2. Remove the system unit cover by undoing the screws on the bottom panel of the unit, and lifting the cover forwards.

3. Move the jumper fitted to option link LK7, from pins 1 and 2, to pins 2 and 3 (a diagram of the motherboard with the positions of all the option links is given in Chapter 11).

4. Replace the jumper on link LK7 to pins 1 and 2

5. Replace the system unit cover.

6. Switch the power back on.

If you are in any doubt about changing option links, refer to your dealer for help.

12. Parallel and Serial ports

12.1 The Parallel Port

The parallel printer connector on the back of the system unit is a 25-way D-type connector, which provides a standard parallel (Centronics) interface. This gives you a wide choice of printers and plotters, though we would naturally recommend the Amstrad DMP and LQ ranges. The port is an industry standard bi-directional port and so can be used by certain software to connect two computers together.
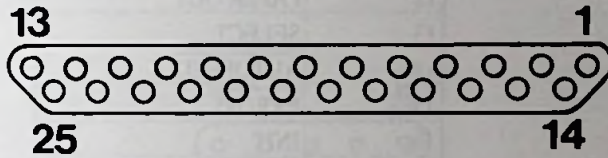
If you or your dealer are not sure whether a printer or plotter is suitable, compare the pin-out and timing information given for the printer/plotter with the pin-out and timing information below.

In the following table, the **Pin** entries refer to the pin numbers on the Computer's parallel port. These Pin numbers are usually different from those on the printer.

Pin	Signal name
1	$\overline{\text{STROBE}}$
2	DATA 0
3	DATA 1
4	DATA 2
5	DATA 3
6	DATA 4
7	DATA 5
8	DATA 6
9	DATA 7
10	ACKNOWLEDGE
11	BUSY
12	PAPER OUT
13	SELECT
14	AUTOFEED
15	$\overline{\text{ERROR}}$
16	INIT
17	$\overline{\text{SLCT IN}}$
18 to 25	GND

The 'standard' IBM PC-to-Centronics printer cable should work correctly. This is a cable which has a 'male' 25-way D-type connector on one end that will fit into the 'female' 25-way D-type on the back of your PC system unit. The connector at the other end of the cable may vary, but it would normally have a 36-way "Amphenol" connector.

The 'male' end of the cable should be plugged into the parallel port on the system unit and the other end to the equivalent connector on the printer/plotter. If the 'male' plug on the end of the lead has slots for screws, use the screws supplied with the lead to attach it securely to the Parallel Port. Look at the printer/plotter's own manual to see how it recommends securing the lead to its connector.

If you attach a printer, find out from its manual which character set the printer uses. If it doesn't use the UK 8-bit ASCII character set, see if there is a switch on the printer that can change the character set used by the printer.

If you wish to use a parallel interface, other than the one supplied on the motherboard of your PC, as LPT1, fit the alternative parallel interface and re-start the PC. The new parallel interface will be detected, and the system will reconfigure automatically, disabling the built-in parallel port and enabling the newly fitted one. This auto-configuration facility is part of the SETUP utility which is described in Chapter 4.

12.2 The Serial port

The serial interface connector on the back of the system unit is a 9-way, D-type connector, which provides a standard PC RS232C interface and so can be used to connect any communications link or printer that uses the standard RS232C serial interface. This gives you a wide choice of modems, communications links and printers.
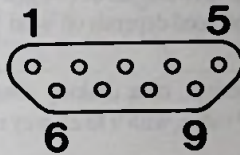
If you, or your dealer, are not sure whether a communications link or a printer is suitable, compare the pin-out given for the device with the pin-out details in the following table:

Pin	Description	Signal name
1	Carrier Detect	DCD
2	Receive Data	RXD
3	Transmit Data	TXD
4	Data Terminal RDY	DTR
5	Signal Ground	GND
6	Data Set Ready	DSR
7	Request to Send	RTS
8	Clear to Send	CTS
9	Ring Indicator	RI

Two connector standards are found on RS232 equipment: the original 25-way connector on modems and printers, and the 9-way connector commonly found on PC's.

To make connections between the device and your PC, you will need a suitable cable. The type of cable you need depends on what you want to connect to the Serial Port:

• To connect to a modem, or a desktop computer wired as a modem, you need a 'one-to-one' RS232 cable, with 9 to 25-way conversion.

• To connect to a serial printer, a terminal, or a desktop computer wired as a terminal, you need a 'null modem' RS232 cable, with 9 to 25-way conversion.

• To connect to another PC with a standard 9-way connector, you need a 'null-modem' 9-way to 9-way cable.

Refer to the diagrams on the following page.

One-to-one 9 to 25-way conversion cable

9 way female   25 way male

1	DCD	—	DCD	8
2	RXD	—	RXD	3
3	TXD	—	TXD	2
4	DTR	—	DTR	20
5	GND	—	GND	7
6	DSR	—	DSR	6
7	RTS	—	RTS	4
8	CTS	—	CTS	5
9	RI	—	RI	22
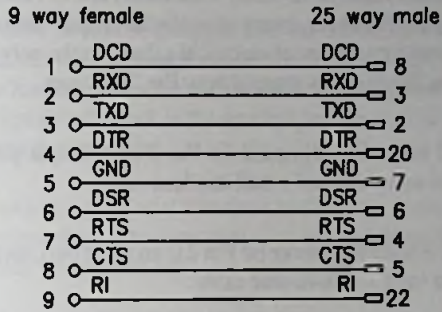
Null modem 9 to 25-way conversion cable

9 way female   25 way female

1	DCD		DCD	8
2	RXD		RXD	3
3	TXD		TXD	2
4	DTR		DTR	20
5	GND		GND	7
6	DSR		DSR	6
7	RTS		RTS	4
8	CTS		CTS	5
9	RI		RI	22

Null modem 9-way to 9-way cable

9 way female   9 way female

1	DCD		DCD	1
2	RXD		RXD	2
3	TXD		TXD	3
4	DTR		DTR	4
5	GND		GND	5
6	DSR		DSR	6
7	RTS		RTS	7
8	CTS		CTS	8
9	RI		RI	9
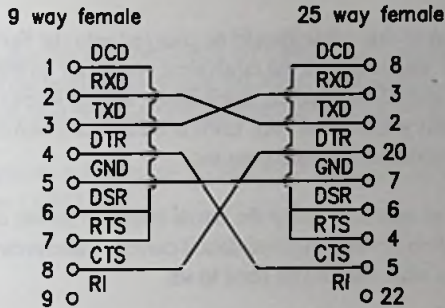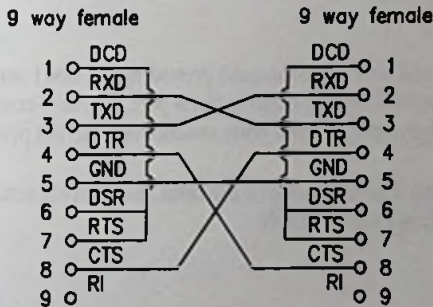
One way of checking whether a device with a 25-way connector is wired as a modem or as a terminal is to look at the type of connector on the device. Conventionally, devices wired as terminals have 'male' connectors and devices wired as modems have 'female' connectors. However, many manufacturers put 'female' connectors on both types of equipment for reasons of electrical safety, so the only sure way of telling is by finding out from the device's manual how Pin 2 is wired:

- If Pin 2 is used to **transmit** (ie Pin 2 is an output pin), then the device is wired as a terminal and you need a **null modem** cable.

- If Pin 2 is used to **receive** (ie Pin 2 is an input pin), then the device is wired as a modem and you need a **one-to-one** cable.

The cable you use should have a 'female' plug on one end to fit the 'male' connector on your PC. The type of plug it should have on the other end depends on whether the device being connected to the PC has a 'male' or 'female' connector. Your dealer should be able to help you here.

One end of this cable should be plugged into the Serial Port on the back of your PC and the other end into the equivalent connector on the device. If the 'female' plug on the PC end of the lead has screw holes, use the screws supplied with the lead to attach it securely to the Serial Port. Look at the device's own manual to see how it recommends securing the lead to its connector.

The next step is to set up the Serial Interface so that data is transmitted with the right characteristics and received data is correctly interpreted. Your device's manual should tell you what values you need to set.

If you plan to use the Serial Interface to link your PC with a particular printer, terminal or modem indefinitely, it would be a good idea to include the necessary MODE commands in the AUTOEXEC.BAT file on your hard disk. These commands could be added easily using the RPED editor. For details of the MODE command, see Part 2 Chapter 8.

If you add an expansion card providing a COM1 serial port that would conflict with the electronics of the built-in serial port, the Auto-configuration facility, in the PC, will reconfigure the internal ports around the external ports that it detects.

Note that it is preferable, if possible, to adjust the setting of the serial interface on your expansion card to COM2.

device being connected to the PC has a 'male' or 'female' connector. Your dealer should be able to help you here.

One end of this cable should be plugged into the Serial Port on the back of your PC and the other end into the equivalent connector on the device. If the 'female' plug on the PC end of the lead has screw holes, use the screws supplied with the lead to attach it securely to the Serial Port. Look at the device's own manual to see how it recommends securing the lead to its connector.

The next step is to set up the Serial Interface so that data is transmitted with the right characteristics and received data is correctly interpreted. Your device's manual should tell you what values you need to set.

If you plan to use the Serial Interface to link your PC with a particular printer, terminal or modem indefinitely, it would be a good idea to include the necessary MODE commands in the AUTOEXEC.BAT file on your hard disk. These commands could be added easily using the RPED editor. For details of the MODE command, see Part 2 Chapter 8.

If you add an expansion card providing a COM1 serial port that would conflict with the electronics of the built-in serial port, the Auto-configuration facility, in the PC, will reconfigure the internal ports around the external ports that it detects.

Note that it is preferable, if possible, to adjust the setting of the serial interface on your expansion card to COM2.

13. Safety and Maintenance

13.1 Backing up data

Hard disks are designed to be extremely reliable and to have a long life, but like all mechanical devices, they can break down or be damaged by misuse or accident. There is also a possibility that the wrong command could be typed, and data lost. The hard disk can always be repaired or replaced if it goes wrong; what is potentially much more serious is the loss of data that might occur after such a mishap. Forty megabytes can easily represent years of work, irreplaceable financial records, or invaluable customer records.

This problem has existed ever since the start of computing. So, it is wise to keep copies of your data and programs. A copy made for safety's sake is known as a "a backup". Backups can be made of the entire hard disk every day (or even more often), or just a file or two every week or fortnight.

There are a number of ways that data can be backed up. There are two commonly used methods: copying files from the hard disk onto floppy disks, which does not involve any extra equipment and is quite convenient, and secondly, by copying large amounts of data, very quickly, onto tape, using a tape-streamer. If you have such equipment, follow the instructions supplied with it.

Backups can be quite time consuming, and you should weigh up the advantages of security against time taken to create the backups. For example, if you are writing a book using your PC, the loss and subsequent re-typing of a morning's work might be an acceptable risk. Anything more than a day's work lost would probably be unacceptable - in which case, you would want to make a backup daily (i.e. at the end of each day's work).

The process of making backups is simple, but needs to be done regularly to be effective.

You will need a number of blank (i.e. formatted) floppy disks.

A hard disk can have the same capacity as sixty floppy disks, so at first sight, backing up a hard disk onto sixty floppy disks seems an awesome undertaking. Since it can take over a minute and a half to write on each floppy, it could seem that backing up would take at least two hours.

Fortunately, this is often not the case. The MS-DOS BACKUP program, supplied with your PC, has various labour-saving options. You can just copy parts of the hard disk, or files that have been changed since the last back up. Also, you will not need to back up any programs that originally came on floppy disks (as long as you keep them somewhere safe) because you can always re-install them. But you should keep backups of any information you generate.

Exactly of what, and how frequently, you make backups is therefore up to you. A popular method is to have five disks, one for each working day, onto which that day's work is backed up. Then at the end of the week, everything important is copied onto a master set of floppy disks, and the day by day floppies can be re-used. It is a good idea to have at least two sets of master disks in use as back ups, and to alternate between them (i.e. backup onto one set one week, and onto the other the next).

This way, if you have a power cut or accident whilst you are making the backup, and both the hard disk and the floppy are ruined, you can always go back to your last backup. This would not be possible if you had just used one set, as you would have just lost your last back up by copying over it!

On a daily basis, this scheme would require the /M option of the MS-DOS BACKUP command, and on a weekly basis, use the /D option. See Part 2, chapter 8, for full details of the BACKUP command.

Whatever scheme you choose, it is important to make backing-up a habit that is religiously observed.

13.2 Transporting a hard disk PC

Whenever you move your hard disk PC, take the following precautions:

- Do not move the unit from a cold environment (e.g. the boot of a car) into a warm environment and attempt to use it immediately - wait until the unit has reached room temperature.

- Take special care when transporting and handling the system unit (which contains the hard disk drive) - it is very sensitive to vibration and will almost certainly be damaged if you drop it.

Note The heads of your hard disk are automatically parked when the power is removed.

13.3 Fitting plugs

There are certain precautions you should take when changing the moulded plug, fitted to the computer's power supply cable. See Section **1.4 Safety**, for detailed information.

13.4 Replacing the computer's CMOS RAM - PC5086 only

The CMOS RAM is fitted with a long-life Lithium battery. If you ever need to change this battery, a message will be displayed warning you that the CMOS battery has failed. The battery cannot be replaced or recharged, the complete CMOS RAM must be replaced. You should ask your dealer to fit a new one for you.

```
                         WARNING

    The CMOS RAM contains a Lithium battery.  Danger of explosion if
    recharging is attempted.  Replace the CMOS RAM with the same type
    recommended by Amstrad PLC.  Do not dispose of the old CMOS RAM
    in a fire.
```

The CMOS RAM in **PC5286** is not replaceable. However, there is a Ni-Cad battery which can be replaced. Ask your dealer to arrange this for you.

Note that if PC5286 is left switched off for some months, the battery will become discharged and you will need to leave the PC switched on for approximately 16 hours to fully recharge the battery.

14. Troubleshooting and System Messages

This Chapter looks at what might have gone wrong when your PC or your program does not work in the way you expect. If you cannot find the solution to your problem here, find out whether the problem relates to MS-DOS by checking the list of MS-DOS system messages in Part 2, Chapter 10. If you still cannot solve the problem, consult your dealer.

Note Your PC will normally bleep if it fails to read a disk or if it cannot accept the character you just typed. If you do not hear any bleep, adjust the volume control.

14.1 Trouble when starting or resetting your PC

- **If nothing happens at all**

  Check that the mains socket is working by plugging in and switching on a lamp you know is working.

  Check that the PC's mains plug is correctly wired and that the fuse in the plug has not blown.

  If neither of these actions shows you where the problem is, consult your dealer.

- **The PC asks you to insert a System disk.**

  Check that you inserted the right disk and then reset the machine. If it asks again, the disk it is trying to read is either damaged, or it does not have any operating system software on it. Try another System disk: if you do not have another System disk or if your PC fails to read this disk as well, consult your dealer. The problem could simply be that your disk drive needs cleaning, in which case your dealer will be able to tell you which cleaning product is recommended for use on your PC. As soon as possible after this failure, use the MS-DOS CHKDSK command (see Part 2, Chapter 8) to find out whether the disk that failed was damaged.

- Software is read into your PC's memory but the machine appears not to be working at all

  Check that you inserted the right disk and then reset the machine. If your PC does not appear to work again, the software on your disk has been corrupted. Try another System disk; if you do not have another System disk, consult your dealer.

- When all the software has been read in, the screen display is plausible but is not what you expected

  You have used either a disk that has been set up to run an application program immediately after loading the system software or a disk with different system software on it. You will be able to tell what is wrong by what you see displayed on the screen. Either leave the application program by holding down the [Ctrl] key and pressing the [Break] key, or reset your PC using another System disk.

- PC5286 only

  If the data contained in your PC's CMOS RAM becomes corrupted, perhaps due to rogue software, you will normally be able to correct this using the built-in SETUP utility, as described in Chapter 4. However, the nature of the corruption may prevent you from using SETUP, in which case, you can completely reset the CMOS RAM to the default configuration, using the following instructions:

1. Make sure the power to the PC is switched OFF.

2. Remove the system unit cover by undoing the screws on the bottom panel of the unit, and lifting the cover forwards.

3. Move the jumper fitted to option link LK7, from pins 1 and 2, to pins 2 and 3 (a diagram of the motherboard with the positions of all the option links is given in Chapter 11).

4. Replace the jumper on link LK7 to pins 1 and 2

5. Replace the system unit cover.

6. Switch the power back on.

   If you are in any doubt about changing option links, refer to your dealer for help.

14.2 Trouble with the keyboard

- **If your PC fails to respond to what you type**

    Check whether the cursor is flashing on the screen. If it is, check that the keyboard cable is connected firmly into the keyboard socket on the PC System Unit. If your PC still does not respond, switch off, wait for a little while and then switch back on and go through the normal Startup procedure. If your PC still fails to repond to your keyboard, consult your dealer.

    If the cursor is not flashing, something in your program has caused your PC to appear not to be working at all. Put your System disk into Drive A and reset your machine by holding down [Ctrl] and [Alt] and pressing [Del]. If your PC still fails to respond, release the disk(s) from the drive(s), switch your machine off and then switch it on again and go through the standard PC Startup procedure (see Chapter 3).

    Check that the switch at the back of the keyboard is set correctly for your PC:

    - PC5086 should be set to **XT**

    - PC5286 should be set to **AT**

    If your PC still fails to respond to your keyboard, consult your dealer.

- **If you get cursor movement when you thought you were using the Numeric keypad (and vice versa)**

    Press the [Num Lock] key and then try again.

- **If you get upper case letters when you were expecting lower case letters**

    Press the [Caps Lock] key and try again.

- **If the characters you type in overwrite what you have already typed in, rather than get inserted into your text**

    Press the [Insert] key and try again.

- **If the keys do not produce the action/characters you expect**

    You may have used the KEYB *xx* utility from a different DOS - compatible operating system. You must use the operating systems supplied with your PC to get full keyboard support.

14.3 Trouble with a disk drive

Floppy Disk drive

If your PC frequently reports that it cannot read or write to a disk drive, it could be that your disk drive is the problem rather than your disks. A likely cause of trouble is that the disk drive is in need of cleaning.

A number of cleaners are available but not all are recommended for use on your PC. Your dealer will be able to advise you on which one to use.

If cleaning the disk drive does not solve the problem, either get the drive fixed or replace it with a new one as soon as possible. Your dealer will be able to help you here. Do not limp on with a defective drive - you could easily damage your disks.

There is no alternative to getting a defective disk drive fixed.

Hard Disk drive

If your system is not responding as you think it should, then you might have a problem with the Hard Disk. However, it is possible that the problem lies elsewhere.

If the computer seems to be ignoring the Hard Disk, claiming that it is an "invalid drive" you may not have carried out the installation procedure, correctly, in Chapter 3. Remember - until you have, the Hard Disk is NOT available for use.

Getting one of the following messages means that you have a hardware fault of some description, and you should consult your dealer.

Hard Disk errors:

Hard Disk not ready

Fixed Disk 0 Failure

Fixed Disk 1 Failure

Fixed Disk Conroller Failure

Note: If you attempt to park a third party Hard Disk (ie. one not supplied as originally fitted equipment) you may receive the following message:

Invalid drive specification

If a third party drive is fitted to your PC, the error message "1701" displayed immediately after you have switched on your PC simply means: Hard Disk not working. You will have to consult your dealer for a more detailed diagnosis.

14.4 Trouble with a printer

This section covers the problems most commonly experienced with printers. However, you should refer to the manual which accompanies the printer for specific help.

- **You send data to the printer but it does not respond.**

  Check that the printer is switched on and on-line.

Note: You often have to abandon the current printing and start again, if you switch a printer on-line after your PC has started sending data to the printer.

- **You send data to the printer and the printer head moves but nothing is printed.**

  Check that you have a ribbon in the printer.

- **You use the MS-DOS MODE command to change the number of characters per line (the pitch) or the number of lines per inch (the line pitch) but no change is seen in what the printer produces.**

  Check the printer's manual to see whether the printer can print different numbers of characters per line or lines per inch. The DMP1, for example, only has one possible line pitch.

- **You set up a document on your screen containing pound signs but when you print it, all the pound signs have been replaced by hashes, for example.**

  Your computer and your printer are not using exactly the same character set. Look in the printer's manual to see if there is a setting on the printer that will give you pound signs (for example, the European IBM character set option on the DMP3160).

14.5 Disk Device errors

Whenever a disk or device error occurs, the operating system displays a message of the form:

error **READING/WRITING DRIVE*n*:**
Abort, Retry, Ignore?

or

error **READING/WRITING DRIVE*n*:**
Abort, Retry, Ignore, Fail?

error specifies the type of error that has occurred. The options are:

Bad call format error
Bad command error
Bad media type
Bad unit error
Data error
FCB unavailable
General failure
Invalid disk change
I/O error
Lock violation
Non-DOS disk error
No paper error
Not ready error
Read fault error
Sector not found error
Seek error
Sharing violation
Write fault error
Write protect error

You should respond to this sort of error message by typing one of the following:

A
for ABORT - If you select this option, the program that called the function that caused the error will be terminated.

I
for IGNORE - If you select this option, MS-DOS will continue as if no error had occurred. Be warned that if you select this option, the data that was being read/written when the error occurred will probably be lost.

R

RETRY - When this option is selected, MS-DOS will attempt the same operation that caused the error. If it occured as the result of a spurious fault then this will correct the problem with no side-effects. If the fault occurred because, for example, the drive door was not closed, this option gives you the chance to correct the error then try again. It is always advisable to select the R (Retry) option if possible, as the other options are likely to result in the software not performing as you expect.

F

FAIL - When this option is selected, the function that caused the error will return to the calling program with a value, suggesting that an error has occurred. It is then the responsibility of the application program to take any corrective measures necessary.

14.6 Non-fatal messages

When you first switch on your PC, the BIOS, contained within the machine, may produce one of several messages as a result of the various checks and tests it performs. The "non-fatal" messages advise you of the state of the machine or any faults that may be corrected then and there.

Keyboard error

This message may be produced if something is holding down one of the keys on the keyboard; or if the keyboard cable has not been connected to the system unit correctly; or if the switch on the back of the keyboard is set incorrectly for the PC you are using:

PC5086 should have the keyboard switch set to **XT**
PC5286 should have the keyboard switch set to **AT** .

Real time clock error

This message is displayed if the time and the date held in your PC's CMOS RAM are invalid.

System CMOS checksum bad - Run SETUP
Press <F1> to continue, <F2> to Setup

Extra-CMOS checksum bad - Run SETUP
Press <F1> to continue, <F2> to Setup

Press <F1> to resume, <F2> to Setup

These messages are displayed when the contents of the CMOS RAM are invalid. You must run the SETUP utility to change this. SETUP is described in Chapter 4.

System battery is dead - Replace and run SETUP

This message is produced when PC5086 detects that the long life Lithium battery, that is built into the CMOS RAM, is exhausted. The battery cannot be replaced or recharged, the complete CMOS RAM must be replaced. Ask your dealer to fit a new one for you.

> **WARNING - PC5086**
>
> The CMOS RAM, in PC5086, contains a Lithium battery. Danger of explosion if recharging is attempted. Replace the CMOS RAM with the same type recommended by Amstrad PLC. Do not dispose of the old CMOS RAM in the fire.

System battery has discharged - Run SETUP

This message is produced on PC5286 when the battery becomes discharged. If PC5286 is left switched off for some months, the battery will become discharged. The CMOS RAM in **PC5286** is not replaceable, it just needs recharging. To fully recharge the battery, leave the PC switched on for approximately 16 hours.

Diskettte error or non system disk
Please insert bootable diskette and press any key

This message will be produced when there is no hard disk fitted. If PC5286 produces this message, it could also mean that the CMOS RAM does not contain the correct type number. If you know that the computer has a hard disk fitted, run the SETUP utility. See Chapter 4 for details of SETUP.

Bad diskette boot record or corrupted disk
Please insert bootable diskette

The disk you are trying to boot from is corrupted.

Memory size does not match CMOS - Run SETUP

When this message is displayed, you should check all the memory allocation controls in SETUP.

Coprocessor internal register error

This message indicates that the maths co-processor is either faulty or not fitted properly.

The following messages relate to the auto-configuration of the on-board COM and LPT ports:

External COM port detected, internal port configured as COM*n*

External LPT port detected, internal port disabled

The above two messages appear if external COM or LPT port(s) are detected.

External LPT port removed or changed, internal port configured as LPT*n*

External COM port removed or changed, internal port configured as COM*n*

The above two messages appear if external ports have been removed or changed so that the on-board ports have to be reconfigured.

Press F1 to confirm

The above message is left on-screen for maximum 8 seconds or until you press the F1 key. If you do confirm the new configuration, the following message is displayed:

New configuration confirmed

Note

n used above, is a placeholder for a port number, which should actually be displayed on your screen.

14.7 Fatal errors

The fatal error messages may be produced as a result of the various system tests the machine performs when it is first switched on You should try switching the machine off, wait a few seconds then turn it back on. However, if the same error message appears, make a note of it and consult your dealer.

Keyboard controller error
Keyboard interface error
Fixed Disk 0 Failure
Fixed Disk 1 Failure
Fixed Disk Controller Failure
xxxxxK RAM Failed at offset: xxxx
xxxxxxK System RAM Failed at offset: xxxx
xxxxxxK Shadow RAM Failed at offset: xxxx
xxxxxxK Extended RAM Failed at offset: xxxx
Monochrome adapter error
Color graphics adapter error
Diskette drive failure on drive [A|B]
System timer error

Note The system messages produced by MS-DOS are listed at the end of Part 2 of this manual.

PART TWO

Guide to MS-DOS version 3.30A

Part Two - Contents

1. Textual Conventions used in this guide

This guide uses a number of symbols and conventions to abbreviate descriptions of MS-DOS programs. You will need to be familiar with these symbols and know where to look them up to use MS-DOS.

Placeholders

A number of text placeholders are used throughout this guide when describing the form of various command lines. A placeholder is used to indicate where variables should be typed in a command line. So, when you see a description of an item printed in italic (ie *slanted text*) or with hyphens between the words if more than one word is used to describe a single item, you should replace them with the required information. This may be the name of a file or drive letter, for example.

Most symbols and text that must be typed in exactly as shown are printed in **bold text**. Any text not printed in italic must be typed in exactly as it is shown. There are certain punctuation symbols that should not be typed either - these are explained below.

For example, if you want a command to process a file called MYFILE.TXT, you should put MYFILE where we have put *filename*, and TXT where we have put *filetype* in the command line.

Most of the placeholders are explained alongside the command itself but those that are used more frequently are explained in the table below.

Square brackets

In addition, optional elements of the command line are surrounded by slanting square brackets: these elements may be left out altogether when typing the command line.

For example:

DATE *[dd-mm-yy]*

allows you to set the correct date by replacing the characters in italics, *dd-mm-yy*, with the correct numbers. However, the command DATE can be typed, without the optional parameters in the square brackets, to get MS-DOS to display the date as currently set

See Section 7.2 for more information.

Repeating options ...

It may be possible to repeat options, within the command line, a number of times. If this is the case, that particular option will be followed by three dots, for example:

PATH *path[;\path...]*

The above command line is used to represent any of the following command lines:

PATH *path*

PATH *path;\path*

PATH *path;\path;\path*

etc.

Bar symbol

Another convention used in this guide indicates that you must use only one of the given options. For example, if you see

ON|OFF

in a command line, it means you can only type **ON** or **OFF**. Do not type the bar character, |.

Spaces and commas

Command lines must be set out exactly as they are specified in the command description. This includes typing spaces and commas between items as they are specified.

If you have any difficulty in interpreting the Form of a command, check the examples given at the end of the description. This should clarify how the command should be used.

The following table describes the standard placeholders used throughout this manual.

command   a second command line may be included within a first command line.

d   refers to the drive letter.   It may also be followed by a colon, *d:*.

destination   When copying files, the destination is the name of the file you want the copy to be stored in.   The name should be specified as *filename.filetype* or the name of a logical device you want the contents of a file to be sent to. (See Section 6.2).

Root directory symbol   An important option to use correctly is the backslash character, \, when it is placed before a path in a command line.   If the path you wish to use starts with the root directory, you should include the backslash in your command line.   If the path you wish to use begins with the current directory, the backslash \ is not used at the start of the path.

path   The placeholder, path, must be replaced with the full details of the path. Start with either the current directory or the root directory on the drive, to the directory you want to work with.   If you start with the root directory, you must start the path with a backslash.   Start defining the path with the name of the directory closest to the current directory and finish with the name of the directory you want to work with.   The directory names should each be separated by single backslashes.   For example, the path between the root directory and a directory called SUBDIR1 might be **\DIR1\SUBDIR1**. (See Section 7.1).

source   The name of a file you want to copy written as *filename.filetype*, or the name of a logical device from which you want to take information and store it in a file. (See Section 6.2).

source-drive   the drive holding the file you want to copy, written as *d:* (*d:* is explained above).

string   refers to a value or a parameter that should be set to a string of characters.

target-drive	refers to the drive holding the disk on which you want to store a copy, written as *d*: (*d*: is explained above).
Wildcard characters	Wildcard characters are * and **?** . The question mark is used to represent any single valid character and the asterix represents any valid character or group of characters. Wildcards are entered in the command tail as a shorthand representation of a number of files: they allow you to use just one command line to tell MS-DOS to process a number of files. See Section 6.2 "Using Wildcards to specify a number of files", for more information.
Control codes	Control codes are used for special functions like clearing the screen, or terminating a program, and are represented in this manual as Ctrl-*character*. The [Ctrl] key should be held down while the character key is pressed. When a control code is displayed on the screen, it will normally be shown as a circumflex followed by a character, for example ^B.

Device names used under MS-DOS

The following list gives the names by which MS-DOS recognises the various devices in the PC:

MS-DOS name	Device
CON	Both the keyboard and the screen
AUX or COM1	The serial interface
COM2 COM3 COM4	Reserved for use if further communications ports are added to your PC
PRN or LPT1	The parallel printer port
LPT2 LPT3	Reserved for use if further parallel ports are added to your system.

Use these names whenever you need to specify to MS-DOS which devices you want to set up and use.

2. Introducing MS-DOS

MS-DOS is the operating system supplied with your PC, and it is installed either on the hard disk of the PC, or on floppy disks.

MS-DOS stands for Microsoft Disk Operating System.

When MS-DOS is loaded into the memory of the PC, you can give instructions to the PC by typing in command lines. MS-DOS will translate those command lines into instructions that the PC's processor understands.

So, you use MS-DOS to communicate with, and control the electronics of, the PC.

Your PC may not be able to run programs without a disk operating system.

2.1 The tasks for which MS-DOS may be used

- **Tailoring the computer to your needs**

  There are a number of ways that the computer can be adapted to suit individual requirements. You can change the way input and output devices are set up using MS-DOS; personalise the PC with your own system prompt and disk labels; and you can set the computer's clock to keep a record of when each file is used. See Chapter 4 for detailed instructions.

- **Processing floppy disks**

  Preparing and using floppy disks are essential activities. How to format, copy and check disks is described in Chapter 5.

- **Organising your work**

  There are various facilities that can be used to organise your files: you can use directories to group together related files; you can make new directories and remove directories that are no longer needed. You will also need to know how to create new files; make copies of files; erase unwanted files and change filenames. It is also possible to protect important files from losing data. All this information can be found in Chapter 6.

- **Running programs**

  The primary job of your computer is to run programs. There are various techniques that you can use to make programs run more efficiently. You can take shortcuts at the keyboard; redirect input and output to send files to, and receive files from, a serial link or to send files to a printer; set up a sequence of programs to run automatically, or when the PC is first switched on. Details of these techniques are given in Chapter 7.

2.2 Starting to use MS-DOS

If you have a hard disk PC, MS-DOS must be installed properly on the disk before it can be used. If you have a floppy disk drive PC, MS-DOS will have to be loaded from a floppy disk every time you switch on the PC.

See the installation section, in Part One, for instructions on how to install and start up MS-DOS for both hard disk drive and floppy disk drive models.

Once you have loaded MS-DOS correctly, you should then find out what commands are, and how to use them. The following chapters explain all about commands and how to run MS-DOS programs.

3. Using MS-DOS commands

This chapter explains what commands are and how to use them. Some simple example uses of the operating system are given later in the chapter so that you can practice using command lines.

What is a command?

A command is an MS-DOS instruction to initiate a program. It consists of the command name and the command tail:

- MS-DOS interprets the command name as an instruction to run the relevant program. The command name has two parts, first, the location of the file holding the program or the command, followed by the name of the file which contains the program.

- The command tail consists of the information the command requires to execute the program. For example, the names of the files to be processed and optional information, such as requesting the program to pause while the program is being executed. The Form or Syntax of the command will tell you exactly what information you need to supply. The Form of each command is included in a command description. See Chapter 8, where all the commands are listed alphabetically.

The Form statement indicates what file details you need to give to MS-DOS to make the programs process the files. For example:

FORM DIR *[d:][path][/P][/W]*

The above statement means that DIR is the MS-DOS command and

[d:][path] are the location details that the command needs. The [ ] indicate that this information is optional, if omitted the command operates on the current directory.

The form also tells you how to specify the program options you might want to take advantage of, like pausing while displaying data on the screen using a /P for example, or displaying only the filenames and filetypes, five files to a line, using the /W option.

More about the command name

The command name could refer to one of a few types of MS-DOS programs:

- an MS-DOS internal command (held in memory all the time that MS-DOS is loaded and therefore instantly accessible)

- an MS-DOS external command (stored either on your hard disk or on one of your MS-DOS disks)

- an MS-DOS or PC-DOS program

- a batch file (see Section 7.4 Setting up a sequence of commands).

The command name tells MS-DOS which command you want to use or which program you want to run. It has two parts:

- first, the location of the file holding the program or the command

- second, the name of the file.

Internal and External commands

INTERNAL commands are available whenever MS-DOS is loaded into your PC and are contained in a file called COMMAND.COM. They are loaded into memory when MS-DOS is loaded and are held in memory.

The rest of the commands are stored in files on your PC disks; these are called EXTERNAL commands. If the PC was supplied with a hard disk, the external commands should be stored in a subdirectory on the hard disk.

Command Lines

A command line consists of the name of the command, the names of the files you want the program to process and any other information the program needs.

If you wanted to copy a file called **FILE.X** to a file called **NEWDATA.PQ**, you would use the command line:

COPY FILE.X NEWDATA.PQ

   The command tail, in this case, the names of files to be processed

The command name, i.e. the name of the program you want to run

The command line must include all the information that MS-DOS needs to execute the program in the way appropriate to your task. This includes specifying where the program that you want to use is stored, that is, in which drive and in which directory.

MS-DOS internal commands are always available. For all other commands and programs, you have to tell MS-DOS where to find the program, that is, in which drive and in which directory the program is stored. For example, if you want to use the external command DISKCOPY, which you have stored on the built-in disk (either a hard disk, if your computer has one of these, or an area of your computer's memory that can be used as a disk), you would start your command line:

C:DISKCOPY ...

However, if the DISKCOPY program were stored in a directory called "COMMANDS" on Drive C, you might start your command line:

C:\COMMANDS\DISKCOPY ...

You must remember to include the location part of the command name when necessary, even if it is not included in the Form or Syntax of the command. Details of how to include the location in the command line are given in Section 7.1.

There are two circumstances in which you do not need to give the location of the file: when the files which hold the MS-DOS external commands are held in the current directory, which is where DOS will look for them, or if the **PATH** and **APPEND** commands have been run. These commands allow DOS to access files, that are not stored in the default directory, automatically, that is, without specifying the location of the file each time you want to use the command.

To find out how to use the MS-DOS programs and the details of the command lines you need to type, see Chapter 8 in this guide, where all the MS-DOS commands are listed alphabetically. The command line details are given in the command description as the "Form" of the command.

Which command to use

To find out which command you need to use for your particular task you could look at the summary of MS-DOS commands in Chapter 9.

Where to type command lines

The command line is typed at the System Prompt. This is a mark that is displayed on the screen by MS-DOS to show that it is ready to receive a command.

The System Prompt

The system prompt is displayed on the screen as soon as MS-DOS is ready to receive an instruction. It also tells you which drive is the current, default drive, by the letter indicated in the prompt, for example:

A:

or

B:

or

C:

and so on.

The default drive is the drive MS-DOS assumes you want to use. This will probably be drive C, until you instruct it otherwise.

MS-DOS can be set up to handle as many as 26 drives at the same time, but it is normally set up to handle just 5. Namely, Drive A through to Drive E. When the system prompt is **A:\>**, the default drive is drive A.

If you have two floppy disk drives, you might change the default drive to drive B, the system prompt would then become **B:\>**.

If you have a hard disk drive computer, and change the default drive from Drive A to the hard disk drive, Drive C, the system prompt would then become **C:\>**. For more information on changing the current directory, see Chapter 7 "Running programs".

The system prompt described here is the standard MS-DOS system prompt. Your computer has been set up to display the drive letter and current directory, for example, **C:\WP>**. You can, if you wish, set up a personalised system prompt which does the same job but contains different information. See Chapter 4, "Tailoring the PC using MS-DOS", for instruction on how to do this.

Typing command lines

Command lines must be typed precisely as they are specified in the command descriptions, otherwise the command will not work properly. You will need to pay attention to every detail of the command line: every comma, colon, space etc. has to be included exactly as described by the program's or the command's Form.

However, it does not matter whether you type characters in either upper or lower case or even a mixture of the two. For example, your computer will perform the same function, whether you type the following command line in any of these three ways:

COPY FILE.X NEWDATA.PQ
copy file.x newdata.pq
COPY file.x newdata.PQ

When you have finished typing the command line, press the [⏎] key. The command line will then be processed by MS-DOS. Once the program has finished, a system prompt reappears and a new command line can be typed.

MS-DOS will notice most of the typing mistakes you might make, and will give you an appropriate error message. However, some mistakes are not detectable, and MS-DOS may, in some circumstances, execute an instruction you have given, which is not what you actually wanted to happen.

When commands fail

Commands fail because of the following reasons:

- there is a typing error in the command line

- the location of the file has not been specified correctly

- there is not enough memory space for the program to run

- there is not enough room on the disk to store the new files that the program produces

- the file holding the program has been corrupted (or it never worked in the first place!)

You can usually tell why a command has failed from the message that appears on the screen.

If MS-DOS displays the message **Bad command or file name**, it has not found the command, program or batch file you wanted to run.

The most common reason for this is that the command name has been mis-typed. For example, you might have typed **COYP** instead of **COPY**. The other possibility is that the program file is not in the directory or directories MS-DOS searched. You may have misdirected MS-DOS, for example, because you forgot which disk you had in the drive. Check where you told MS-DOS to look for the file.

If MS-DOS displays a message like **File not found**, together with details of the file and a fresh system prompt, it has not found one of the files you asked it to process.

Either the filename or filetype was mis-typed, or the file is not in the directory that was specified. Check to see whether you told MS-DOS to look for the file in the correct place.

In both of the above cases, to try again, you can either retype the command line at the new system prompt or copy and then edit your previous command line. The keystrokes to help you do this are described in Section 7.2. When you have finished preparing your new command line, press the [⏎] key.

If MS-DOS displays some other message, like **Program too big to fit in memory** or **Disk full**, turn to Chapter 10 "Troubleshooting" or the section in Part One on "Hardware Errors", where error messages like this are explained, and then take the appropriate action. You may, for example, need to delete some files on the disk that you no longer need, or change what you are trying to do. If in doubt, consult your dealer.

If the screen goes blank or your PC does not seem to be working at all, your program file may have been corrupted.

Reset your PC (see Part One) or, if you cannot reset your machine, release any disks you may have in the drives, switch off the machine and then work through the startup procedure again (see Part One). Then try running your back-up copy of the program (if you have made one of these). If that fails too, consult your dealer.

Some practice in using MS-DOS commands

If you have never used MS-DOS before, you would probably find it useful to practice with the example commands in this section.

The sets of commands used for examples here, are those used for finding out about the files stored on your disks and those for keeping your files organised. These are

described in Sections 7.1 and 6.2. We recommend that you look up the commands used in the reference sections as you work through this introduction. This will help you to get used to using the command descriptions.

In this section, we remind you to press the Return key [↵] at the end of each command line. This keystroke tells MS-DOS to read what you have typed in. However, the more advanced sections of this manual assume that you know that the [↵] key has to be pressed.

Simple commands

MS-DOS commands will work with files in the default directory, that is the directory you are currently working on, unless you instruct them otherwise.

When you start up your computer, the default directory is the Root directory, that is, the main directory from which subdirectories are created. On a model with a hard disk, this will be on Drive C, or Drive A if you have a computer which only has floppy disk drives.

One of the first commands you will probably want to use is the **DIR** command to list all the files stored in this directory. To use this command just type:

DIR [↵]

at the system prompt. You can type **DIR** in upper or lower case letters. A list of all the names of the files in the default directory will be then be displayed on your screen, for example:

```
Volume in drive A has no label
Directory of   A:\

COMMAND  COM    25276 24-07-87  12:00a
ANSI     SYS     1647 24-07-87  12:00a
CONFIG   SYS       18 27-07-88   2:50p
COUNTRY  SYS    11254 24-07-87  12:00a
DRIVER   SYS     1165 24-07-87  12:00a
KEYBOARD SYS    19735 24-07-87  12:00a
PRINTER  SYS    13559 24-07-87  12:00a
RAMDRIVE SYS     6481 24-07-87  12:00a
AUTOEXEC BAT       58 27-07-88   2:50p
ASSIGN   COM     1530 24-07-87  12:00a
BACKUP   COM    29976 24-07-87  12:00a
CHKDSK   COM     9819 24-07-87  12:00a
COMP     COM     4183 24-07-87  12:00a
DEBUG    COM    15866 24-07-87  12:00a
DISKCOMP COM     5848 24-07-87  12:00a
DISKCOPY COM     6264 24-07-87  12:00a
EDLIN    COM     7495 24-07-87  12:00a
FDISK    COM    48919 24-07-87  12:00a
FORMAT   COM    11671 24-07-87  12:00a
GRAFTABL COM     6136 24-07-87  12:00a
GRAPHICS COM    13943 24-07-87  12:00a
```

This command can also be used to produce information about particular files by adding a 'command tail' to the original command. For example:

DIR COMMAND.COM [⏎]

gives you the standard information, but just about the file, **COMMAND.COM**. This command could be used to check whether a particular file is in the default directory. If the file is not found, MS-DOS will display the message:

File not found

Wildcard characters

The DIR command can also be used to illustrate the function of Wildcard characters. It is one of a small group of commands which will process a number of files at a time.

A special sort of file name has to be included in the command tail, that is, one that includes 'Wildcard' characters. Wildcard characters are * and **?**. The question mark represents any single valid character, and the asterix represents any valid character or group of characters.

The special file name is used as a template with which the name of each of the files in the directory is compared. If a file is found with a name that matches the template, information on the file will be displayed.

So, for example, if you wanted to list all the files with the filetype **COM**, you must first change to the directory which holds these files. This directory is called "DOS", so using the Change Directory command, type **CD \DOS**, then you would use the template *.COM** and the command:

DIR *.COM [⏎]

If you wanted to list all the files, you might type:

DIR *.* [⏎]

In fact you would just type **DIR** because DIR is a recognised shorthand for **DIR *.*.** Similarly, you probably would not type **DIR *.COM** to tell MS-DOS to list all files with the filetype COM because you can just type **DIR .COM.**

If you wanted to list all the files with the filetype COM whose filenames started with DISK, you might use the template **D*.COM** and the command:

DIR D*.COM [⏎]

This will, however, give you all the files that match this template, that is, every file that has a filename starting with the letter D - not just the ones with the filenames starting DISK - as you will see if you try this out.

Longer Commands

Some commands need the name of more than one file in the command tail. For example, when you want to make a copy of one of your existing files, you need to tell MS-DOS the name of both the file you want to copy (the 'Source') and the name you are going to give the copy you create (the 'Destination'). For example, the command line to make a copy of the file **AUTOEXEC.BAT** (the Source) and store it as the file **MYBAT.BAT** (the Destination) is:

COPY AUTOEXEC.BAT MYBAT.BAT [↵]

The source file is not changed in any way by being copied.

As you don't need the file **MYBAT.BAT**, you might as well delete it with the command:

DEL MYBAT.BAT [↵]

Commands with options

The commands we have typed so far have all been as simple as possible. You can get commands to do more for you by using command options. These options are listed in the command descriptions in slanting brackets. These brackets indicate that you do not have to use these parameters.

The options are often represented by a slash followed by a letter. For example, the DIR command has a /W option that prints the names of the files in a directory five to a line, rather than in a long list. This way of displaying the directory uses commands similar to the following:

DIR /W [↵]   - the whole directory

DIR .EXE /W [↵]   - all the files with the filetype EXE

Another possibility with the DIR command is to use the **/P** option to make **MS-DOS** pause at the end of each screenful so that information is not scrolled off the top of the screen before you have a chance to read it. You can use this option on its own or you can use both options at once, by typing:

DIR /W/P [⏎]

DIR /P/W [⏎]

the order in which you list the extra options usually does not matter: if it does matter, this will be emphasised in the description of the command.

Another drive, another directory

The final commands we will look at in this section show what you need to add to the command line to process a file that is not in the default directory.

A very simple example of this is using the DIR command to see if a particular file is in the current directory on Drive A (the floppy disk) without first changing the default drive to Drive A. Make sure your MS-DOS disk is in drive A, then type:

DIR A: COMMAND.COM [⏎]

the PC will display similar details to those displayed if you had typed:

DIR COMMAND.COM [⏎]

the only difference being that instead of giving details of a file in the current directory on the default drive, the PC gives details of a file called **COMMAND.COM** in the current directory on Drive A (if such a file exists).

To use files which are not in the current directory, you have to include details of how to get to this directory. For example, suppose the file you want details of is called **WIN.COM** and it is stored in a directory called WINDOWS that branches off the Root directory on Drive C

```
                          ROOT
                 /                    \
          WINDOWS              Other directories
          /        \
   WIN.COM      Other files
```
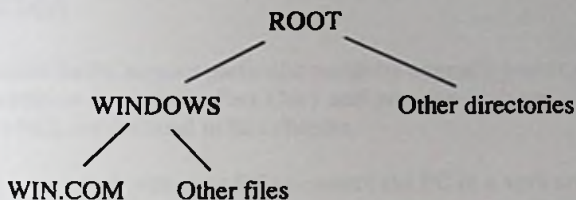
The path to the file is therefore: *Root* - **Windows** - **WIN.COM** which you write as **\WINDOWS\WIN.COM** (the first backslash telling MS-DOS to start the path from the Root directory). Drive C is the default drive, so your DIR command line becomes:

DIR \WINDOWS\WIN.COM [↵]

If drive C had not been the default drive, this command line would have been:

DIR C:\WINDOWS\WIN.COM [↵]

Postscript

This brief tour should have given you an idea of how to use MS-DOS commands to carry out tasks for you. Chapters 4-7 give detailed descriptions of the tasks and the commands you will need to use.

4. Tailoring the PC using MS-DOS

Introduction

You can tailor the PC to your particular needs by upgrading and extending the hardware (this information is given in Part One) and you can also use a number of MS-DOS facilities which are outlined in this chapter.

MS-DOS is supplied with your PC to control the PC in a very conventional way, with the keyboard as the main means of giving instructions and information to the computer and with the display screen being used by the computer to display the computer's output.

However, MS-DOS has many optional features which would allow you to use the PC to the best advantage for your work.

These features can be set up as default conditions so that they are loaded automatically every time you switch on your PC.

To set up these features, you must give MS-DOS instructions. Some of which are commands that are typed at the system prompt and some are commands which have to be entered into the AUTOEXEC.BAT file or the CONFIG.SYS file. These files are read and the contents are executed immediately after the PC is switched on.

There is a section in Part One which describes the contents of the AUTOEXEC.BAT file and a section on the CONFIG.SYS file as they are supplied with your particular model of PC.

Any commands that you add to these files will improve the system in some way. However, many of the commands that you can include in the AUTOEXEC.BAT and the CONFIG.SYS files will consume memory that would otherwise be available for running MS-DOS programs. You will have to choose the best balance of memory usage and system performance for your work. For more information about memory, see Part One of this manual.

All the commands outlined in this chapter, are described in detail in Chapter 8. Each command is listed alphabetically.

Setting up the system prompt

Your personal MS-DOS system prompt does not have to be the current default drive and directory. It can contain any of the following:

- **the default drive**

- **the default directory**

- **the date**

- **the time**

- **the version number of your MS-DOS**

- **special text or characters**

    - whatever information you find most helpful while you are using MS-DOS.

The command that sets up a personalised prompt is the PROMPT command.

Your new style of prompt will be used until your PC is reset. Then MS-DOS will revert to the standard C:\> prompt. If you want to always use a special style of prompt, simply change the PROMPT command in your AUTOEXEC.BAT file. Any text editor can be used to edit the AUTOEXEC.BAT file. See Chapter 8 for details of the PROMPT command.

Setting the PC's clock

If your PC is fitted with an internal clock, it is maintained in the battery-backed area of the computer's RAM so that it keeps perfect time even when your PC is switched off.

You can reset the clock through the MS-DOS commands, DATE and TIME which are described in Chapter 8.

The internal clock allows the DATE and TIME commands to date stamp files. You will see each file's date and time of creation when you use the DIR command. This can be useful for identifying different versions of files with the same name.

Using peripheral equipment - printers, monitors and modems

- A number of devices are supported by MS-DOS. This means you can connect and use various pieces of hardware and MS-DOS will recognise them and operate with them immediately. These devices are: the keyboard, the monitor, the floppy disk drive, hard disk drive, clock, COM ports and LPT ports. Other devices that you might want to add include a scanner, a plotter, a CD-ROM and so on. To install drivers for additional devices, you will need to use the DEVICE= command listed in Chapter 8.

  Any additional device you buy will probably include the correct DEVICE= command in the documentation accompanying the device.

- The keyboard is instructed by the PC's built-in operating system to interpret keystrokes as the American set of characters. You can use the KEYB command to change this interpretation to one of many other sets of characters. There will probably be such a KEYB command in AUTOEXEC.BAT. You may use RPED to change the default (UK) setting.

- The characters that will be displayed on the screen and output to the printer are those characters used in code page 437 (UK/US). This code page can be changed to other countries. See the section called "Using foreign characters and national symbols on your PC", later in this chapter.

- American country information is given as the default setting. If you want to change this to UK country information, use the COUNTRY command. The command has to be used within the CONFIG.SYS file. See Chapter 8 for details of how to use the command. The country information is used by some programs when they wish to display the date or time in the correct format (e.g. day-month-year instead of the American month-day-year).

- If you are using a CGA monitor, you will have to include a GRAFTABL command in the AUTOEXEC.BAT file to allow the correct characters for the current code page to be displayed in graphics mode.

- When sending LPT1 output to the printer, data will be sent to the parallel port which is at the back of the system unit. It can be redirected to the serial port using the MODE command. This could be added to AUTOEXEC.BAT.

- The version of MS-DOS supplied with your computer is set up to receive commands from the keyboard and to send commands to the screen. You may want to enter commands from a terminal connected to your computer or located elsewhere. In which case you could connect a terminal or a modem to your serial port and issue the CTTY command. Commands could then be sent to and received from another terminal. See Chapter 8 for details of the CTTY command.

- The default printing setup is 80 characters per line and 6 lines per inch. MS-DOS has a facility to change these values and to continuously try to print a file but this facility is not set as a default. It has to be instructed to do so. See the MODE command in Chapter 8. This command could be added to AUTOEXEC.BAT if you want the new values used every time you switch on the PC.

- The COM1 device is used to identify the serial interface on the back of the system unit. It is set up for 9600 baud transmission, 7 data bits, even parity and 1 stop bit. Use the MODE command in Chapter 8 to change these values. This command could be added to AUTOEXEC.BAT if you want the new values used every time you switch on the PC.

- The default mode for the screen will be 80 columns and either black and white if you have a monochrome monitor, and colour if you have a colour monitor. The MODE command can be used to switch to 40 columns or to switch between b/w and color. This could be used in AUTOEXEC.BAT.

Accessing directories

- When a program looks for files, it will only search the current directory unless you tell it otherwise. If you want MS-DOS to search specific directories for your data files, automatically, you can specify those selected directories using the APPEND command. If you want selected directories to be searched for your program files, use the PATH command to instruct MS-DOS which directories. Full details of the APPEND and PATH command are given in Chapter 8. These commands may be included in the AUTOEXEC.BAT file. Indeed this file probably already contains a PATH command that you may change or add parameters to.

- When you load MS-DOS, the root directory will automatically be set as the current directory. However, you can use the CHDIR command to set up a subdirectory as the default, current directory, by placing the command in the AUTOEXEC.BAT file. See the CHDIR command in Chapter 8.

- If you are using more than one drive, you may find it useful to be able to access the contents of another drive directly. This is possible using the JOIN command which allows you to connect a directory structure on one drive to a directory structure on a second drive. See Chapter 8 for details of the JOIN command.

Interrupting a program

- You can stop a program, while it is running, by pressing the [CTRL] key and the [C] or [BREAK] key together. Unless you instruct MS-DOS otherwise, you will only be able to stop a program while information is being sent to the screen or to the printer. You can use the BREAK command to tell MS-DOS to check whether you have pressed CTRL-C at more frequent intervals, that is, when the program is performing a number of functions. For a permanent change use the BREAK= command in CONFIG.SYS. A temporary change may be made by typing the BREAK command at the DOS prompt.

Memory

- You can increase the amount of memory space that MS-DOS uses for reading a disk to speed up the process using the BUFFERS command. But in so doing, you would reduce the amount of space used for running programs. This facility is one form of "caching". It allows you to allocate memory most appropriately for your work.

- If you have a program that spends a lot of time reading disks, for example, a database, you could increase the number of buffers to improve the disk performance but the amount of memory used to run programs would be decreased. However, with larger programs such as desktop publishing and CAD programs, it is more advantageous to reduce the buffers, leaving more memory space for the programs. In this case, disk accessing will be less efficient. Use the BUFFERS command, listed in Chapter 8, to allocate memory to suit your requirements.

Opening files

- If you are using a number of files repeatedly, you would probably find it useful to have them opened quickly. When the FASTOPEN command is included in the AUTOEXEC.BAT file, a record of the files that are opened is kept, which speeds up the re-opening process. This command is described in Chapter 8.

- There are two ways in which MS-DOS accesses files. One method, which is used less in more recent software, is the File Control Block method. In this method, the program keeps an internal record of information about the files it is accessing. The other method accesses files using 'handles': when a file is opened, MS-DOS gives it a number that the program can use to recognise the file.

- You can include an FCBS command in the CONFIG.SYS file to instruct MS-DOS while it is loading into memory, to reserve more space for extra file control block

which store information on each file that is opened. Increasing the value in an FCBS command means that more files can be opened, concurrently. However, this is at the expense of memory space.

- If your program uses the handles method to open files and you want to increase the amount of space reserved for holding information on the files, use the FILES= command described in Chapter 8.

Using graphics

- If you want to print CGA graphics images from your screen, using the [Print Screen] key function, you will need to include a GRAPHICS command in the AUTOEXEC.BAT file. See Chapter 8 for details of this command.

Including your PC in a network

- If you need to have more than five drives set up on your computer, or if your computer is connected to a network in which there are many drives to be accessed, you will need to inform MS-DOS of the extent of the drives you wish to use. You can use the LASTDRIVE= command in CONFIG.SYS to inform MS-DOS of the range of drives by giving the last drive letter. See Chapter 8 for details of this command.

- If you are using a network, you would find the SHARE command provides extra support to file sharing across the network. This command may be added to AUTOEXEC.BAT.

User Interfaces

- MS-DOS is set up with a command processor, COMMAND.COM, which acts as an interface between the specialised programs of MS-DOS and the user, simply to make the operating system easier to use. This interface is known as a 'shell'. It may be possible to use other shells, such as Wordperfect software for example. If you want to change the shell, use the SHELL= command listed in Chapter 8.

Using foreign characters and national symbols (Code Page Switching)

If you want to use more than one language, or if you want to use symbols of a foreign country, to input or output data on your PC you will most probably need to use a different character set for some languages or countries.

A character set is a group of 256 characters, which is specific to a given country or language, for example, the Portugueser character set is the particular set of letters, numbers and symbols used by the Portugueser; the UK character set is the set used in the United Kingdom, and so on.

A code page is a table that controls the definition of one or more character sets. The definitions are stored as numeric values which the computer translates into letters, numbers and symbols you can recognise on the screen or from the printer.

The process of changing the character set is called "code page switching".

Code page switching allows you to:

• **use the most suitable set of characters for your own country**

• **switch your machine to using a different character set on a temporary basis, and back to the default setting again, quickly and easily.**

Previously, the IBM PC offered a choice of 256, apparently different, characters per ROM: 256 being the fundamental limit to the number of individual characters in a set, for an 8 bit computer.

The 256 characters chosen, did not include all the variations of alphabets, currencies and other national, linguistic symbols, of European countries. Therefore, European users, who needed to use symbols of more than one country, had to make hardware adjustments to access different ROMs, or reset the DIP switches each time they wanted to read or print, a character or symbol which was not one of the 256 characters resident in their ROM code page.

This was very inconvenient for a company in Portugal, for example, which works on an international scale and needs to produce and read documents from Italy, France and the United States, on a daily basis.

Code page switching

Now, however, to accommodate European users, there are five different sets of characters with MS-DOS . All five sets are available to your PC. One set is already installed to use as a default setting. It contains those characters useful to the United Kingdom. There are then four more sets of characters available, which you can switch to using MS DOS commands. The five character sets are as follows:

437 The set of characters used in English speaking countries in vurtually all PCs, before options existed allowing code page switching.

850 A multilingual set of characters which aims to suit all countries.

860 Contains certain special characters for Portugal

863 Contains certain special characters for French-Canada

865 Contains certain special characters for Norway and Denmark

Note: The numerical values of the code page number is insignificant.

The characters within each of these code pages are shown on the following pages.

Code Page 437 - UK/United States

Hex Digits	-0	-1	-2	-3	-4	-5	-6	-7	-8	-9	-A	-B	-C	-D	-E	-F
	0	16	32	48	64	80	96	112	128	144	160	176	192	208	224	240
0-	0			☺	▲		▼	P	@	`	p	Ç	É	á	░	└	⊥	α	≡
1-		☺	►	!	1	A	Q	a	q	ü	æ	í	▒	┴	β	±
2-	☻	↕	"	2	B	R	b	r	é	Æ	ó	▓	┬	Γ	≥
3-	♥	‼	#	3	C	S	c	s	â	ô	ú	│	├	π	≤
4-	♦	¶	$	4	D	T	d	t	ä	ö	ñ	┤	─	Σ	⌠
5-	♣	§	%	5	E	U	e	u	à	ò	Ñ	╡	┼	σ	⌡
6-	♠	▬	&	6	F	V	f	v	å	û	ª	╢	╞	µ	÷
7-	•	↨	'	7	G	W	g	w	ç	ù	º	╖	╟	τ	≈
8-	◘	↑	(	8	H	X	h	x	ê	ÿ	¿	╕	╚	Φ	°
9-	○	↓	)	9	I	Y	i	y	ë	Ö	⌐	╣	╔	Θ	∙
10	◙	→	*	:	J	Z	j	z	è	Ü	¬	║	╩	Ω	·
11	♂	←	+	;	K	[	k	{	ï	¢	½	╗	╦	δ	√
12	♀	∟	,	<	L	\	l	|	î	£	¼	╝	╠	∞	ⁿ
13	♪	↔	-	=	M	]	m	}	ì	¥	¡	╜	═	φ	²
14	♫	▲	.	>	N	^	n	~	Ä	₧	«	╛	╬	ε	■
15	☼	▼	/	?	O	_	o	⌂	Å	ƒ	»	┐	╧	∩	

Code Page 850 - Multilingual

Hex Digits	-0	-1	-2	-3	-4	-5	-6	-7	-8	-9	-A	-B	-C	-D	-E	-F
0-		►		0	@	P	`	p	Ç	É	á	░	└	ð	Ó	
1-	☺	◄	!	1	A	Q	a	q	ü	æ	í	▒	┴	Ð	ß	±
2-	☻	↕	"	2	B	R	b	r	é	Æ	ó	▓	┬	Ê	Ô	‗
3-	♥	‼	#	3	C	S	c	s	â	ô	ú	│	├	Ë	Ò	¾
4-	♦	¶	$	4	D	T	d	t	ä	ö	ñ	┤	─	È	õ	¶
5-	♣	§	%	5	E	U	e	u	à	ò	Ñ	Á	┼	ı	Õ	§
6-	♠	▬	&	6	F	V	f	v	å	û	ª	Â	ã	Í	µ	÷
7-	•	↨	'	7	G	W	g	w	ç	ù	º	À	Ã	Î	þ	¸
8-	◘	↑	(	8	H	X	h	x	ê	ÿ	¿	©	╚	Ï	Þ	°
9-	○	↓	)	9	I	Y	i	y	ë	Ö	®	╣	╔	┘	Ú	¨
A-	◙	→	*	:	J	Z	j	z	è	Ü	¬	║	╩	┌	Û	·
B-	♂	←	+	;	K	[	k	{	ï	ø	½	╗	╦	█	Ù	¹
C-	♀	∟	,	<	L	\	l	|	î	£	¼	╝	╠	▄	ý	³
D-	♪	↔	-	=	M	]	m	}	ì	Ø	¡	¢	═	¦	Ý	²
E-	♫	▲	.	>	N	^	n	~	Ä	×	«	¥	╬	Ì	¯	■
F-	☼	▼	/	?	O	_	o	⌂	Å	ƒ	»	┐	¤	▀	´	

MS-DOS

Code Page 860 - Portuguese

Hex Digits	-0	-1	-2	-3	-4	-5	-6	-7	-8	-9	-A	-B	-C	-D	-E	-F
0-		☺		0	@	P	`	p	Ç	É	á	░	└	╨	α	≡
1-	☺	►	!	1	A	Q	a	q	ü	À	í	▒	┴	╤	ß	±
2-	☻	◄	"	2	B	R	b	r	é	È	ó	▓	┬	╥	Γ	≥
3-	♥	↕	#	3	C	S	c	s	â	ô	ú	│	├	╙	π	≤
4-	♦	‼	$	4	D	T	d	t	ã	õ	ñ	┤	─	╘	Σ	⌠
5-	♣	¶	%	5	E	U	e	u	à	ò	Ñ	╡	┼	╒	σ	⌡
6-	♠	§	&	6	F	V	f	v	Á	Ú	ª	╢	╞	╓	µ	÷
7-	•	▬	'	7	G	W	g	w	ç	ù	º	╖	╟	╫	τ	≈
8-	◘	↑	(	8	H	X	h	x	ê	Ì	¿	╕	╚	╪	Φ	°
9-	○	↓	)	9	I	Y	i	y	Ê	Õ	Ò	╣	╔	┘	Θ	∙
10-	◙	→	*	:	J	Z	j	z	è	Ü	¬	║	╩	┌	Ω	·
11-	♂	←	+	;	K	[	k	{	Í	¢	½	╗	╦	█	δ	√
12-	♀	∟	,	<	L	\	l	|	Ô	£	¼	╝	╠	▄	∞	ⁿ
13-	♪	↔	-	=	M	]	m	}	ì	Ù	¡	╜	═	▌	φ	²
14-	♫	▲	.	>	N	^	n	~	Ã	₧	«	╛	╬	▐	ε	■
15-	☼	▼	/	?	O	_	o	⌂	Â	Ó	»	┐	╧	▀	∩	

Code Page 863 - French Canadian

Hex Digits	-0	-1	-2	-3	-4	-5	-6	-7	-8	-9	-A	-B	-C	-D	-E	-F
DEC	0	16	32	48	64	80	96	112	128	144	160	176	192	208	224	240
0- / 0		▲		0	@	P	`	p	Ç	É	¦	░	└	╨	α	≡
1- / 1	☺	▼	!	1	A	Q	a	q	ü	È	´	▒	┴	╤	β	±
2- / 2	☻	↕	"	2	B	R	b	r	é	Ê	ó	▓	┬	╥	Γ	≥
3- / 3	♥	‼	#	3	C	S	c	s	â	ô	ú	│	├	╙	π	≤
4- / 4	♦	¶	$	4	D	T	d	t	Â	Ë	¨	┤	─	╘	Σ	⌠
5- / 5	♣	§	%	5	E	U	e	u	à	Ï	¸	╡	┼	╒	σ	⌡
6- / 6	♠	▬	&	6	F	V	f	v	¶	û	³	╢	╞	╓	µ	÷
7- / 7	•	↨	'	7	G	W	g	w	ç	ù	¯	╖	╟	╫	τ	≈
8- / 8	◘	↑	(	8	H	X	h	x	ê	¤	Î	╕	╚	╪	Φ	°
9- / 9	○	↓	)	9	I	Y	i	y	ë	Ô	⌐	╣	╔	┘	Θ	∙
A- / 10	◙	→	*	:	J	Z	j	z	è	Ü	¬	║	╩	┌	Ω	·
B- / 11	♂	←	+	;	K	[	k	{	ï	¢	½	╗	╦	█	δ	√
C- / 12	♀	∟	,	<	L	\	l	¦	î	£	¼	╝	╠	▄	∞	ⁿ
D- / 13	♪	↔	-	=	M	]	m	}	‗	Ù	¾	╜	═	▌	φ	²
E- / 14	♫	◄	.	>	N	^	n	~	À	Û	«	╛	╬	▐	ε	■
F- / 15	☼	►	/	?	O	_	o	⌂	§	ƒ	»	┐	╧	▀	∩	

Code Page 865 - Norwegian

Hex Digits	-0	-1	-2	-3	-4	-5	-6	-7	-8	-9	-A	-B	-C	-D	-E	-F
DEC	16	32	48	64	80	96	112	128	144	160	176	192	208	224	240	
0		►		0	@	P	`	p	Ç	É	á	░	└	╨	α	≡
1	☺	◄	!	1	A	Q	a	q	ü	æ	í	▒	┴	╤	ß	±
2	☻	↕	"	2	B	R	b	r	é	Æ	ó	▓	┬	╥	Γ	≥
3	♥	‼	#	3	C	S	c	s	â	ô	ú	│	├	╙	π	≤
4	♦	¶	$	4	D	T	d	t	ä	ö	ñ	┤	─	╘	Σ	⌠
5	♣	§	%	5	E	U	e	u	à	ò	Ñ	╡	┼	╒	σ	⌡
6	♠	▬	&	6	F	V	f	v	å	û	ª	╢	╞	╓	µ	÷
7	•	↨	'	7	G	W	g	w	ç	ù	º	╖	╟	╫	τ	≈
8	◘	↑	(	8	H	X	h	x	ê	ÿ	¿	╕	╚	╪	Φ	°
9	○	↓	)	9	I	Y	i	y	ë	Ö	⌐	╣	╔	┘	Θ	∙
10	◙	→	*	:	J	Z	j	z	è	Ü	¬	║	╩	┌	Ω	·
11	♂	←	+	;	K	[	k	{	ï	ø	½	╗	╦	█	δ	√
12	♀	∟	,	<	L	\	l			î	£	¼	╝	╠	▄	∞	ⁿ
13	♪	↔	-	=	M	]	m	}	ì	Ø	¡	╜	═	▌	φ	²
14	♫	▲	.	>	N	^	n	~	Ä	₧	«	╛	╬	▐	ε	■
15	☼	▼	/	?	O	_	o	⌂	Å	ƒ	¤	┐	╧	▀	∩	

Using Code Page switching

Firstly, if you want to print out documents, check that you have a suitable printer such as the IBM Propinter model 4201, or IBM Quietwriter III printer, model 5202. Code page switching will only be effective in printing if you are using a supporting printer.

Commands

The MS-DOS commands which support code page switching are:

NLSFUNC   Loads the file containing country-specific information.

CHCP   Displays or changes the current code page for the system and all prepared devices

KEYB   Allows you to select a country-specific keyboard code for the keyboard you are using, and a code page for the character set you prefer.

                      You may also use this command to select an alternative definition file (other than the default KEYBOARD.SYS file) if alternatives exist.

MODE   -Prepares a code page for a device

                      -Selects a code page for a device

                      -Displays the code pages prepared and selected for a device

                      -Refreshes code pages that were lost due to hardware error

GRAFTABL   Displays an extended character set when using display adaptors in color graphics mode (CGA). A table of data is loaded into memory which defines the additional ASCII characters, 128 to 255.

CONFIG.SYS Commands

COUNTRY=   Identifies the country in which you work or live. This command also defines the appropriate country-specific conventions such as date and time formats, and sorting sequence for the character set.

DEVICE=   Installs device drivers in the system, including two device drivers that can be installed, which support code page switching. These device drivers are called:

DISPLAY.SYS   used to install a standard console screen device with code page support

PRINTER.SYS   used to install one of the above named printers with code-page support

The following commands will use country-specific date and time conventions, relevant to the code pages you choose:

DATE

BACKUP

RESTORE

TIME

DIR

See the COUNTRY command in Chapter 8, for details of country dependant information-e.g. date and time formats, currency symbols, etc.

A single code page is already installed for use on your PC. This is code page 437, which is most appropriate for the U.K.

There are two ways to change code pages: one is used to switch from the **default** code page to the **secondary** code page; the second way is used to switch the default code page to any of the other three code pages (860, 863, 865). Instructions for both types of swiching are given below.

Before you can switch from the default code page to the secondary code page, you must first install the secondary code page, which is always the multilingual code page, 850

Installing code page switching

To install a secondary code page, and the facility which allows you to switch from using the default code page (437) to the secondary code page, you will need to edit the **CONFIG.SYS** and **AUTOEXEC.BAT** files.

When you install more than one code page, the second code page is always the multilingual code page (850).

1. Edit the CONFIG.SYS file using the command:

RPED CONFIG.SYS

2. When the current contents of the file are shown on the screen add the following line below the last time:

DEVICE=DISPLAY.SYS CON:=(EGA,437,1)

3. Press [Esc] to save this change in the file.

4. When RPED's main menu appears press [F1] to select the option **Edit Existing File** and enter the name AUTOEXEC.BAT when promoted.

5. When the current contents of the file are shown on the screen, press [Alt] and [M] together to insert a new line at the top of the file. On the blank line that apprears type:

NLSFUNC

6. Press [Alt] and [M] together to insert another new line and on that line type:

MODE CON: CP PREPARE=((850) EGA.CPI)

7. Press [Esc] to save these changes in the file.

8. Reset the machine by holding down the [Ctrl] and [Alt] keys and pressing [Del].

Switching to the secondary code page

You will probably find that the default code page is adequate for your day to day use, but if you wish to read or print documents which contain European characters that are not included in your default code page, switch to the multilingual code page.

The multilingual code page contains a set of the most commonly used European characters and symbols.

Having installed the secondary code page and the facility to switch code pages as described above, to switch from the default code page to the secondary code page, type:

CHCP 850

To return to your default code page type:

CHCP 437

Note: The default code page, 437, will be selected when you reset your computer.

Changing the default code page

You may also want to use a code page other than the default and multilingual code pages. If, for example, you are in the USA using the USA code page, and you receive a document prepared on a Norway/Denmark system, you would see the symbol for **yen** and the symbol for **cent** on your screen where there should be the characters Ø, and ø.

To see the correct characters for your document, that is the Norway/Denmark Ø, ø you need to switch to the Norway/Denmark code page, 865.

To use code page 865 you need to change the default from 437 to code page 865.

You cannot change the second page (850) for any other code page.

In order to change the first code page to 865 follow these steps:

1. Edit the file CONFIG.SYS using the command:

   RPED CONFIG.SYS

2. Edit the line which says:

   COUNTRY=044,437

   so that it reads:

   COUNTRY=047,865

   This instructs MS-DOS to use Norwegian country information (i.e. date and time formats, currency symbols, etc.) and also specifies that code page 865, the Norwegian character set, should be the source for the country-specific symbols.

3. Edit the line which says:

   DEVICE=DISPLAY.SYS CON:=(EGA,437,1)

   so that it reads:

   DEVICE=DISPLAY.SYS CON:=(EGA,437,2)

   This instructs the DISPLAY.SYS driver to reserve room for a second code page (both 865 and 850 will be available).

4. Press the [Esc] key to save these changes.

5. When RPED's main menu appears press [F1] to select the option **Edit Existing File** and enter the name **AUTOEXEC.BAT** when prompted.

6. Edit the line which says:

   MODE CON: CP PREPARE=((850) EGA.CPI)

   so that it reads:

   MODE CON: CP PREPARE=((850,865) EGA.CPI)

7. Edit the line which says:

   KEYB UK,437

   so that it reads:

   KEYB NO,865

   In order to use the Norwegian code page, it is advisable to instruct MS-DOS to use the keyboard driver for a country that has 865 as its default code page.

8. Press the [Esc] key to save these changes.

9. Reset the PC holding down the [Ctrl] and [Alt] keys and pressing [Del].

   If you have a printer capable of supporting code pages, you may also want to add the following lines to the **CONFIG.SYS** and **AUTOEXEC.BAT** files.

   If you are just adding support for the secondary code page (850), add the line:

   DEVICE=PRINTER.SYS LPT1=(4201,437,1)

   If your printer model number is 5202, type 5202 in place of 4201.

   Also add the line:

   MODE LPT1 CP PREPARE=((850) 4201.CPi)

   to the **AUTOEXEC.BAT** file (replacing 4201 with the number of your printer model).

If you want to change the deftault code page (437) to one of the other three code pages (860,863,865), and have the secondary code page installed as well, add the line:

DEVICE =PRINTER.SYS LPT1=(4201,437,2)

to the **CONFIG.SYS** file (replacing 4201 as appropriate).

You must also add the following line to the **AUTOEXEC.BAT** file

MODE LPT1 CP PREPARE=((860,850) 4201.CPI)

replacing 4201 as appropriate. If you wish to select 863 or 865 as the default code page, replace 860 with your choice.

5. Processing floppy disks

Processing your floppy disks covers:

- **Preparing new blank disks**

  - Dividing up the blank disk into sections so that your PC can store and retrieve information from the disk. This process is called Formatting the disk.

- **Maintaining existing disks**

  - Making duplicate copies of your disks so that you have a reserve or 'back up' copy for use in case of accidents.

  - Testing your disks when you suspect that the reason for a program failing was a damaged disk.

  - Comparing a copy you have made of a disk against the original.

These tasks are fundamental to using floppy disks in your PC. For example, the storage area of each new blank disk you buy must be formatted before you can use it, even if you just want to store one program or data file on it. The process of copying a disk automatically includes formatting the disk used for the copy. Formatting is also used to reclaim a disk on which the data has become electronically damaged.

5.1 Preparing new disks for use

FORMAT Preparing a new blank floppy disk for use involves the use of the FORMAT command.

The simplest version of the command will give the new disk the number of tracks and sectors appropriate to the drive in which you format the disk.

18 Sectors per track   Track 79   Read Window   Shutter

A Sector   Track 0   Write Protect Tab
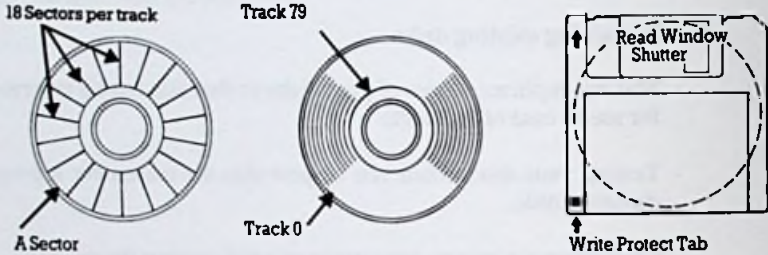
When you format a disk, the FORMAT command selects values most appropriate for the drive that is being used. 5.25 inch drives will normally be formatted to a capacity of 1.2Mb while disks in 3.5 inch drives will be formatted to hold 1.44Mb. If you do not use disks that are certified 'high density', it is wise to override the format defaults and make it format 5.25 inch disks for 360K or 3.5 inch for 720K. The former is done with:

FORMAT *d*: **/T:40 /N:9**

while the latter is done with:

FORMAT *d*: **/T:80 /N:9**

To prepare a disk to use to store programs and data, follow the instructions below:

1. **If your PC has a hard disk, display a C:\> system prompt, or if your PC has two floppy disk drives, display an A:\>.**

If you are not certain how to do this, reset your machine - instructions for this are given in Part 1 in the Installation section. If you have yet to switch on your PC, go through the Startup procedure described in Part 1.

2. **If you have a floppy disk PC, place your MS-DOS disk in Drive A and display an A:\> system prompt.**

This disk will already be in the drive if you have just switched on or reset the machine.

3. **Make the root directory the current directory.**

If you have just switched on or reset your PC, you need not do anything. If you have been using MS-DOS command lines, you may need to type:

CD\ [↵]

To return to working on the root directory.

4. **Type:**

FORMAT A: [↵]

After a short while, you should see the following message:

Insert a new diskette for drive A:
and strike ENTER when ready

5. **If you have a hard disk PC, insert the disk you want to format into drive A. If you have a floppy disk PC, remove the MS-DOS disk from drive A: then insert the disk you want to format.**

To remove a disk, press the drive release button. This releases the disk, you can then withdraw it completely from the drive. Insert the disk you want to format into the drive until it latches into place.

6. **Press the [↵] key**

The following line will appear on the screen:

Head: 0 Cylinder: 0

The numbers in this line will change as the disk is formatted.

After a short while, messages similar to the following should appear on the screen:

Format complete

1457664 bytes total disk space
1457664 bytes available on disk

Format another (Y/N)?

7. Type [Y] [↵] if you want to format another disk; type [N] [↵] to leave FORMAT.

You can use the command FORMAT A: /S to copy the MS-DOS system onto it after formatting. This copies MS-DOS.SYS and COMMAND.COM to it to ensure that the 'Startup' disk can then be used to start the machine.

Alternatively you can use FORMAT A: /B to reserve space for those 3 files which may be added at a later date. This is a 'Potential Startup disk'.

Full details of the FORMAT command are listed in chapter 8.

SYS If you decide to postpone making your disk a Startup disk, you can copy IO.SYS and MSDOS.SYS to the disk later by using the SYS command.

The space allocated to the system files on a Startup or a Potential Startup disk cannot be used to store data files and program files, and so the amount of space available for your files is reduced. It would therefore be wasteful to make all your disks potential Startup disks. Instead, only choose this option if you are fairly sure that you are going to need to make the disk a Startup disk.

5.2 Giving disks labels

LABEL When you have a number of files and directories on a disk, it is not always easy to tell which disk you are working with, particularly if it could be any one of a number that you haven't used for some time.

When a disk has a label, it is much easier to find out which disk you have in the drive. A label is an individual name of up to 11 characters. This name is always displayed when you use the DIR command to list any directory on the disk, even those that are lower than the root on the directory tree. It is a means of identifying your disks and can be used as the name by which you catalogue your disks and the files they hold.

As well as using the FORMAT command with the /V option, the LABEL command can also be used to give a disk such a label or to change the label if it already has one. See Chapter 8 for full details of the LABEL command.

5.3 Copying disks

DISKCOPY The process of copying the contents of a disk onto another makes the second disk an exact copy of the first. Immediately after the copy has been made, the two disks are identical in every way; any processing you do of either disk will stop them from remaining identical. The command to use is DISKCOPY.

The only information that DISKCOPY needs is which drive will hold the disk you want to copy (the Source drive) and which drive will hold the disk the copy will be made on (the Target drive). The target drive doesn't have to be a different drive from the source drive, but if you have two drives this is usually the most convenient way of working. If you use the same drive for both source and target, DISKCOPY will prompt you when you need to change the disk in the drive from the source disk to the target disk.

Note: If you want to put the copy on a new blank disk, you don't have to format the new disk before you start to make your copy. DISKCOPY will give the new disk the same format as the source disk.

The steps to copy a disk are as follows:

1. Display a C:\> system prompt (or an A:\> if you have a floppy disk drive PC)

If you are not sure how to do this, reset your PC by holding down the [Ctrl] and [Alt] keys and pressing [Del].

If you have a floppy disk drive PC, put the MS-DOS Startup Disk in Drive A, and hold down the [Ctrl] and [Alt] keys and press [Del].

2. Make the root directory the current directory

If you have just switched on or reset your PC, you need not do anything. Otherwise you may need to type:

CD\ [↵]

to return to working on the root directory.

3. Type:

DISKCOPY A: B: [↵]

What happens next depends on whether your PC has one or two floppy disk drives.

If you have a PC with one floppy disk drive

After a short while, you will see the following message on the screen:

Insert SOURCE diskette in drive A:
Press any key when ready...

4. Remove the MS-DOS disk from the drive and insert the disk you want to copy

Press the drive release button to release the disk, then withdraw it completely from the drive. Insert the disk you want to copy into the drive until it latches into place.

*5. Press a character key

The [↵] key or the Space Bar are both character keys and one of these is usually the most convenient choice.

After a short while, you will see the message:

Copying - 80 tracks

18 Sectors/track, 2 Side(s)

followed by:

Insert TARGET diskette in drive A:
Press any key when ready...

6. Remove the disk from the drive and insert the disk you want to store the copy on

Press the drive release button to release the disk, then withdraw it completely from the drive. Insert the disk, on which you want to store the copy, into the drive until it latches into place.

7. Press a character key

The [↵] key or the Space Bar is usually the most convenient choice.

If you are storing the copy on a new blank disk or on a disk that has a different format to your source disk, you will see the message:

Formatting while copying

you may then see the message:

Insert SOURCE diskette in drive a:
Press any key to continue...

This means that all the contents of your source disk could not fit into the computer's memory at one time. Replace the target (destination) disk with the source disk (the one you are copying from) then go back to Step5*.

When copying is completed, the following message will be displayed:

Copy another diskette (Y\N)?

8. Type [Y] if you want to copy another disk; type [N] to leave DISKCOPY

If you have a two-drive PC

After a short while, you will see the following message on the screen:

Insert SOURCE diskette in drive A:

Insert TARGET diskette in drive B:

Press any key when ready...

4. Remove the disks currently in the drives and insert the disk you want to copy in drive A and the disk you want to store the copy on in drive B.

To remove a disk, press the drive release button and then withdraw the disk completely from the drive. Insert the disk you want to copy and the disk you want to store the copy on, into their appropriate drives until they latch into place.

5. Press a character key

The [↵] key or the Space Bar is usually the most convenient choice.

After a short while, you will see the message:

Copying 80 tracks
18 sectors/track, 2 Sides(s)

If you are storing the copy on a new blank disk or on a disk that has a different format to your source disk, you will see the message:

Formatting while copying

Finally the message:

Copy another diskette (Y/N)?

6. Type [Y] if you want to copy another disk; type [N] to leave DISKCOPY.

5.4 Checking disks

CHKDSK When a program fails unexpectedly, with MS-DOS reporting an error in reading or writing to a disk, it may be that your disk has become physically damaged (for example, scratched) but it may be that your program or its data has become corrupted electronically.

The command to use to check a disk for errors is CHKDSK. This will check a disk for:

- errors in the directory structure that would prevent you from accessing certain parts of the directory tree

- errors in the recorded list of disk areas which are used to store a file

- bad directories

Note, however, that it does not check the contents of every file or all the sectors on the disk; this can be done using the DISKCOMP command.

Any errors it finds are reported through error messages.

Errors such as these will stop your program from working. CHKDSK can in some cases ease the problem by 'correcting' the error - though perhaps with the loss of some data from a file. However, it will only do this if you specifically select one of the CHKDSK options: its normal action is just to produce a status report on the disk - plus, if you want, a report on specific files on that disk. The report on files will tell you, in particular, how many separate ('non-contiguous') areas of the disk are used to store the file. (Re-using areas of the disk freed by deleting a file usually leads to the new files being stored in a number of separate areas of the disk).

Checking how much storage space there is on a disk

1 **If you have a hard disk, insert the disk you want to examine in Drive A**

2 **Type:**

CHKDSK A: [⏎]

If you have a floppy disk drive PC, insert your MS-DOS disk in drive A: and the disk to examine in drive B: then type:

CHKDSK B: [⏎]

After a little while, MS-DOS will display a report on the disk, which tells you (among other things) the number of bytes of storage space available on the disk. (1000 bytes holds about 1000 characters).

If you want to check a hard disk, type:

CHKDSK C: [⏎]

This process may take a few minutes if there are a lot of files on the disk.

5.5 Comparing disks

DISKCOMP You may occasionally want to compare your security copy of a working disk (created by copying the disk using DISKCOPY) with the original disk. For example, you may keep two security copies of a working disk, to which you copy the working disk alternately; you may at some time become confused as to whether they contain the same information or not.

The command to use is DISKCOMP. This carries out a track-by-track comparison of the two disks and when DISKCOMP finds a difference between the disks, it puts up a message specifiying on which side of the disk, and in which track, it found the discrepancy. Either one side or both sides of the disk can be compared in this way.

DISKCOMP can also be used to check if the whole of a disk is readable and it will check more thoroughly than CHKDSK. Although the program would expect two disks to be used, simply insert the same disk twice when you are prompted for the 'source' and the 'destination' disks.

Full details of this command are included in Chapter 8.

Note: The DISKCOMP command will only make a valid comparison if the copy was made using DISKCOPY . If you made the back up disk by COPYing each file individually, the comparison will probably fail because although the data is the same and the directory tree is the same, the files themselves are likely to be in different places on the disk.

6. Organising your work

This chapter describes how to make and keep your files readily available for use by:

Putting your files into groups

As you increase the number of files on a disk, you will find that they become much more manageable and more convenient to use if related files are grouped together. MS-DOS then lets you work on just a group at a time.

Section 6.1 of this chapter explains:

- Directories (groups of files)

- Displaying the current pattern of directories

- Directory names

- Specifying a path (moving from one directory to another)

- Starting new directories

- Getting rid of directories you no longer need

Disk housekeeping

The selection of files you have on your disks and the way these files are grouped will frequently become out of date. You may well have files you no longer need taking up valuable space on your disk.

Section 6.2 explains

- Filenames

- Using Wildcards to specify a number of files

- Copying files

- Transferring files to and from Input and Output Devices

- Combining files

- Examining text files

- Deleting files

- Renaming files

- Comparing files

- Finding out how large a file is

- Finding out how much room there is on a disk

- Displaying the label of a drive

- Using the Editor to create or change a text file

Protecting important files

Files are readily erased or overwritten. Section 6.3 describes how to protect your most valuable files - programs you have bought, last year's accounts, etc. - against being erased or overwritten accidentally.

6.1 Putting files into groups: directories

What is a directory?

Programs and data are stored in files, both in the computer's memory and on disks. Each file has a name to allow it to be identified.

Computer files are organised into directories in a similar way that letters are organised in a filing cabinet: each computer file is like an individual letter or a document in the filing cabinet.

In your filing cabinet, you would group together letters which are related in some way. Similarly, if you group together, on your computer, files containing programs and data which are related, your files will be easy to manage. So, directories provide a means of organising files on your disks.

How directories are organised

Directories are organised into a 'tree-like' structure, with a main directory called the "Root" directory, and as many subdirectories as you need, leading from the Root directory. You can move from directory to directory, and you can add and remove directories as you require them.

Displaying the current pattern of directories

When you want to find out what directories are used on a particular disk and how these are linked together, you can find this out by working your way around the directories on the disk using CHDIR to move from directory to directory (see Section 7.1) and DIR to tell you what is in each directory. If you start at the Root directory and keep a note of the subdirectories within each directory, you can soon build up a tree structure showing how the directories are linked together.

For example, if the Root directory has the subdirectories HOME and BUSINESS, the top part of the tree must be:

Root

Home   Business
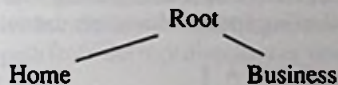
If you change to the HOME subdirectory, you might find this has the subdirectories LETTERS and GAMES. If you then found that the LETTERS and GAMES directories had no subdirectories, the lefthand side of the tree would be:

```
              Home
             /    \
        Letters    Games
```
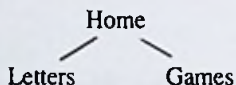
Turning to the righthand side of the tree, you might find that the BUSINESS directory contains subdirectories called LETTERS, REPORTS and ACCOUNTS and that LETTERS and ACCOUNTS had subdirectories A, B and C. If directory A,B, C and REPORTS do not have any further subdirectories, your final directory tree would look like this:

```
                    Root
                   /        \
            Home              Business
           /    \            /    \        \
      Letters   Games   Letters  Reports   Accounts
                                 / | \      / | \
                                A  B  C    A  B  C
```
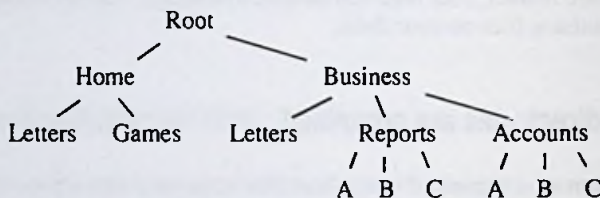
TREE Moving from one directory to another is one means of finding out how your directories are structured. There is also an MS-DOS program called TREE which is used to list all the directories you have on a drive. The TREE command displays, on the screen, the path from the Root directory for each subdirectory. This command is listed in Chapter 8.

Directory names

To make your directories more manageable, choose directory names which are relevant to the contents of the directories.

Directories can be given a name which is in two parts - a Name and a Type, although in practice, the type is rarely specified.

The Name is any combination of 1 to 8 characters, starting with one of the letters of the alphabet or a number. The following special characters cannot be used:

< > = | / [ ] , . : ; \ + * ? " ^ !

and you may not include any spaces in the name.

The full stop is used as a separator between the filename and filetype.

For example, the following names are valid:

A

AAAAAAAA

123

The following names are invalid:

A23[4]   includes one or more special characters

AAAAAAAAA   too many characters

Often, just the letters of the alphabet A-Z and the digits 0-9 are used. Note that Lower Case letters (a-z) are exactly the same to MS-DOS as upper case letters (i.e. A-Z) Cat, for example, is exactly the same as cat or CAT.

Note You must not use the names **AUX, COM1, COM2, COM3, COM4, LPT1, LPT2, LPT3, NUL** and **PRN**.

The Name is usually chosen to remind the user about the files the directory holds, but this does not have to be so.

The Type can be up to three characters long and again the special characters and spaces cannot be used.

A directory can be given any valid name provided it is not already the name of a file or subdirectory in the same directory.

A subdirectory name describes the path to the subdirectory holding the files you want to use.

Specifying a Path

A 'Path' is a list of the names of the directory, or directories which link one subdirectory to another. It indicates to MS-DOS where to find a required directory. You can always start the path from the root directory or you can start with the directory you are currently working with.

Suppose, for example, that you knew that the structure of directories on the disk was:

```
                          Root
          Home                        Business
        /      \                   /      |      \
   Letters    Games          Letters   Reports   Accounts
                             / | \        |        / | \
                             A B C       New      A  B  C
```
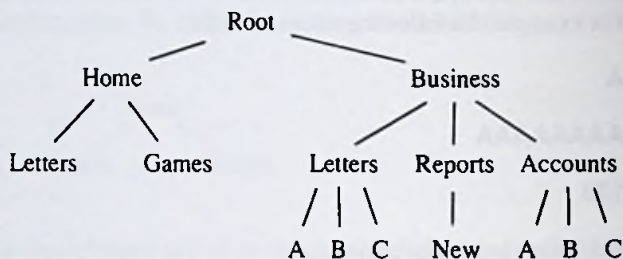
Paths from the Root directory

To work out the path you need, start at the Root directory and list all the names on the way to the directory you want (including the name of this directory). The path consists of these names, written down in order and separated by backslashes (\).

For example, to direct the operating system to the ACCOUNTS directory, the names on the way are BUSINESS and ACCOUNTS

and so the path is:

BUSINESS\ACCOUNTS

When using this path, you must also include a backslash at the beginning to tell the operating system that the path starts at the Root directory. If you are specifying a file, put another backslash at the end of the path, to separate the path from the file name. For example, to specify a file called NEW.A in the ACCOUNTS directory, write:

\BUSINESS\ACCOUNTS\NEW.A

Paths from the current directory

To work out the path you need, start at the current directory and, working down the tree as necessary, list all the names on the way to the directory you want (including the name of the current directory). The path consists of these names, written down in order and separated by backslashes (\). If you want to move back a level, you must use just '..' instead of the name of that directory.

```
                          Root
                  _____/      _____
              Home                      Business
            /      \                   /    |    \
       Letters    Games          Letters Reports Accounts
                              /   |   \     |     /  |  \
                             A    B    C   New   A   B   C
```
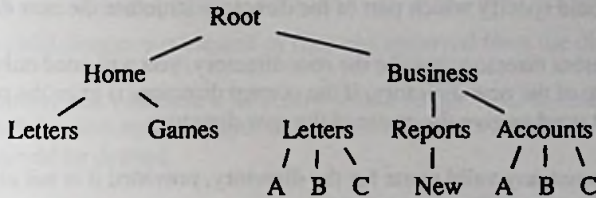
For example, suppose the current directory is NEW. To direct the operating system to the ACCOUNTS directory, via the REPORTS and BUSINESS subdirectories, the path you would type is:

..\..\ACCOUNTS

When using this path to specify a file in the directory, put a backslash at the end of the path, to separate the path from the file name. You should not put a backslash at the beginning of the path. For example, to specify a file called NEW.A in the ACCOUNTS directory, write:

..\..\ACCOUNTS\NEW.A

Adding a new directory

MKDIR A new directory can be added by specifying to MS-DOS where the new directory will fit in. The command used for this is the MKDIR ('Make Directory') command.

For example, if the directory structure you start with is like this:

```
                          Root
                  _____/      _____
              Home                      Business
            /      \                   /    |    \
       Letters    Games          Letters Reports Accounts
                              /   |   \         /  |  \
                             A    B    C       A   B   C
```
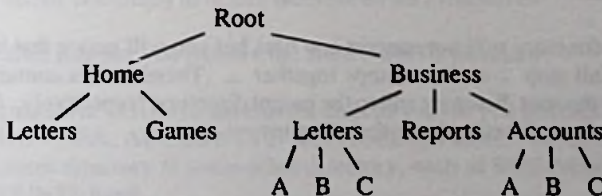
You might want to add a directory to your existing tree for storing the minutes of meetings. There are two things to define about this new directory: where it fits on the tree and its name.

You must determine which directory the new directory is to start from by specifying the path to it. This will either be from the root directory or from the current directory.

The last part of this path should give the name of the new directory and the rest of the path should specify which part of the directory structure the new directory starts from.

If the parent directory is to be the root directory, you will need only a backslash before the name of the new directory. If the current directory is to be the parent directory, you will just need to give the name of the new directory.

You can use any valid name for the directory, provided it is not already the name of a child directory of the same parent.

In this case, we will choose the name MINUTES and make BUSINESS its parent.

New tree:

```
                        Root
            Home                      Business
           /    \                 /      |      \
      Letters  Games        Letters  Reports  Accounts  Minutes
                           / | \              / | \
                          A  B  C            A  B  C
```
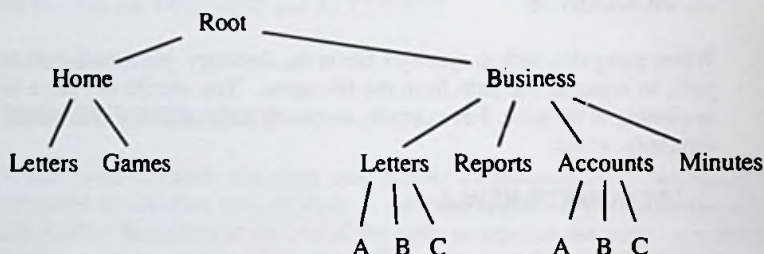
The path from the root directory to the new directory should therefore be written \BUSINESS\MINUTES, so type:

MKDIR \BUSINESS\MINUTES

When a directory has just been created, it does not have any files in it - these have either to be copied to the new directory from other directories, or created and stored in the new directory. You would have to use the COPY command (see Chapter 8) to copy a number of files to your new directory.

A new directory will not contain any files but you will notice that it has two entries: a single full stop . and two stops together .. .These entries contain the details of the route to the root directory and to the parent directory, respectively. All directories other than the root directory have these entries.

Removing a directory

RMDIR A directory can be removed from the directory structure by using the RMDIR ('Remove Directory')command.

Before you use this command, you have to ensure that:

- there are no files in the directory

- any child directory is cleared of files and removed from the directory structure first

Remember, you can clear a directory with a single DEL command, if it includes the name of the directory and optionally ends with the wildcards, *.* to indicate that all files should be deleted.

Note: You cannot (and should not attempt to) clear a directory of the entries . and .. These hold details of the route to the root directory and of the parent directory and cannot be erased.

Before you use the RMDIR command, you also have to ensure that the directory you want to remove is not the current directory on the drive and that it is not assigned to an imaginary drive. For example, suppose the directory structure at present is:

```
                        Root
            _____/    _____
           /                              \
        Home                          Business
        /    \                    ____/    |    \____
       /      \                  /         |         \
  Letters   Games           Letters    Reports   Accounts   Minutes
                             / | \                 / | \
                            A  B  C               A  B  C
```
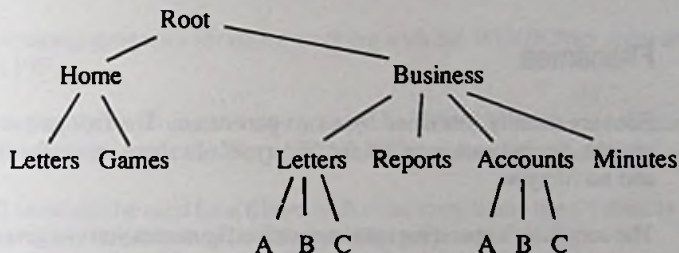
and you wanted to remove ACCOUNTS from your directory structure.

You would first have to remove ACCOUNTS\A, ACCOUNTS\B and ACCOUNTS\C. That means you would have to erase all the files in these three directories and then use the RMDIR command to delete the directories themselves.

Only after that can you remove the ACCOUNTS directory.

If you made ACCOUNTS the current directory when you were removing the directories ACCOUNTS\A, ACCOUNTS\B and ACCOUNTS\C, you will now need to change the current directory to some other directory, such as BUSINESS, before you remove ACCOUNTS itself.

6.2 Disk housekeeping

Disk housekeeping involves keeping your disks organised, with your files on the most appropriate disks and in the most appropriate directories. To achieve this you will need to be able to perform the following tasks:

- find out what files are already stored in a directory

- add to these files by creating new files and copying files from other directories

- remove files you no longer want, for example, to make space for new files

- give files new names

It is not possible to simply move a file from one directory to another: you always have to make a copy of the original file.

To use the commands described in this chapter, effectively, you need to understand about DOS directories and paths. See section 6.1 if you do not understand how directories are structured.

Filenames

Files are usually identified by a two-part name. The first part is called the 'Filename' and the second part is called the 'Filetype'. In some cases, the file has just a filename and no filetype.

The computer's operating system restricts the names you can give to files. The filename can be from one to eight characters in any combination, starting with one of the letters of the alphabet or a number. The following special characters cannot be used:

< > = | / [ ] , . : ; \ + * ? " ^ !

and you may not put spaces into a filename.

For example, the following filenames are valid:

A

AAAAAAAA

123

The following filenames are invalid:

A23[4]   includes one or more special characters

AAAAAAAAA   too many characters

Often just the letters of the alphabet A...Z and the digits 0...9 are used. Lower case letters (i.e. a...z) are exactly the same to MS-DOS as upper case letters (i.e. A...Z) when used in filenames. For example, the filename Cat is identical to the filename cat or CAT.

Note: The filenames **AUX, CON, COM1, COM2, COM3, COM4, LPT1, LPT2, LPT3, LST, NUL** and **PRN** have special meanings and should not be used for your own files.

The filename will usually be chosen to remind you about the information the file holds but this doesn't have to be so.

The filetype is up to three characters long and again the special characters and spaces cannot be used. But unlike the filename, the filetype can be fixed by the information the file holds. For example:

- files containing programs which run directly from the MS-DOS operating system must have the filetype COM or EXE

- files containing programs set up for working with the WINDOWS software have the filetype PIF.

Always check in your program's user guide to see if the data files associated with this program must have a particular filetype. If no filetype is specified, choose one yourself.

Any valid name can be used for a file provided the same name hasn't already been used for another file or subdirectory in the same directory.

When you want to specify a particular file, write its name as *filename.filetype*: for example, if the *filename* is MYFILE and the *filetype* is TXT, you would write the complete name as MYFILE.TXT (You must always remember to put the full stop between the filename and the filetype).

Using Wildcards to specify a number of files

Some programs are able to work on a number of files, one after another. You can make use of this to save yourself typing a separate instruction for each file provided you can construct a 'template' that at least some of your chosen files will match.

The 'tools' you can use in constructing this template are two special characters called wildcards because they can represent any valid character. The two wildcards are:

? which represents one valid character (or blank) in this place in the name

* which represents any number of valid characters (including blank) finishing off this part of the file's name

For example, suppose a directory contained the following files:

A.COM, AB.COM, ABB.COM, B.COM, A.BAT and **B.BAT**

?.COM would be the template for **A.COM** and **B.COM**

*.COM would be the template for **A.COM, AB.COM, ABB.COM** and **B.COM**

Both **?.BAT** and *.**BAT** could be the template for **A.BAT** and **B.BAT**

A?.COM would be the template for **A.COM** and **AB.COM**

A*.COM would be the template for **A.COM, AB.COM** and **ABB.COM**

A.* would be the template for **A.COM** and **A.BAT**

?.* would be the template for **A.COM, B.COM, A.BAT** and **B.BAT**

. would be the template for all the files

Note the use of a separate asterisk for the filename and the filetype parts of the file's name.

Making copies of files

COPY

XCOPY You make copies of files to:

- make 'back up' copies of files in case your original file is damaged or accidentally destroyed

- move one or more files from one directory to another (the original file must be erased once the copy has been made)

- create a new file that combines a number of existing files

- transfer a file you create at the keyboard into a disk file, output a copy of a disk file on a printer, or transfer what you type at the keyboard to the printer as MS-DOS treats input and output devices as files.

The original files are left unchanged by the process.

The MS-DOS commands used to make copies are COPY and XCOPY, full details of which are given in Chapter 8. XCOPY will only handle disk files and cannot combine files in the way COPY can, but it can search a directory's subdirectories for the files you want to copy: this is something that COPY cannot do.

Copying a file makes a new file that contains all the same information as the original. This copy can be stored either in the same directory as the original or in a different directory on a different disk.

The methods of copying described here, make copies of one or more files. However, the files must all be in the same directory, so if you want to copy files from separate directories you must repeat the process for each directory in turn.

The originals of the files are known as the 'Source' and the place that the copies are to be stored is known as the 'Destination'.

The steps are as follows:

1. **Decide which file or files you want to copy. These are described as your source files.**

   You can use one command line to copy a number of files provided these can be described by the same file template (i.e. a file name covering a number of files by including the wildcard characters * and ?) and provided you do not want to store the copies in the same directory as the original files.

2. Jot down the drive, path to the directory and file name (or template) you are going to use for the source file(s). These make up the source details for the copy.

Write this down in the form *drive:\path\filename.filetype*. For example, if you want to copy all the files with the filename MYFILE in a directory called SUBDIR on Drive A, you would write:

A:\SUBDIR\MYFILE.*
if SUBDIR is listed in the Root (principal) directory on Drive A.

A:\DIR1\SUBDIR\MYFILE.*
if SUBDIR is listed in the DIR1 directory, which is itself listed in the Root directory on Drive A.

3. Decide where you want to store the new files and what they are to be called. This is known as the destination of the copies.

Often you will want to store the copy in a different directory but under the same filename and filetype. Make sure that you do not already have any files with this filename and filetype in your destination directory or, if you do, make sure that you no longer need the files.

It is also wise to check that there will be enough room for the new file on the destination disk. You can use the DIR command in Chapter 8 to do this.

4. Jot down the drive, path to the directory and file name (or template) you are going to use for the destination file(s). These make up the destination details for the copy.

If you want to use the file name(s) that the source file(s) already have, use the following form.

drive:\path

But if you want to use different file name(s)

drive:\path\filename.filetype

5. Type in the appropriate COPY command

The command you need will be:

COPY *source-details destination-details* [↵]

MS-DOS then makes the copy or copies you have requested.

For information on how to make Hard Disk backups see the section in Part One, and the BACKUP command in Part Two, Chapter 8.

Transferring files to and from Input and Output Devices

The following methods of transferring information are all copying operations:

- from an Input Device such as the keyboard into a disk file

- from a disk file to an Output Device such as the display or the printer

- from an Input Device to an Output Device

They use COPY commands very like those used to copy disk files between different drives, but with an Input Device as the Source for the copy and/or an Output Device as the Destination.

The way to tell MS-DOS that, for example, the keyboard is the source and the printer is the destination, simply put its device name in the relevant position in the COPY command. The keyboard's name is CON and the printer's name is LPT1, and so the command line you would need in this instance would be:

COPY CON LPT1

Everything you type in at the keyboard will simply be printed out on the printer when you press Ctrl-Z.

Similarly, you could tell MS-DOS to transfer information it receives through the Serial Interface (known to your computer as AUX) to the disk file called TRANSFER.DAT with the command line:

COPY AUX TRANSFER.DAT

The device names associated with the PC's input and output devices are listed in Chapter 1.

Combining a number of files into one large file

The COPY command also allows the data from a number of sources - disk files, the keyboard, the serial interface - to be combined into a single file in one copying process. The files that are combined do not have to be stored on a disk: one of the files could be input from the keyboard and another could be input from the serial interface.

The resulting file can either be a new file or the first of the source files, with the information from the other files appended to the end of this file. The other source files are not affected by the copying process.

Details of the commands that combine files in this way are given in the full description of the COPY command in Chapter 8.

Examining text files

TYPE
PRINT Many files can only be interpreted by the program that uses them and so using an application program to examine the file is often the only way of checking up on what the file contains. However, text files - that is, files of ASCII characters that are entirely free of special program codes - can readily be displayed on your screen or printed out on a line printer. Trying to display non-text files in this way will only result in output that is impossible to read.

The commands used to display text files are TYPE and PRINT. The TYPE command is used to display the text file on your PC's screen; the PRINT command is used to output the file on a printer attached to your PC.

The TYPE command can display only one file at a time and unless you make the display pause, for example by using the MORE filter (described in Section 7.3), much of the file will be scrolled off the screen before you have time to read it. However, it provides a simple and quick way of checking whether a particular text file contains what you expect.

The PRINT command can be used to print either one or a number of files. It sets up a list of files that are to be printed and sends these to the printer in the background while you get on with doing other jobs.

You cannot change any of the files that are waiting to be printed and you must not take the disk, on which they are stored, out of the drive until all the files have been printed.

However, you can change the list after the files have started being printed. You can:

- **add new names to the end of the list**

- **remove the names of files you no longer want to print**

- **abandon the rest of the print list**

See Chapter 8 for details of the PRINT command.

Deleting files

DEL

ERASE Unwanted files will clutter up your disk space unless you delete them. Deleting a file reclaims the space the file occupied both in the directory and on the disk, freeing it for use for some other file.

The command to use is DEL or ERASE. ERASE is the alternative name for the DEL command.

Files cannot be deleted if they are write-protected. Write-protecting is a means of protecting a file from being altered or deleted accidentally. There are two ways of protecting files: one is to protect individual or selected files using the ATTRIB command (see Chapter 8) and the other is to protect the whole floppy disk by opening the write-protect shutter on a floppy disk. See section 6.3 for more information.

Once a file is deleted, it cannot be recovered, so it is important that only files you do not want are deleted.

This is especially important if you plan to delete a number of files by giving a file template constructed using the wildcards * and ? (see the above section, Using Wildcards to specify a number of files). MS-DOS asks you if you are sure you want to delete every file that matches the template, if you ask to delete all the files in a directory using the template *.* .

The steps are as follows:

1. Decide on the file or files you want to delete

You can use one command line to delete a number of files provided these can be described by the same file template (i.e. a file name covering a number of files by including the wildcard characters * and ? (see the section on using wildcards, above).

2. Jot down the drive, path to the directory and file name (or template) you are going to use. These make up your file-details.

Write this down in the form *drive:\path\filename.filetype*. For example, if you want to delete all the files with the filename MYFILE in a directory called SUBDIR on Drive A, you would write:

A:\SUBDIR\MYFILE.*

if SUBDIR is listed in the Root (principal) directory on Drive A

A:\DIR1\SUBDIR\MYFILE.*

if SUBDIR is listed in the DIR1 directory, which is itself listed in the Root directory on Drive A.

3. Type in the appropriate DEL command

The command you need is:

DEL *file-details* [⏎]

MS-DOS then deletes the files you have specified, unless you have asked it to delete all the files in the directory when it first puts up the message:

Are you sure (Y/N)?

Type [Y] [⏎] if you want all the files to be deleted; type [N] [⏎] and then re-write your command line if you had not intended to delete all the files.

Renaming files

RENAME Files do not have to keep the names they were given when they were created. The names can be changed at any time to any other valid filename by using the RENAME command. However, you must not use a name that has already been given to another file or to a subdirectory within the same directory.

Renaming a file does not affect the contents of the file in any way; it just changes the filename recorded in the directory. Note that, renaming cannot move a file from one directory to another, even on the same disk: to do that, you have to make a copy in the new directory and then delete the old version.

The name you choose should:

- be different from any other file or subdirectory name in this directory

- suit the needs of the programs you are going to use to process the file (refer to the programs's user guides)

- remind you of the information stored in the file

The usual characters to use in the name are the letters A...Z and the numbers 0...9.

The steps are as follows:

1. Jot down the drive, path to the directory and file name of the file you are going to rename.

Write this down in the form *drive:\directory\filename.filetype*. For example, if you want to rename a file called MYFILE.TXT in a directory called SUBDIR on Drive A, you would write:

A:\SUBDIR\MYFILE.TXT

if SUBDIR is listed in the Root (principal) directory on Drive A, and

A:\DIR1\SUBDIR\MYFILE.TXT

if SUBDIR is listed in the DIR1 directory, which is listed in the Root directory on Drive A.

2. Jot down the new file name you have chosen for the file.

For example, if you have decided to call the file MYFILE.VI write down MYFILE.VI

3. Type in the appropriate REN command

The command you need is:

REN *old-name new-name* [↵]

MS-DOS then renames the file, unless you have chosen a name that you are already using. In that case, it displays an error message and does not rename the file. If this happens, either delete the file that is causing the problem or choose another name before trying to rename the file again.

Comparing files

COMP MS-DOS has two commands that can be used to compare files: COMP and FC. COMP is used to confirm that files that you think are the same do not contain any differences. For example, after a COPY command you may use COMP to check that the copy was successful.

FC, on the other hand, is used to highlight the differences between several versions of a file that are slightly different and perhaps, even, different lengths.

FC If you have a number of versions of the same file, you may want to find out exactly what the differences are between these versions.

The command to use is the FC command, which will compare files for you either line-by-line or byte-by-byte. You would opt for:

- **line-by-line comparisons to compare versions of a word-processor document or a BASIC program**

- **byte-by-byte comparisons to compare versions of a machine-code program**

When FC spots a difference, it carries on comparing until the two files match again: the whole section that is different is then either output on the screen or sent to a file.

Because inserting or deleting lines is a common change to make to documents or BASIC programs, FC tries to 'resynchronise' files it is comparing line-by-line. It will keep reading lines into its buffer from each file until it matches a line from one file with a line from the other - or the buffer is filled up. If the buffer becomes full, FC gives up comparing the files and declares the files 'too different'. No such attempt is made to resynchronise files that are being compared byte-by-byte.

Finding out how much room there is on a disk

As you create, copy, edit and delete files on a disk, you may want to check how much storage space is currently available on the disk. (When you edit a file and save a new edition of the file, typically you will need at least as much free space on the disk as the size of the file, and it is wise to check this *before* you start editing the file.)

The easiest way of getting this information is to use the DIR command (see Section 7.1) to display details of a directory or even of a single file on the disk. At the bottom of the display will be quoted the number of bytes free on the disk. (1000 bytes will hold about 1000 characters.)

Compare this number with the size quoted for the file you want to copy onto the disk or the size of the file you want to edit, before deciding to go ahead.

Displaying the label of a drive

VOL The VOL command displays the label on the specified drive (See also the LABEL command in Chapter 8).

Finding out how large a file is

1. **Jot down the drive, path to the directory and file name of the file you want to know the size of. These make up the file-details.**

   Write this down in the form *drive:\path\filename.filetype.* For example, if you want to find out how large a file called MYFILE.TXT in a directory called SUBDIR on Drive A, you would write:

   A:\SUBDIR\MYFILE.TXT

   if SUBDIR is listed in the root (principal) directory on Drive A

   A:\DIR\SUBDIR\MYFILE.TXT

   if SUBDIR is listed in the DIR1 directory, which is itself listed in the root directory on Drive A

   Turn to Section 6.1 Specifying a path, if you need extra help in working out what to write down

2. **TYPE:**

   DIR *file-details*

   Among the details that will appear on the screen will be the size of the file in bytes. (1000 bytes is about 1000 characters.)

Using the Editor to create or change a text file

The PC is supplied with a screen-based Text Editor called RPED which is very useful for editing small text files. As it shows the file you are editing on the screen, it is very easy when you are using RPED to look over sections of the text file you are creating or changing, spot a mistake, move the curser to this mistake and make your corrections.

The main use you are likely to make of RPED is for creating or updating files that have the filetype BAT, in accordance with instructions in your programs' user guides. (These guides may suggest you use the MS-DOS text editor, EDLIN, but you will probably find using RPED easier.) Other files are usually created by the programs you run and updated by them as well.

The RPED program is stored on an MS-DOS system disk.

Overview of using RPED

The first screen that RPED displays, tells you about the keys on your keyboard you will be able to use while you are working with RPED. It also asks you whether you want:

- to edit (ie. change) an existing file

- to immediately re-edit the file you have just finished editing

- to create a new file

and it tells you which key to press to make your selection. Put the disk holding the file you want to edit (or the disk you are going to store the new file on) in Drive A and then press the key appropriate to the job you want to do.

RPED then asks you where the edited version is to be stored.

After you enter this information and press [↵], you will see either the current version of the file displayed on the screen or a blank page ready for you to type in your new file. Messages on the screen tell you which keys to press to do such actions as:

- inserting a new line

- deleting a line

Running RPED

1. Display a C:\> system prompt if your PC has a hard disk, and an A:\> if it has two floppy disk drives.

   To do this you should switch on and load MS-DOS, by following the Startup procedure given in Part One, and using the MS-DOS Disk system disk. If you are already using MS-DOS on your PC, finish what you are doing then return to a system prompt and type:

   CD \ [↵]

2. If you have a floppy disk drive-based PC, place the MS-DOS working disk in drive A.

Note In the case of a Hard Disk PC, the RPED program should be already available on the disk.

3. Type:

RPED

After a short while, the following should be seen on the screen. This is RPED's opening screen:

```
This screen is for small files (up to 750 lines) and uses
normal Cursor, Page Home, End, Insert and Delete keys.

             f1 = Edit existing File

             f2 = Re-edit Previous File

             f3 = Create New File

             f4 = Quit
```

While editing you may use the [Home] key to return to the start of the file while [End] positions the cursor at the end of the file. The [Page Up] key moves up a screenful while [Page Down] moves down a screen, [Insert] switches between insert and type-over mode, [Delete] performs a backward deletion while the [←] key just moves the cursor to the left. Forwards deletion can be done by pressing Ctrl-G, Ctrl-Left Cursor and Ctrl-Right Cursor can be used to go to the start or end of a line.

6.3 Protecting your files

As you store programs and data in files, there are a number of questions you should give some thought to:

• **Will you want to maintain a security copy of the file?**

• **Do you want to protect the file against being accidentally deleted or overwritten?**

• **Will you want to know when the file was last changed?**

These questions are all ones of file security and we strongly recommend you to pay attention to this aspect of using your PC. In particular, we would advise you to make security copies of your valuable files. If you do this regularly, you may not need to take any other steps to protect your files.

Making security copies

The process of creating such copies is known as 'backing up' files.

There are a number of possible ways of making back-up copies of files:

- You can make copies of whole disks, by using the DISKCOPY command or the XCOPY command.

- You can copy individual files onto a different disk, by using the COPY command or the XCOPY command.

- You can use the BACKUP command to copy selected files onto floppy disks which can later be retrieved by the RESTORE command.

All of the above commands are described in Chapter 8.

Controlling the creation of security copies

If you have a group of files that you back up regularly, you can save time by backing up only the files that have changed. You can do this whether you created your security copies by using an XCOPY command, by using a DISKCOPY command or a number of COPY commands.

The /A and /M options provide the necessary control when using the BACKUP and XCOPY commands.

Protecting against accidental deletion

ATTRIB When a file is created it is a Read-Write file. This means you can:

- read the contents

- change the contents

- delete the contents

This in turn means you can accidentally destroy it!

Although you wouldn't deliberately delete a file you knew you wanted, you might temporarily forget that it contained important information or you might delete it alongside a group of other files with similar filenames.

The way to ensure that your important files are not lost through being accidentally overwritten or deleted is to make them Read-Only files. This allows the files to be read into the computer's memory and processed but the versions stored on the disk cannot be overwritten nor can they be erased.

The files are then said to be "write-protected", and they stay write-protected until you change them to Read-Write again.

Use the ATTRIB command to make a file Read-Only - and to make it Read-Write again.

Monitoring when files are changed

MS-DOS helps you monitor when your files are changed, by recording the date and time they were created, this is called "time and date stamping". These times are recorded automatically for your DOS files, and can be displayed when the directory is listed, using the DIR command (see Section 7.1).

It is important to keep track of your files if you develop more than one version of a file. Time and date stamping can be a means of identifying the latest version.

You may also want to take advantage of the time and date stamping if you share the same data files with other people and you want to know whether a particular file has been changed since the last time you used it. The time and date stamps would quickly tell you whether a file had been changed.

Time and date stamping relies on the PC's internal clock, so you should keep it set correctly.

7. Running programs

The primary job of your computer is to run programs for you. These programs can be 'application' programs you buy from your computer dealer, programming tools such as programming languages or assemblers, or the MS-DOS commands described in this manual.

Remember: Internal commands are always available, but External commands can be used only if they are are stored on a disk in one of your drives and MS-DOS is told where to look for them.

Section 7.1 describes the fundamental process of running a program - locating the program you want to run and the data files you want it to process; making these files available so that the program runs efficiently; and finally, typing in the command line that starts the program running.

Section 7.2 describes some shortcuts you can take at the keyboard:

- Editing the previous command line to save typing.

- Stopping the program that is being run. Sometimes you can make it continue where it left off.

- Keeping a record on your printer of what you have typed and the programs you have run.

- Extending the number of disks and directories MS-DOS will automatically search to find the program or data file you want.

Programs are usually designed with the assumption that you will type in any additional information and instructions it needs at the keyboard. They are often also set up to send any information they generate to the display screen. Section 7.3 shows you how to make your programs accept information from, and send information to, alternative sources without changing the programs themselves in any way. You can instruct the computer to:

- tell a program to take its input from a file or from a telephone link

- tell a program to send its output to a file, or to a printer or down a telephone link

- link programs together so that the output of one program is the input of the next program in the chain

It also describes three special programs known as filters, that take the output from the other programs and process it.

Section 7.4 describes how to ease the burden of running the same series of programs repeatedly, by telling MS-DOS the details of the sequence of programs once. This information would then be contained in a batch file. Then, on future occasions, you can type in one command line and MS-DOS will run the programs one after another automatically. A special case of this is a series of programs which you can arrange for your PC to run whenever it is turned on.

When you buy programs for your PC to run under the MS-DOS operating system, remember you need to choose those that are:

- designed to run under either the MS-DOS or the PC-DOS operating system

- supplied on the correct size of disk for your computer

VER In a few cases, you may need to know which version of MS-DOS you are using in order to be sure that the program will run on your PC. You can readily find this out by using the VER command.

Programs supplied with your PC and many commercial programs can be run simply by typing in the appropriate command line and they will work perfectly. Other programs will run but will not always produce quite the results you expect because they do not control the screen properly or they do not respond correctly to what you type. Such programs need to be 'installed' before you use them. How to go about installing the program should be included in the program's user guide. You may need to enter information about the specification of your PC to install a program. You can find this information in Part One of the manual.

It is important to know what a directory is to understand the commands covered in this chapter. If you are not certain you know, read Section 6.1 before you use the commands.

7.1 Running a program

Before you run any program, you need to know which disk files you will need, both to start the program running and while it is running. You also need to know how you are going to ensure that these files are found by MS-DOS when they are needed.

Usually, the program's own user guide will tell you which files you need and your job is simply to ensure that all the relevant files are on disk in one of your drives and that you can tell MS-DOS, through the program, where to look for the files.

This section covers:

- finding the files you want to use by listing sections of DOS directories

- accessing files from different directories

- running the program

Note:

(i) If the program you want to use wasn't specifically intended for use on your PC, you may be able to run the program but the results may not appear correctly on the screen. In which case, you will need to use special installation instructions which should be included in the program's installation guide.

(ii) Always remember to check whether you can make a duplicate copy of the programs you buy, before using them. If possible, you should always use a copy and keep the original disks safely stored away, to use solely to make further copies when they are needed.

(iii) You may also need to prepare disks with the programs and external commands that are needed while you are using a particular application (for example, your word processor or your spreadsheet). See the application program's user guide for details of the programs that need to be held on such a disk.

Finding the files you want

Application programs and MS-DOS external commands are stored in files which have the filetype COM or EXE. MS-DOS internal commands are built into MS-DOS and stored in a file called COMMAND.COM

MS-DOS internal commands are always available, but if you want to run an MS-DOS external command or an application program, you will need to specify where the files, which contain the programs, are located.

You will also need to know where the files which contain your data are located, if you intend to manipulate data with the programs. Note that a user guide supplied with an application program may not tell you which directories files are stored in.

You will need to know how to display directories so that you can locate your files. You may also want other information about your files, like how large they are and when they were last edited.

DIR This information is obtained by displaying sections of the directory with the DIR command.

When you use the DIR command, you will have to give MS-DOS information in two parts:

- which directory you want information from

- the names of the files within the directory that you want information about

Specify the directory by giving the drive it is on and the path to the directory. Instructions on how to do this are given in the section below, "Using files in a different directory". If you do not specify a directory, your PC displays information about the current directory.

Specify the files you want by giving the file template that covers all their names. A file template is a special type of file name that matches a number of possible file names by including the wildcard characters * and ? See section 6.2 "Using Wildcards to specify a number of files". If you do not specify which files you want, you get information about all the files in the directory.

The amount of information that is displayed when you use the DIR command depends on which command option you select. One option displays just the filenames and filetypes of the files in the directory. This is often the only information you need and it is displayed compactly with details of five files on each line. If you do not specify a command option, MS-DOS gives one line of the display to each file and shows the size of the file in bytes (1024 bytes - which can also be written as 1 kilobyte or 1K or 1Kbyte - is approximately 1000 characters) and when it was last changed. The time information can be useful if, for example, you want to check whether you brought a particular file up to date the last time you used your PC.

Using files in a different directory

Files are organised into directories which are organised into a 'tree-like' structure. MS-DOS only searches or stores files in one directory at a time because this is quick and effective. You may not often want to process files from different directories at the same time.

Unless you tell it otherwise, MS-DOS will use the directory that has been designated as the Current Directory.

However, this means you need to know how to direct MS-DOS to a different directory:

- to use a particular file from a different directory.

- to change the current directory on the drive if, for example, the command or program you want to use can only process files in the current directory.

One of the first things you should find out about a program or command is whether it needs any files to be in a current directory.

The key to using files from a different directory is the 'Path' either from the current directory or the root directory on the drive.

The Path

A 'Path' directs MS-DOS to the directory you want to use by giving it a route through the directory tree. The route is essentially just a list of directory names.

The starting point for the path is:

either the root directory on the drive
   or the directory you are currently working with on the drive

You can use the path from the root directory regardless of which directory you are currently working with.

Suppose, for example, that you knew that the structure of directories on the disk was:

```
                            Root
                         /        \
                   Home            Business
                  /    \          /    |    \
             Letters   Games  Letters Reports Accounts
                                 /|\      |     /|\
                                A B C    New   A B C
```
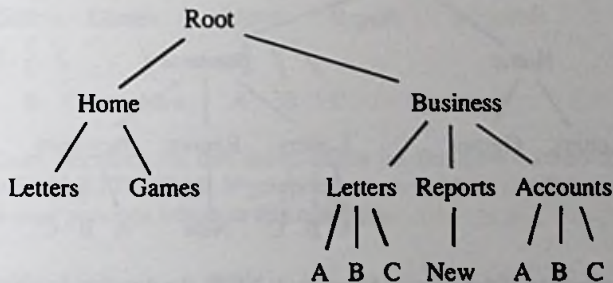
Paths from the Root directory

To work out the path you need, you start at the root directory and list all the names on the way to the directory you want (including the name of this directory). The path is these names, written down in order and separated by backslashes (\).

For example, the directory which separates the ACCOUNTS directory from the root is the BUSINESS directory and so the path is:

BUSINESS\ACCOUNTS

When you use this path, for example, to specify a file in the directory, precede it by a backslash (to tell the operating system that the path starts at the root directory). If you are specifying a file, you put another backslash at the end of the path, to separate the path from the file name that immediately follows it.

For example, to specify a file called NEW.A in the ACCOUNTS directory, you would write:

\BUSINESS\ACCOUNTS\NEW.A

Paths from the current directory

To work out the path you need, list the names of the directories which lead back to the root directory, including the current directory, and then those which lead to the directory you want to work on.

The path consists of these directory names, typed in order and separated by backslashes (\). If you want to move to a directory which is back one level towards the root, use the abbreviation "..", rather than the name of the "parent" directory.
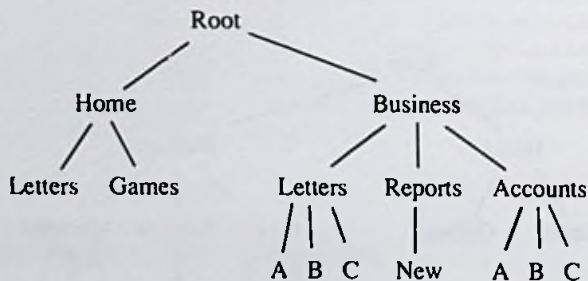
For example, if the current directory is NEW, the directories which separate the current directory from the ACCOUNT directory are REPORTS and BUSINESS

However REPORTS is the Parent directory of NEW and BUSINESS is the Parent directory of REPORTS, and there is a special way of writing Parent which is to use two full stop characters (..).

So the path you would write is:

..\..\ACCOUNTS

When you use this path to specify a file in the directory, you would put a backslash at the end of the path, to separate the path from the file name that immediately follows it. **You would not put a backslash at the beginning of the path because it starts from the current directory, not the root directory.**

For example, to specify a file called NEW.A in the Accounts directory, you would write:

..\..\ACCOUNTS\NEW.A

Changing the current drive and directory

The current directory on a drive is the directory MS-DOS assumes you want to work on if you do not specify which directory you want to use. It can be any of the directories on the drive. When you first use a drive or when you reset it, the root directory is automatically the current directory.

If the directory structure is like this:

```
                        Root
              Home                  Business
         Letters  Games      Letters   Report   Accounts
         / | \        \        | \ \
        A  B  C       New     A  B  C
```
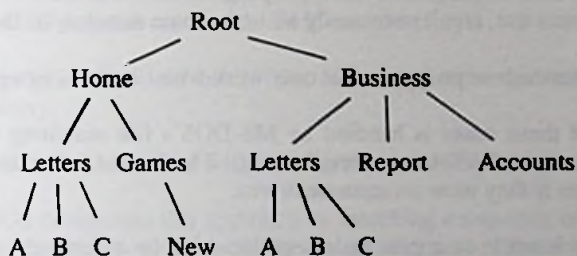
the current directory on this drive might be Business Letters to Company A (ie \BUSINESS\LETTERS\A). If you prepare a new letter, it will automatically be stored with all your previous letters to this company.

CHDIR If you want to change the directory that is to be used on a drive automatically, or you want to find out which is the current directory, use the CHDIR ('Change directory') command. There are two steps:

- Make the drive which contains the required directory the default drive if it isn't already by typing a command line consisting of the drive letter, followed by a colon (:). For example, to change the default drive to Drive C (the Hard disk), you should type:

    C: [↵]

- Use CHDIR to make the directory the current directory on the drive. For example to change to the GAMES directory in the HOME directory type:

CD \HOME\GAMES

Note: When you make a directory the default directory, this directory will be searched when you ask for a file by just its filename.

Having more than one current directory on disk

The current directory gives you an efficient way of working on just the files in one directory on a particular drive. However, there may be a few occasions when you would like two or more directories on the same disk to behave as current directories.

There are two possible sets of circumstances:

- running a suite of programs, when the program files and MS-DOS commands, that the programs use, aren't necessarily all in the same directory as the data files

- using commands or programs that only work with files in a current directory

The first of these cases is handled by MS-DOS's file searching facilities (see the description of the PATH command below). The second is handled by treating the directories as if they were on separate drives.

SUBST A directory is made to appear on a separate drive by assigning a drive letter to the directory. This is done with the SUBST command. You simply invent a drive that your PC does not already have a meaning for, for example Drive N, Drive O, or Drive P. (The PC initially has meanings only for Drives A..E. If you want to increase the number of drives see the LASTDRIVE= command).

For example, suppose the directory structure was like this:

```
                        Root
           Home                    Business
          /    \              /       |       \
    Letters   Games     Letters    Reports   Accounts
    /  |  \                           |       /  |  \
   A   B   C                         New     A   B   C
```
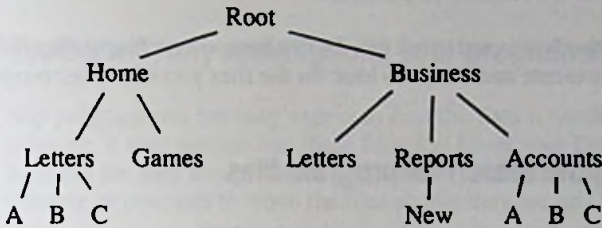
If you wanted to use a program that cannot handle paths to process files from both the ACCOUNTS directory and the REPORTS directory, you would make, an imaginary drive - say, Drive N. REPORTS is then automatically made the current directory on Drive N. When you use your program to process, for example, REPORT.85 in the REPORTS directory, you can now give directions that the program can handle, that is:

N:REPORTS.85

The directory assigned to the imaginary drive acts as the root directory on that drive. If this directory has child directories, you can use paths on the imaginary drive to work with the child directories just as you would with one of the standard drives. However, you cannot access its parent directory from the imaginary drive.

Setting up MS-DOS to search for files in a number of directories

It is advisable to organise your files so that

- MS-DOS external commands are in one directory

- the program files and batch files of an application software package in another directory.

- the data files associated with running the software package in a third directory

MS-DOS encourages this approach by searching a sequence of directories for files as if these directories were part of the default directory. This means that you can keep programs and batch files in directories other than the default directory, but treat them in command lines as if they were in the default directory. Batch files are described in section 7.4.

You will find this particularly helpful in using applications that make use of development software (eg. a programming language such as BASIC) as well as its own programs or when you need to use MS-DOS external commands alongside your application programs. Continually moving the files containing MS-DOS software, so

that they are always in the same directory as the application software, is not recommended or even always possible.

Separate methods are used to tell MS-DOS where to look for the files holding programs you want to execute and where to look for the files you want your program to process.

Extending the search for program files

Note: This applies to the program, command or batch file you want to execute and to any program that is run as part of the Batch process. It doesn't apply to data files that the program processes.

PATH The PATH command can be used to tell MS-DOS where to look for program files. Use it to specify the directories to be searched, and then later, when you type the required program's filename, to start the program running. The specified directories are searched in the order given in the PATH command until a file matching the program's filename is found or until the sequence of directories is exhausted.

This command can also be included in your AUTOEXEC.BAT file to make this facility available every time you switch on your PC.

Note: You must keep the list of directories to be searched up to date. If you delete a directory on the search path (See Section 6.1), you must adjust your complete search path. Otherwise, the search will fail whenever MS-DOS tries to search the directory which no longer exists.

Searching for data files to process

APPEND The APPEND command can be used to tell MS-DOS to search a number of directories, as well as the default directory, when you attempt to retrieve a data file.

Before you start working on your files, you may know, for example, that all the files you are going to need to use are stored in three of your directories. To save you from changing directory each time you retrieve a file, you can specify these three directories with the APPEND command, and MS-DOS will search them automatically.

This command could be put into your AUTOEXEC.BAT file, which would mean you have this facility available whenever you switched on your PC. Otherwise, you would have to re-run the APPEND command each time the PC is switched on.

Most, but not all, programs can take advantage of this extra searching facility. The description of the program should tell you if it can be used with APPEND. An option exists that will increase the number of programs affected by the APPEND command.

MS-DOS

Note: As with PATH, you should keep the list of directories up to date or the search will fail.

Coping with any assumptions your program makes

Any program you run may expect to find the files it needs on a particular drive. For example, it may assume that these files will be on your Drive B disk when in fact you have put the files alongside the program on your Drive A disk. It may not always be possible or practical to move the files so that they are on Drive B.

ASSIGN The solution, provided none of the files the program wants is on Drive B, is to tell MS-DOS to route any request for a file from Drive B to Drive A. You can do this using the ASSIGN command. However, don't use the ASSIGN command too freely: while this assignment is in force, no file on the disk in Drive B can be used because all instructions to look for a file on Drive B will be diverted to Drive A.

JOIN Another problem you may meet is that programs and procedures you have established have built into them the assumption that certain files are in a certain directory on a particular disk when in fact there is no longer room for these files on this disk. For example, suppose you need to move all the files in the BUSINESS directory onto another disk.

Rather than change your programs and procedures, you can just leave an empty 'Business' directory on this disk and then tell MS-DOS that whenever you ask for files from this directory, it should look for them in a different drive. The command that sets this up for you is the JOIN command.

Running the program

To run a program you will need:

- the disks you need in your disk drive(s)

- the current directories you need selected on all your drives

- the paths to any other directories worked out

- an MS-DOS system prompt on the screen (with the cursor flashing beside it)

You will have to type in a command line made up of the command name (the name of the program you want to run) and the command tail (the other details the program needs to execute the command), and then press the [⏎]key.

The command line you need to type will either be given precisely, in the documentation about the program or it will be given through a **Form** or **Syntax** statement which shows

you how to include the information you want in the command tail. Read the documentation carefully to find out what details you need to type in, instead of the placeholders in the Form or Syntax statement. The meaning of each placeholder should be either explained alongside the Syntax statement or in some general description of the conventions used in the user guide, like the one given in Chapter 1 of this manual.

In addition, you may have to include details of the location of the program itself if this is neither built into MS-DOS or in the current directory on the default drive (the drive which is indicated by the letter shown in the current system prompt) or in a directory automatically searched by MS-DOS. You will need to precede the command name with:

[d:][path]

included if the program is not in a current directory
- precede with a backslash (\) if the path starts from the Root directory

included if the program is not in the default drive

For your program to work, the command line has to be exactly right so take care in typing this in. If you make a typing mistake, use the [←] key to rub out characters and then type the line in again. When you are sure the line is correct, press the [↵] key.

SET A few programs may additionally require certain parameters to be set up in advance, which are used to specify the Environment the program works in. For example, the program may work differently depending on the current size of your PC's RAM disk. If this is the case, full details should be given in the program's own user guide. Some of these parameters are set up by specific MS-DOS commands: the others are set by using the SET command.

If your program fails in some way, see if you can work out what has happened and how to stop it failing again, either from the program's own user guide or from Chapter 10 of this manual. Chapter 10 covers a wide range of problems. If this does not help to solve your problems, seek the advice of your dealer.

Note: There are two other MS-DOS commands you may find helpful when you are running application programs:

CLS
VERIFY

    CLS   Clears the screen and puts a fresh system prompt in the top lefthand corner

    VERIFY   Instructs MS-DOS to confirm every time it writes data to a disk, that this data can be read back, for example, by checking that there are no bad sectors.

7.2 Shortcuts at the keyboard

Editing the command line

If you make a mistake or change your mind about the command or program you want to run before you press the [↵] key, you can always use the [←] key to rub out characters and then type in the rest of the line again.

If your command has failed because of some small error, you might think that you have to type in the whole command line again. However, MS-DOS automatically stores your command line and, by pressing certain keys, you can build parts of the stored line into a new command line.

As you do this, you need to imagine a cursor moving through the stored command line dividing the command line into a section you have 'used' and a section that still remains for you to use. This cursor moves 'forward' through the line:
- every time you copy characters from the stored line into your new line

- every time you tell MS-DOS to skip over characters in the stored line

- every time you type fresh characters without telling MS-DOS that you want to insert them.

It also moves 'backwards' if you delete any characters from the line.

The keys you can use are as follows:

[F1] or [→]	Add the next character from the stored line.
[F2] plus a character key	Add everything in the stored command line between the current position of the cursor and the given character. The character itself is not added to the new line.
[F3]	Add all the characters in the stored command line to the right of the cursor.
[F4] plus a character key	Add the given character and every thing in the stored command line to the right of this character.
[Insert]	Insert the following characters into the new command line without moving the cursor through the stored command line. If you don't press the [Insert] key, this cursor will move forward one position for each

	character you type. Press [Insert] again after you have typed the last character you want to insert.
[←]	Delete the character to the left of the cursor from the command line. The cursor in the stored line also moves back one character.
[Esc]	Abandon the current new command line and start again working with the old stored line. MS-DOS places a \ at the end of the line you have abandoned and gives you a new line to work on.
[F5]	Replace the stored command line with the command line you have created so far and then start again working with this new line. MS-DOS places a @ character at the end of the line you have stored and gives you a new line to work on. (For use when you notice that you made a mistake back near the beginning of the new command line but, naturally, you want to save your changes since then.)
[⏎]	Send the new line to MS-DOS for processing. It also replaces the stored command line with this new line.

For example, suppose that your last command was:

COPY MYFILE B:\DIR1\FILE

and you wanted the next command to be:

COPY MYFILE C:\DIR2\YOURFILE

The first character you want to change is B, so press [F2] and then type **B**. Everything up to, but not including, the B will appear on the screen that is,:

COPY MYFILE

In the stored command line, the cursor moves up to the letter B

If you now type **C**, the **B** will be replaced with **C** . The screen will display:

COPY MYFILE C
In the stored command line, the cursor moves past the B.

The next character you want to change is 1, so press [F2] and then type **1**. Once again, everything from the current position of the cursor in the stored line up to, but not including the character you typed, is shown on the screen, giving you:

COPY MYFILE C:\DIR

Then type **2**, and the command line will become:

COPY MYFILE C:\DIR2

Now you want just the next character from the old line, so press [F1]. Your new command line is now:

COPY MYFILE C:\DIR2

Next you want to insert YOUR, without moving the cursor through the stored command line - so press [Insert], type **YOUR** and then press [Insert] again. This gives you:

COPY MYFILE C:\DIR2\YOUR

The final stage is to add the remainder of the stored line (**FILE**) to the new line, which you do by pressing [F3]. Your new command line should now be:

COPY MYFILE C:\DIR2\YOURFILE

and you will have got this line with a total of 14 keystrokes instead of 28.

If you had forgotten to press [Insert] before typing **YOUR**, you would have effectively overwritten the **FILE** in the stored command and after pressing [F3], you would still have:

COPY MYFILE C:\DIR2\YOUR

Stopping a program while it is running

Occasionally, you may start a program running and then quickly realise that you do not want to run this program after all. You will be able to stop most programs from the keyboard by entering Ctrl-Break ie. holding down the [Ctrl] key and pressing the [Break] key.

BREAK When Ctrl-Break is used, the program will probably not stop immediately. The length of time it takes before the program actually stops depends on the type of work the program is doing. If it is not taking input from the keyboard or sending output to the screen or to a printer, it may be a while before the program stops.

You can make the program respond sooner using the BREAK command. It can be used to increase the frequency that MS-DOS looks at the keyboard to see if Ctrl-C or Ctrl-Break has been entered. This is particularly useful while you are developing a program that uses your disks very much more than the keyboard, the screen or the printer.

Some programs are designed to halt, temporarily, when a particular key or combination of keys is pressed. Similar keystrokes may restart the program. You may, for example, want to stop the program to take note of some information then want the program to continue.

The TYPE command is one program that can be halted by entering Ctrl-S and then restarted by entering Ctrl-Q. You will need to study the documentation provided with your program to find out if you can use keystrokes like these to halt and restart it. The [Pause] key can often be used to temporarily halt a piece of software. Any other key can then be used to restart it.

Keeping a record of the work you do

If you have a printer attached to your PC, you can use this to record everything that appears on the screen. This includes everything typed in, and everything the programs display on the screen. You may find it helpful to record all your actions if you need to analyse the work at a later stage, or when preparing for future work using the same programs.

To start recording, on the printer, all the instructions you type in and all the messages MS-DOS displays, enter Ctrl-P. To stop the information being output to the printer, press Ctrl-P again.

However, the printout may not always be identical to the screen display. It would only be the same if the program writes to the screen line-by-line. Spreadsheets, for example, do not.

GRAPHICS Another way of recording what is displayed on the screen is to print an image of the [Print screen. This is done simply by pressing a special key on the keyboard, but if there are Screen] pictures on the screen (rather than just text), you first need to prepare your PC by using the GRAPHICS command.

Once this has been done and the printer is both switched on and on-line, you only need to press [Print Screen] each time you want to print the current display. Provided your PC has been properly set up for your printer, a picture of your screen will be printed in a few minutes.

This will only work if you are using Color Graphics Adapter (CGA).

Note: If you press the [Print Screen] key accidentally, when there is no printer attached to your PC, the machine will appear to stop working. However, it will start to work again when the printer "times out" which will be after about 20 seconds. If you have used the MODE command, it may be necessary to press Ctrl-Break.

7.3 Redirecting input and output

Programs are usually designed to take their standard input from the keyboard and to send their standard output to the screen. However, under MS-DOS a program can perform the following tasks without any part of the program having to be rewritten:

- take required input from another input device

- send the screen output to another output device

- take required input from a disk file

- store screen output in a disk file

This section describes how to tell MS-DOS to take the standard input for the program you want to run, from a device other than the keyboard and how to send the standard output it produces to a device other than the screen. This redirecting is called "piping".

How to redirect the standard output from one program to another for further processing is also covered, in particular, how to redirect this output to one or more of the three MS-DOS filters FIND, SORT and MORE. The functions of these filters are:

• find all the places a given string of characters is used

• sort data into alphanumeric order

• organise the output of data to the screen so that it is seen a screenful at a time

Note: The redirection described here applies only to the command line in which it is used. If you want to redirect input and output more permanently, turn to Section 4.1.

Redirecting the standard input

You tell MS-DOS to take a program's console input from a different input device or a disk file by ending the usual command line with the details of the source of the input.

These details are written as follows:

<name

if the input is to be taken from a different input device. A list of MS-DOS devices is given in Chapter 1.

[d:][path]filename.filetype

if the input is to be taken from a file

For example, if the input for the program MYPROG is to be taken from the serial interface, you might have the command line:

MYPROG <AUX

or

MYPROG <COM1

If, however, it is to be taken from the file RUNDATA.1 on Drive C, you might have the command line:

MYPROG <C:RUNDATA.1

Take care, when you redirect input, that all the information the program needs is input through the different input device or stored in the file. The program will stop if it runs out of input data.

Redirecting the standard output

Tell MS-DOS to send a program's console output to a different output device or a disk file by ending the usual command line with the details of the destination of the output.

These details are written as follows:

>device-name

if the output is to be sent to a different input device

>[d:][path\]filename.filetype

if the output is to be sent to a file (replacing any existing file of that name)

>>[d:][path\]filename.filetype

if the output is to be appended to an existing file

A list of MS-DOS device names is given in Chapter one.

For example, if the output from the program MYPROG is to be sent to the printer, you might have the command line:

MYPROG >PRN

OR

MYPROG >LPT1

If however, it is to be appended to the file RUNDATA.1 on Drive C, you might have the command line

MYPROG >>C:RUNDATA.1

Piping output from one program to another

If you have a pair of programs, with the standard output being produced by one program, and the exact data required as standard input by the other, then you can use MS-DOS to pipe the information from the first program to the second. The second program of the pair is known as a filter.

You pipe information from one program to another by having both command lines on the same line as follows:

command-line-1|command-line-2

For example, if you had a program called FILTER that processed the output from the DIR command, you might have the combined command line:

DIR C:|FILTER

where **DIR C:** is the first command line and **FILTER** the second. The | character is typed using the key marked | at the bottom lefthand corner of the keyboard.

If you have another filter program that can process the standard output from the second program, this output can be piped on to the next program and so on, simply by having the separate command-lines on the same line as follows:

command-line-1|command-line-2| ... |command-line-n

Typical tasks you might want a filter program for are:

- **to find all the places in which a given string of characters is used**

- **to sort data into alphanumeric order**

- **to organise the output of data to the screen so that it is seen a screenful at a time**

FIND
MORE
SORT These types of processing are provided by the three MS-DOS filters FIND, SORT and MORE: FIND searches through the output for text strings: SORT sorts the lines of output into alphanumeric order: and MORE arranges that the output is displayed a screenful at a time.

These filters provide a good example of using one filter after another. You might well want to sort into alphanumeric order the output from, say, a DIR command and then ensure that the sorted directory is displayed a screenful at a time. You would do this with a command like:

DIR C:|SORT|MORE

Note: You cannot make use of piping within a Batch process

7.4. Setting up a sequence of commands

As you become familiar with the PC, you are likely to find yoursef typing in the same sets of commands. For example, each time you use a particular suite of commercial software or back-up your important files you will use the same commands. This can be both tedious and error-prone.

It is possible to put all the commands into a file and then just type one command which tells MS-DOS to execute all the commands in this file. This is known as Batch Processing and the file containing the commands is called a Batch file. This section is about creating and running Batch files. It also describes a special Batch file that can be executed immediately after MS-DOS is loaded.

A Simple Batch file

A batch file is a file containing a sequence of MS-DOS command lines. It always has the filetype BAT.

The simplest form of Batch file - and by far the most common - is just a list of MS-DOS command lines. So if, for example, you have to type the following three lines to run your suite of software:

```
CHDIR C:\WS
FUNCTION  WS.PFK
WS
```

you could create a file containing these three lines. (Use RPED for this - see Section 6.2). Note: The usual rules apply to choosing a filename for this file; however, take care not to give it the same filename as any of your program or command files because MS-DOS will always execute a program or command file in preference to a Batch file.

If you called this file RUNWS.BAT you would just use the filename RUNWS to run this particular suite of software, MS-DOS will execute the command lines one at a time, in the order they appear in the Batch file. In other words, typing:

```
RUNWS
```

is exactly equivalent to typing:

```
CHDIR C:\WS
FUNCTION  WS.PFK
WS
```

The command lines will be displayed on the screen one by one as your PC executes them.

Note: Only if you fully understand and intend their action should you use any of the characters > < or % in a Batch file (even if contained in a REM line).

Making a Batch file more versatile

Batch files can provide a number of facilities:

- repeated commands or commands that you only want executed under certain circumstances.

- a more appropriate way of logging your PC's progress on the screen.

- pausing in the middle of a batch process to change disks, for example.

- carrying out similar actions but with different sets of program files and data files.

These facilities are provided by some special Batch subcommands and Batch file parameters. How to use them is described below, with full details of the subcommands given in Chapter 8.

Repeated or conditional commands within Batch files

FOR
GOTO
IF In a typical Batch file, you may have:

- the same program file used in a number of command lines, one after the other

- the same data file(s) used in a number of command lines, one after the other

- command lines that you only want executed if certain conditions are met

- short sequences of command lines that are used over and over again in a loop

Batch processing has the subcommands FOR, GOTO and IF (and IF NOT) to handle repeated or conditional actions.

FOR   is used where the same command line is used repeatedly

GOTO   is used to direct MS-DOS to a different command (marked by a label)

IF   is used to make MS-DOS take different actions, depending on
                       the truth of a statement

You can make a whole series of actions depend on a single test by using IF and GOTO
together.

Logging your PC's progress on the screen

ECHO
REM Normally, while a Batch file is running, each MS-DOS command line is displayed on
the screen just before it is executed. This is the default way of showing its progress but
there are other possibilities:

- displaying command lines and additional messages

- displaying just some special messages

- no on-screen messages

The functions of the commands within the batch file determine which options you
should choose. For example, you might opt for either no on-screen messages or just
some special messages if the commands gradually build up output on the screen. If the
commands split up into a number of stages, you might want to use additional messages
to show which stage your PC has reached.

The Batch subcommands, ECHO and REM, let you determine what appears on the
screen:

ECHO   controls whether the MS-DOS command lines are displayed (it
                       doesn't affect the output from your programs in any way)and
                       gives you one way of displaying special messages

REM   also lets you display special messages

If you want both command lines and special messages displayed, use REM for the
additional messages. If you don't want the command lines displayed, use ECHO both
to turn off the display of command lines and to generate the special messages. This is
because turning off the command line display also stops any REM messages from being
displayed. (Note: It also stops the special messages associated with PAUSE commands
from being displayed - see 'Pausing in the middle of a Batch process' below.)

REM commands can also be used in a Batch file to space out the other commands,
making the file more readable.

Pausing in the middle of a Batch process

PAUSE If you need to swap disks, for example, in the middle of processing a Batch of commands, you should put a PAUSE subcommand in your Batch file. This subcommand is put between the last command line you want executed before the disks are to be swapped, and the first command line to use the data on the new disks.

When you run the Batch file, your PC will stop after the PAUSE subcommand. You can then change disks. When you are ready for your PC to continue, press one of the character keys on the keyboard (for example, the space bar). The next command in the Batch file will then be executed.

The PAUSE subcommand can include a message which will be put up on the screen just before the program halts. You can use this message to remind you what to do before MS-DOS resumes running the Batch file.

If you remove the disk holding the Batch file, from the drive, to allow one command line to be executed, you will have to re-insert it before the following command line in the file can be executed. A message will appear on the screen instructing you to put the disk back in the drive. Another PAUSE command will be needed if you want to swap the disks again.

Using Batch files for more than one job

You can use one Batch file to carry out the same operations but on different files by using dummy parameters in the file. Such a Batch file is called a 'multi-purpose Batch file'.

The standard set of parameters are the characters %0...%9. Each of these parameters may be replaced with a real value which you supply when you run the Batch file. For example, suppose you wanted a Batch file that could be used to copy any file in any directory on the default drive, to any other directory, you could use one parameter to represent the file and one to represent the source directory and another to represent the destination directory.

Batch files can also make use of environment strings as parameters. These environment strings and the names used to represent them are made available to each program as it is run. They are mainly set up by using a SET command. (This command is described in Chapter 8). To make use of an environment string in a Batch file, include its name as a parameter, surrounded by percent characters. For example, if you wanted the Batch processing to depend on whether your environment parameter, DISPLAY, was CGA or EGA, you would include the parameter **%DISPLAY%** in an IF subcommand in the Batch file, as follows:

IF "%DISPLAY%"=="CGA" GOTO LABEL

Parameters can represent any string of characters in a Batch file command line (other than spaces and Batch subcommands themselves). They can therefore be used to represent:

- a filename

- a directory

- a path

- a command line parameter

- a string of characters to compare in an IF command

- a label

- a part of any of these

- any combination of these

For example, in your Batch file MYBAT.BAT, you might represent the filename of a file you want to copy by %1 and the filename of the copy by %2. You might therefore have a line in the file like this:

COPY %1.TXT B:%2.NEW

When you run the Batch process you follow the name of the Batch file by the values you want the parameters to represent. MS-DOS then assigns values to the parameters in order, starting with %0 which is assigned to the drive, directory and filename of the Batch file; %1 takes the first value in your list; %2 the second, and so on. So, running the Batch file MYBAT.BAT with the command:

A:MYBAT File1 File2

would replace each %0 in MYBAT with **A:MYBAT**, each %1 with **File1** and each %2 with **File2**.

Therefore, MS-DOS would actually obey the command:

COPY File1.TXT B:File2.NEW

SHIFT The ten dummy parameters you get from %0..%9 is usually plenty, but it is possible to use more if you use the SHIFT subcommand. SHIFT can also be used to apply the same group of actions to an unspecified number of files, one after another. This is described alongside the details of the SHIFT subcommand in Chapter 8.

Interrupting a Batch process

You can interrupt a Batch file while it is running, by entering either [Ctrl]-[Break] or [Ctrl-C] at the keyboard.

The command currently being executed is immediately abandoned but the remaining commands within the batch file are not. MS-DOS will ask you whether you want to abandon the remaining commands. If you type [N] for No, the remainder of the Batch file is processed normally.

Obeying a Batch file automatically

AUTOEXEC.BAT

MS-DOS will obey a Batch file automatically, when you turn your PC on or reset it, if this file is called AUTOEXEC.BAT and it is stored in the root directory of your Startup disk (ie. the disk from which MD-DOS is loaded).

Immediately after the operating system software has been loaded into your PC's memory, MS-DOS looks to see if there is a file called AUTOEXEC.BAT in the default drive. If this file is found, the commands it contains are executed before the PC can be used for anything else (though you can always interrupt it by entering Ctrl-Break or Ctrl-C).

Notes: The AUTOEXEC.BAT file cannot be a multi-purpose Batch file.

You can run a Batch process from within another Batch process. This is done using the CALL command. When the CALLed batch file ends, control returns to the original batch file, to the point in the file immediately after the CALL command.

Special BATCH subcommands

CALL	Used to call a Batch file as a sub-routine of another Batch file. When the called file has been executed, the commands in the original Batch file continue to be executed, from the one following the CALL command.
ECHO	Turns the screen display of MS-DOS commands on or off, as the commands are executed.
FOR	Repeats the same or similar command line a number of times.
GOTO	Directs MS-DOS to a special point in the file, marked by a label.

IF	Executes a command only if a statement is true.
IF NOT	Executes a command only if a statement is false.
PAUSE	Stops further execution of a Batch file until a key on the keyboard is pressed
REM	Allows explanatory lines, which are not to be executed, to be included in the file. If ECHO is on, the REM lines will be displayed but will have no other effect.
SHIFT	Assigns new values to Batch file parameters.

These subcommands are described in detail in Chapter 8, where they are listed alphabetically.

All Batch subcommands can be used in normal command mode as well as within batch files, although some would be of no practical use, for example, the SHIFT subcommand.

8. MS-DOS Commands

This chapter describes all the MS-DOS (version 3.3) commands, supplied with your PC. Each command description is listed alphabetically, according to its name, for example, APPEND, ASSIGN, ATTRIB and so on.

Detailed information about how to use the command, the command lines to type, and examples to follow, is given in each description.

If you have difficulty in using the commands, refer to Chapters 1-3 for explanations about how to type command lines properly; why you might want to use MS-DOS commands; and how to substitute the command placeholders (for example, destination, path, source) with the correct information.

If something goes wrong while you are running a command and a system message appears on the screen, see Chapter 10 "Troubleshooting", for instructions on how to correct the mistake.

APPEND

APPEND *[d:]path[;[d:]path...][/option]*

Set a search path for data files

Use APPEND to define a search path which will lead to the directories which contain the files you intend to use. This allows you to access data files stored in a number of directories, whilst you remain in your current working directory.

It is advisable to specify the search path(s) from the root directory so that the specified path can be found, regardless of which directory you are working in, when the files are needed.

MS-DOS will look first in the current directory, then the first directory in the APPEND search path, then the second, and so on until the files are found. Once the files are found, MS-DOS will not continue to look through the remaining appended directories.

Forms

- **APPEND**

  Use this form of the command to display the current search path.

- **APPEND** *[d:]path[;[d:][path]...]*

  This form specifies the directories to be searched.

- **APPEND** */E]*

  You can use this form only when you use the command for the first time after loading MS-DOS. If you want the APPEND facility available every time you use the PC, add this form of the command to the AUTOEXEC.BAT file. The **/E** option is described below.

- **APPEND**

  Use this form to delete appended paths.
  MS-DOS will then search only the current directory for data files.

Option

/E Use this option to store appended directories in the MS-DOS environment, that is, the environment strings which can be changed, or displayed, using the MS-DOS SET command and many application programs.

Notes

- You can specify more than one search path. Separate each path with a semicolon (;).

- You can use the APPEND command across a network to locate remote data files.

- If you use the MS-DOS ASSIGN command and the APPEND command, you must use APPEND before ASSIGN.

- If you want to set a search path for external commands, see the PATH command, listed alphabetically in this chapter.

  The APPEND command tells MS-DOS to search the data path for all files, regardless of their file extensions, but on the condition that they are accessed using the following MS-DOS system calls:

Code	Function
0FH	Open File (FCB)
23H	Get (FCB) File Size
3DH	Open Handle

Examples

- *Suppose the directory you are currently working with is C:\BUSINESS, and you want to access data files stored in a subdirectory called LETTERS on drive A, A:\CLIENTS\LETTERS and data files stored in a subdirectory called REPORTS on drive A, A:\CLIENTS\REPORTS. You should use the following command:*

  APPEND A:\CLIENTS\LETTERS;A:\CLIENTS\REPORTS

  This command will set up a search path into the two directories which contain the data files you need to use, allowing you to retrieve them whilst staying in your original directory C:\BUSINESS.

- *If the command APPEND /E is used when MS-DOS is first loaded, the above APPEND path will appear in the environment strings, so if, for example, you type*

  SET

  it may produce a result like the following:

  **COMSPEC=COMMAND.COM
  PROMPT=PG
  APPEND=A:\CLIENTS\LETTERS; A:\CLIENTS\REPORTS**

ASSIGN

Assign *requested-drive[=]searched-drive*

Assigns a drive letter to another drive

The ASSIGN command tells MS-DOS to convert instructions to read or write files on one drive into instructions to read or write files on another drive. This lets you use drives other than those your program was set up to use.

The ASSIGN command, used on its own without a command tail, cancels all the current 'assignments'.

Forms

- To set up one or more assignments

  ASSIGN *d=d [d= d...]*
  ```
        |  |
        |  Searched drive
        Requested drive
  ```

- To clear all current assignments

  ASSIGN

Notes

- It is recommended that you use the SUBST command, rather than the ASSIGN command, to ensure compatibility with future versions of MS-DOS.

  The following commands are, therefore, equivalent:

  ASSIGN A=C

  SUBST A: C:

- You do not have to type the colon after the drive letter when you specify either the searched drive or the requested drive.

- The ASSIGN command disguises the true drive/device type, so you should not use ASSIGN with commands that require drive information (BACKUP, RESTORE, LABEL, JOIN, SUBST, PRINT and FORMAT) nor during normal use of MS-DOS, unless it is required by a program.

- Each ASSIGN command cancels the effect of all previous ASSIGNed commands. So, if for example, you used the command line:

ASSIGN A=C B=D

and then wanted to change the A to C connection and typed:

ASSIGN A=A

You would break not only the A to C connection, but the B to D connection as well.

Examples

- *You want all requests for Drive B to be directed to Drive C. The command line you need is:*

ASSIGN B=C

(assuming that the external command ASSIGN is stored either in the default directory or in a directory that MS-DOS automatically searches see Section 7.1 The Path).

- *You have assigned both Drive A and Drive B to Drive C, but now you want requests for Drive A to go to Drive A. the command line you need is:*

ASSIGN A=A

ATTRIB

ATTRIB *[+R|-R]* *[+A|-A]* *[d:][path]filename.filetype[/S]*

Sets or displays file attributes

Use the ATTRIB command to set Read-Only and/or Archive attributes for files.

Setting a Read-Only attribute allows the file to be read but prevents data from being written to the file, that is, saved on the disk, thereby protecting the data contained in a file. The Read-Only attribute can be cleared again by using an ATTRIB command, to allow data to be saved on the disk.

Setting an Archive attribute makes the file appear to have been changed, whether it has or not, and allows the file to be backed up by the next XCOPY command with the /A or /M options, or by using the BACKUP command with the /M option. If the Archive attribute is cleared, the latest version of the file appears to have been backed up, so it will not be backed up by the next XCOPY command even though it may have changed.

* To change attributes

Form ATTRIB *[+R|-R]* *[+A|-A]* *[d:][path]filename.filetype[/S]*

where:
+R   sets the Read-Only attribute of a file
-R   clears the Read-Only attribute of a file
+A   sets the Archive attribute
-A   clears the Archive attribute of a file

d:\path\filename.filetype specifies the location of the file or files you want to reference

/S is an option which makes the command process all subdirectories as well as the specified path.

* To display attributes

Form ATTRIB *[d:][path]filename.filetype*

Notes You can use a filename template, constructed using the wildcard characters * and **?**
(see Section 6.2), to change or display the attributes of a number of files simultaneously.

The BACKUP, RESTORE and XCOPY commands use the archive attribute as a
control mechanism. You can use the **+A** and **-A** options to select files that you want to
back up using the BACKUP /M command, or copy with the XCOPY/M or XCOPY/A
commands.

If an application program creates a file that has Read and Write permission, ATTRIB
can be used to force Read-Only mode to allow file sharing over a network, using the
+R option.

Examples

- *To make the file MYFILE.TXT in the default directory Read-Only, use the command*
  line:

  ATTRIB +R MYFILE.TXT

  (assuming that the external command ATTRIB is stored either in the default directory
  or in a directory that MS-DOS automatically searches see Section 7.2).

- *If MYFILE.TXT is in a different directory, for example \DIR1 (a subdirectory of the*
  Root directory), the command line would be:

  ATTRIB +R \DIR1\MYFILE.TXT

- *To make MYFILE.TXT Read-Write again, use the command line:*

  ATTRIB -R MYFILE.TXT

- *If it is in the default directory or, if it is in \DIR1, use:*

  ATTRIB -R \DIR1\MYFILE.TXT

- *To ensure that the file MYFILE.TXT in the default directory will be processed by the*
  next XCOPY command with the /M or /A options, or the BACKUP/M command, set the
  file's Archive attribute with the command line:

  ATTRIB +A MYFILE.TXT

- *To stop it being processed, clear the file's Archive attribute with the command line:*

  ATTRIB -A MYFILE.TXT

- *If the file is in \DIR1 (a subdirectory of the Root directory), clear its Archive attribute by using the command line:*

  ATTRIB -A \DIR1\MYFILE.TXT

- *Display the attributes of all the files in the default directory with the command:*

  ATTRIB *.*

- *Displayed on the screen would be something like this:*

  A>attrib *.*

R	**A:\SPREAD.COM**
A	**A:\SPREAD.DAT**
A	**A:\RECORDS.OLD**
A	**A:\RECORDS.NEW**

- *To remove Read-Only permission from the files in a directory called "MANUAL" on drive C, and the files in any subdirectories leading from this directory, type the following command:*

  ATTRIB -R C:\MANUAL*.* /S

BACKUP

BACKUP *drive1*:*[path][filename.filetype] drive2*:*[/S][/M][/A][/F]*
[/D:*date][/T*:*time][/L*:*[[d:][path]filename.filetype]]*

Backup files from one disk to another

This command can back up files from one type of disk to another. For example, from hard disk to floppy disk. It will also back up one floppy disk to another, even if the disks have a different number of sides or sectors.

Form **BACKUP***drive1*:*[path][filename.filetype] drive2*:*[/S][/M][/A][/F]*
[/D:*date][/T*:*time][/L*:*[[d:][path]filename.filetype]]*

where:

drive 1 is the disk drive that you want to back up

drive 2 is the target drive to which the files are backed up

Notes

i)   If you are sharing files, MS-DOS will only let you backup files to which you have access.

ii)   BACKUP will erase the old files on a backup disk, before it adds new files to it. You can prevent this by using the /A switch.

Options The BACKUP command accepts the following switches:

/S	To back up subdirectories
/M	To back up only those files which have changed since the last back up and those that have their Archive bit set (see the ATTRIB command).
/A	To add files to be backed up, to those already on the backup disk. It does not erase old files on the back up disk. If you do not use the **/A** switch BACKUP erases the old files on a backup disk, before adding new files to it. You cannot use this switch if files exist on the disk, which were backed up using BACKUP

command from version 3.2 (or an earlier version) of MS-DOS.

/F	Formats the target disk, if it is not already formatted. This switch will only function while the MS-DOS FORMAT command is accessible from the current path.
/D:_date_	Will only back up files which were modified on or after date.
/T:_time_	Will only back up files which were modified on or after time.
/L:_filename.filetype_	Makes a backup log entry in the specified file. If you do not specify filename, backup, places a file called BACKUP.LOG in the root directory of the disk which contains the files being backed up.

Backup log file

The format used by the backup log file is:

- the first line lists the date and time of the backup

- a line for each backed-up file lists the filename and number of the backup disk on which the file resides.

Notes

i) If the backup log file already exists BACKUP will append the current entry to the file.

ii) You can also use the backup log file when you need to restore a particular file from a floppy disk, but you must specify which disk to restore, so that the RESTORE command does not have to search for files. The RESTORE command always puts a file back in the place where it was backed up. BACKUP displays the name of each file as it is backed up.

iii) You cannot use an older version of the RESTORE command (MS-DOS 3.2 or earlier) for files backed up with the MS.DOS 3.3 BACKUP command. It is wise to always use the same version of DOS for both BACKUP and RESTORE.

Additional Information:

The BACKUP program returns the following exit codes:

0   Normal completion

1   No files were found to back up

2   Some files not backed up due to sharing conflicts

3   Terminated by user

4   Terminated due to error

You can use the batch processing command, IF, for error processing which is based on the ERRORLEVEL returned by BACKUP.

Example

To back up all the files in a directory called JOHN\MANUAL, on drive C, to a blank, formatted disk in drive A, type:

BACKUP C:\JOHN\MANUAL A:

BREAK
BREAK=

BREAK [ON|OFF]

Set frequency MS-DOS checks whether Ctrl-Break has been issued

If you want to stop a program while it is running, you can press either the [Ctrl] and [C] or [Ctrl] and [Break] keys on the keyboard. MS-DOS normally checks whether [Ctrl]-[C] or [Ctrl]-[Break] has been pressed when it is reading input from the keyboard or sending output to the screen or to a printer.

You can use the BREAK command to make MS-DOS check whether [Ctrl]-[C] or [Ctrl]-[Break] is issued during various activities, for example, reading data from a disk or writing data to a disk.

However, this slows down each program's speed of operation slightly, so whenever this extra checking is not needed, it should be turned off again.

This command can be used from the DOS prompt, or can be included in the CONFIG.SYS file, to be executed every time MS-DOS is loaded.

Typing the BREAK command at the system prompt:

Forms

- **To show the current state**

  BREAK

- **To increase the number of occasions DOS will check that [Ctrl] [Break] or [Ctrl] [C] has been pressed**

  BREAK ON

- **To return to standard checking**

  BREAK OFF

> *You want to stop the next program if it goes wrong, yet you know that for much of the time it will be taking input from disk and sending all its output to disk. The command line you need is:*

BREAK ON

> *When you are happy with the program and would prefer it to run a little bit faster again, but without the extended [Ctrl] [Break] checking facility, type the command line:*

BREAK OFF

Including the BREAK= command in the CONFIG.SYS file

Forms

- To increase the number of occasions DOS will check that [Ctrl]-[Break] or [Ctrl]-[C] has been pressed, every time MS-DOS is used

  BREAK=ON

  or

- To return to standard checking

  BREAK=OFF

Note that if no field is specified, OFF is assumed as the default value.

> *If the following line is included in the CONFIG.SYS file, on your MS-DOS Startup disk:*

BREAK = ON

> *then the system will check more often to see if [Ctrl]-[C] or [Ctrl-[Break] has been pressed. This will probably give you the opportunity to stop the execution of a program, prematurely.*

BUFFERS=

BUFFERS=*n*

Set the amount of space used for MS-DOS disk buffers.

This command allows you to specify the number of buffers that MS-DOS allocates when it starts up. A disk buffer is a block of memory where MS-DOS holds data being read from, or written to, a disk when the amount of data is not an exact multiple of the physical sector size.

Form

BUFFERS=*n*

Where:

n is a number between 2 and 255

Notes

If the BUFFERS= command is not used, MS-DOS defaults to 10 buffers when there is less than 512k of base RAM, and defaults to 15 buffers if there is 512k or more. The number of buffers stays the same after MS-DOS is loaded, until the machine is switched off or MS-DOS is loaded again.

For best performance for standard applications (word processors, spreadsheets, etc.) a buffers allocation between 10 and 20 is recommended. If you tend to use many subdirectories, it would probably be better to increase the allocation to between 15 and 30 buffers.

But since buffers use the available system memory (approx. 528 bytes each), there may have to be a compromise between memory usage and performance. Allocating more than 40 buffers serves no useful purpose. Check with the User Manuals supplied with your applications, if in doubt about the number of buffers needed for your programs.

Example
_____

If the following line is included in the file CONFIG.SYS on your MS-DOS startup disk:

BUFFERS = 25

MS-DOS will reserve space for 25 disk buffers.

_____

CALL *[d:][path]batchfile*

Call a batch file from within a batchfile

Whilst running a batchfile, you can use CALL to call up another batchfile. You do not have to exit the original batchfile. This means a batchfile can be used like a command within a batchfile. When the called batchfile has been executed, the commands in the original batchfile continue to be executed.

CALL can be used from any line inside a batchfile. It is limited only by available memory.

Form

- **CALL** *[d:][path]batchfile*

where *batchfile* is the batch file you want to call

The filename of a batch file must include the **.BAT** extension, for example, CONDENSE.BAT but you do not need to include the extension when specifying the batchfile to be CALLed.

Notes:

i)   Do not use pipes and redirection symbols with the CALL command.

ii)   A batch file can recur within itself. That is, a batch file can call itself to run again; a termination condition should be included unless you want the batch file to run more than once. If you do not include a termination condition, press [Ctrl]-[C] to terminate the command when you are ready.

Example:

To run a batch file called CLIFF.BAT from within a batch file called ROBERT.BAT, use the following command within ROBERT.BAT:

CALL CLIFF

CHCP

External command

CHCP*[nnn]*

Display or change the current code page for the command processor

The CHCP command accepts one of the two prepared system code pages as a valid code page. If you select a code page which has not been prepared for the system, an error message will be displayed. If you just type the CHCP command without a code page number, CHCP displays the active code page for the system.

For detailed information on Code Page Switching, see Chapter 4.

Form

- **CHCP*[nnn]***

where *[nnn]* is the desired code page.

If it is not specified, the operating system code page is displayed.

You may select any one of the prepared system code pages defined by the COUNTRY command in the CONFIG.SYS file.

Options

Valid code pages:

VALUE	CODE PAGE
437	United States
850	Multilingual
860	Portuguese
863	French-Canadian
865	Nordic

CHCP messages:

If you type CHCP the message will be similar to:

Active code page: 850

8-16

MS-DOS

If you select a code page that is not prepared for the system, the message will be similar to:

Invalid code page

If a device (screen, keyboard, printer) is
not prepared for a code page, MS-DOS displays the following message:

Code page 865 not prepared for device xx.

The CHCP command may need to access the COUNTRY.SYS file. If the file cannot be found, the following message is displayed:

File not found

Notes

i)   Using the COUNTRY= statement in the CONFIG.SYS file or the NLSFUNC command, you can tell DOS where to find COUNTRY.SYS.

ii)   The NLSFUNC command must be loaded prior to issuing the CHCP command.

Example:
_____

To set the code page to 437 (United States), type the following command:

CHCP 437
_____

Associating Commands

The other MS-DOS commands which support code page switching are:

NLSFUNC   Loads the file containing country-specific information.

KEYB   Allows you to select a country-specific keyboard code
                 for the keyboard you are using, and a code page for the
                 character set you prefer.

                 You may also use this command to select an alternative
                 definition file (other than the default KEYBOARD.SYS
                 file) if alternatives exist.

MODE   - Preparing a code page for a device

                     - Selecting a code page for a device

                     - Displaying the code pages prepared and selected for a device

                     - Refreshing code pages that were lost due to hardware error

GRAFTABL   - Displays an extended character set when using display adaptors in CGA graphics mode.

CONFIG.SYS commands

COUNTRY=   Identifies the country in which you work or live

DEVICE=   Installs device drivers in the system, including:

                     DISPLAY.SYS used to install a standard console screen device with code page support

                     PRINTER.SYS used to install a standard parallel printer with code-page support

CHDIR

CHDIR *[d:]path*

Change the current directory

The CHDIR command is used to:

- change the current directory of a particular drive

- display the current directory path of a particular drive

If the path you give starts from the root directory, you will need to start the path with a backslash. If it starts from the current directory, do not include this backslash.

CHDIR can be abbreviated to CD.

Forms

- **To change the current directory**

  CHDIR *[d:]path* or **CD** *[d:]path*

- **To display the current directory path**

  CHDIR *[d:]*
  or
  CD *[d:]*

Examples

Suppose the pattern of directories on the disk in Drive B was as follows:
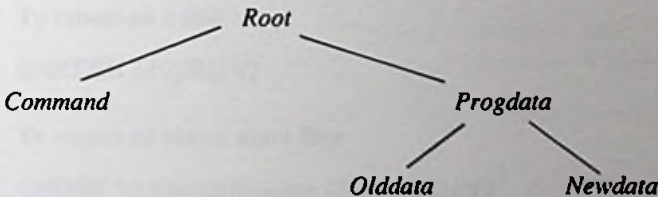
- *If you wanted the PROGDATA directory, a subdirectory of the Root directory on Drive B, to be the current directory on Drive B. The command line you need is:*

CD B:\PROGDATA

Note that a backslash is used to tell MS-DOS that PROGDATA is a subdirectory of the Root directory on this disk.

- *If, after using PROGDATA as the current directory for a while, you then want to move on to using NEWDATA. The command line to use is:*

CD B:NEWDATA

Note that there is no backslash between the colon and the name of the directory in this command line, because NEWDATA is a subdirectory of the current directory.

- *To reset the current directory on the default drive to the Root directory, type the command line:*

**CD **

- *If you want to find out which directory on Drive C is the current directory. The command line to type is:*

CD C:

and the response might be:

C:\DIR1

CHKDSK

CHKDSK *[d:][path][filename.filetype][/**F**][/**V**]*

Check disk for errors and file(s) for non-contiguous storage areas

CHKDSK produces a status report on a disk and optionally on one or more of the files on the disk as well. This report summarises how the storage space on the disk is divided between directories, files, hidden files and free space and how parts of the specified file(s) are allocated to different non-contiguous storage areas on the disk. (Re-using areas of the disk freed by deleting a file usually leads to the new files being stored in a number of separate areas of the disk.)

If CHKDSK encounters any directory entries that have been corrupted, it will display appropriate error messages on the screen. Normally all these messages are displayed at the end of the process, but if you choose the **/V** option, these messages will be displayed as the errors are found.

CHKDSK's main role is to report errors but there are some problems that it can overcome (possibly with some loss of data) as it processes the disk. These are:

- errors that cause parts of the directory tree to become   inaccessible

- errors in the table that holds details of where the separate parts of a file are stored (the File Allocation Table)

The **/F** option will remove, from the directory tree, any places where the directory tree has become inaccessible. Files will be cut short at the point the error appears in the File Allocation Table. However, sections of files that become detached from the main file are recovered and stored in files called **FILE***nnnn***.CHK**. If these broken files are text files (or word processor files), you can then use a text editor or a word processor to recover most of your data.

Forms

- **To report on a disk**

  CHKDSK *[d:][/**F**][/**V**]*

- **To report on one or more files**

  CHDSK *[d:][path][filename.filetype][/**F**][/**V**]*

filename.filetype may include the wildcard characters * or ? to specify more than one file.

Options	/F	Fix errors as the disk is processed
	/V	Display the name of each file and any error messages as the disk is processed

Note: You can send the output from CHKDSK to a file rather than display it on the screen, but then you cannot use /F option

Examples

* *To check the disk in the default drive for errors, use the command line:*

CHKDSK

(assuming that the external command CHKDSK is either in the default directory or in a directory that MS-DOS automatically searches see Section 7.2)

* *If you want to check the disk in Drive B, the command line to use would be:*

CHKDSK B:

Either of these commands will produce a report something like this:

A>chkdsk

Volume CLIFFS DISK created May 6, 1989 4.07p

```
362496   bytes total disk space
  5124   bytes in 5 directories
124928   bytes in 20 user files
234444   bytes available on disk

655360   bytes total memory
595612   bytes free
```

No attempt will be made to correct for any errors that CHKDSK finds.

- *To tell MS-DOS to check the disk in Drive B and correct, as far as possible, the errors that are detected, use the command line:*

CHKDSK B:/F

Parts of the directory tree that have become inaccessible will be removed from the tree and files that have been damaged will be cut short, with the removed sections recovered and stored in files called FILEnnn.CHK in the root directory. You may then be able to use a text editor or a word processor to reunite these with the main part of the file.

- *To discover how many separate storage areas of the default disk are used to store a file called MYFILE.TXT in the DIR1 directory, use the command line:*

CHKDSK\DIR1\MYFILE.TXT

The result you see on the screen could be something like this:

A>CHKDSK \DIR1\MYFILE.TXT

Volume CLIFFS DISK created September 7, 1988 10.30a

362496	**bytes total disk space**
5124	**bytes in 5 directories**
124928	**bytes in 20 user files**
234444	**bytes available on disk**
655360	**bytes total memory**
592552	**bytes free**

A:\DIR1\MYFILE.TXT
   Contains 2 non-contiguous blocks

CLS

CLS

Clear the Screen

CLS clears the screen and leaves the cursor in the top lefthand corner of the screen.

Form CLS

Note If the screen has been working in reverse video ('black' characters on a 'white' background), it will go back to its normal mode of operation ('white' characters on a 'black' background) after the screen is cleared.

Example _____

You may have the following display on your screen after having typed the command DIR:

```
Volume in drive A has no label
Directory of  A:\

COMMAND  COM   25276 24-07-87  12:00a
ANSI     SYS    1647 24-07-87  12:00a
CONFIG   SYS      18 27-07-88   2:58p
COUNTRY  SYS   11254 24-07-87  12:00a
DRIVER   SYS    1165 24-07-87  12:00a
KEYBOARD SYS   19735 24-07-87  12:00a
PRINTER  SYS   13559 24-07-87  12:00a
RAMDRIVE SYS    6481 24-07-87  12:00a
AUTOEXEC BAT      58 27-07-88   2:58p
ASSIGN   COM    1530 24-07-87  12:00a
BACKUP   COM   29976 24-07-87  12:00a
CHKDSK   COM    9819 24-07-87  12:00a
COMP     COM    4183 24-07-87  12:00a
DEBUG    COM   15866 24-07-87  12:00a
DISKCOMP COM    5848 24-07-87  12:00a
DISKCOPY COM    6264 24-07-87  12:00a
EDLIN    COM    7495 24-07-87  12:00a
FDISK    COM   48919 24-07-87  12:00a
FORMAT   COM   11671 24-07-87  12:00a
GRAFTABL COM    6136 24-07-87  12:00a
GRAPHICS COM   13943 24-07-87  12:00a
```

If you then type CLS, the screen will clear, leaving a system prompt and flashing cursor.

COMMAND

COMMAND *[d:][path][ctty-dev][*/**E:***nnnn][*/**P***][*/**C** *string]*

Start the command processor

This command starts a new command processor, that is, the MS-DOS program that contains all internal commands.

When you start a new command processor, you also create a new command environment. The new environment is a copy of the old, parent environment. However, you can change the new environment without affecting the old one.

Note COMMAND can be used with the SHELL command in the CONFIG.SYS file. SHELL is listed later in this chapter.

Form COMMAND*[d:][path][ctty-dev][*/**E:***nnnn] [*/**P***][*/**C** *string]*

Where:

[d:][path]	instructs the system to look for COMMAND.COM if it needs to re-load it.
ctty-dev	allows you to specify a different device (such as AUX) for input and output.
*/**E:***nnnn*	specifies the environment size. nnnn is the size in bytes, ranging from 160 to 32,768. MS-DOS rounds this number up to the next logical paragraph boundary. The default value is 160 bytes. If nnnn is less than 160 bytes, MS-DOS defaults to 160 bytes and displays the following message:

Invalid environment size specified

If *nnnn* is greater than 32,768 bytes MS-DOS displays the same message, but defaults to 32,768.

*/**P***	keeps the secondary command processor in memory and does not automatically return to the primary command processor.
*/**C** *string*	tells the command processor to perform the command, or commands, specified by string and then to return automatically to the primary command processor.

Example:

If you type:

COMMAND /C CHKDSK B:

- *the command will tell the processor to*

  - *Start a new command processor under the current program*

  - *Run the command CHKDSK B:*

  - *Return to the first command processor*

COMP

COMP *[d:][path][filename.filetype] [d:][path][filename.filetype]*

Compare files

The COMP command is used to make a byte-by-byte comparison between two files. If the two files are not expected to be exactly equal in content and size, the FC command should be used instead.

Form **COMP** *[d:][path][filename.filetype] [d:][path][filename.filetype]*

If you do not specify the filename and filetype, you will be prompted to enter the names of each of the files to be compared. If the file is on the current directory you need only enter the filename and filetype.

If the file is on another disk or directory, enter the drive and pathname.

If you enter a drive letter only for the second file, the command looks on that drive for a file which has the same filename and filetype as the first.

Mismatches are reported in the format:

Compare error at OFFSET XXXX

File1 = YY

File2 = ZZ

Where **XXXX** is the number of bytes into the file in hex, where the difference exists.

YY and **ZZ** are the hex codes for the unequal characters.

If ten unequal comparisons are detected, the command terminates with the display:

10 mismatches ending compare

Compare more files (Y/N)?

if the files are not EXACTLY the same size, the message:

Files are different sizes

Compare more files (Y/N)?

is displayed.

Example

If you want to compare all the files in the current directory on drive C with the filename extension of NEW, with all the files in the current directory on drive A with the same filename but the extension OLD, type:

COMP C:*.NEW A:*.OLD

COPY

COPY *[d:][path]source[/**A**][/**B**] [d:][path]destination[/**A**][/**B**][/**V**]*

Copy files

COPY is used:

- To make copies of individual source files

- To make a single copy that combines a number of separate source files

  where the source file can be either a disk file or data taken from an Input Device such as the keyboard or the Serial Interface. Similarly, the destination for the copy can be either a disk file or an Output Device such as the display screen or a printer.

  The COPY command can therefore be used, for example, to

  - copy disk files either on the same drive or between different drives

  - display a disk file on the screen or print it out on a printer

  - create a file from text typed in at the keyboard

  The copy of a disk file can either have the same name or a different name to the source file, unless the source and the copy are stored in the same directory.

  A group of files can be copied with a single COPY command if you can create a file name template for the files that you want copied (see Section 6.2). These files should all be in the same directory.

- **To copy a disk file to another disk file**

  Keeping the same file name:

Form **COPY** *[d:][path]source [d:][path][/**V**]*

  Changing the file name:

Form **COPY** *[d:][path]source[d:][path]destination[/**V**]*

Copying to the current directory of the default drive:

Form COPY *[d:][path]source*

Note These copies retain the date and time stamps of the original file. If you are just copying one file, you can give the destination file a new date and time stamp by ending the source file specification with

+,,

in the special case of copying to the current directory on the default drive, you just need to add the +. If you are copying binary files use the **/B** switch.

- **To copy to an output device**

Form COPY *[d:][path]source output-device*

where *output-device* is:

CON	Display screen
PRN or LPT1	A printer attached to the parallel printer port onthe back of your PC (LPT2 or LPT3 may also be used if such a device is fitted)
AUX or COM1	The Serial Interface (COM2 may also be used if such a device is fitted)
NUL	A dummy output device. Used when, for example, testing a program

- **To copy from an Input Device**

Form COPY *input-device [d:][path]destination[/V]*

where *input-device* is:

CON	The keyboard
AUX or COM1	The Serial Interface (COM2 may also be used if such a device is fitted)

Notes In general, everything is recorded in the destination file until Ctrl-Z is entered. The exceptions are line-editing keys such as [F1] and [Del] used when typing information at the keyboard.

If the destination file specificationm atches an existing file on the destination drive, the copy will be made and then the existing file will be deleted.

- **To make a file that combines data taken from a number of sources**

Form **COPY** *[/A][/B]source-1+source-2[+source-n...][path][destination][option[option]]*

where *source-n* is: *[d:][path]filename.filetype[option]* or input-device

destination is: *[d:][path]filename.filetype[option[option]]* or output-device.

Notes You can use a file name template (see 6.2 Using Wildcards) to specify a group of disk files that are to be combined. These files all have to be stored in the same directory and they are combined in the order in which they appear in the directory.

If you leave out the destination part of this command, the combined file will replace the first source file in your list.

Options

Source

/A   The file is treated as an ASCII text file. The contents are copied up to, but not including, the first Ctrl-Z (end-of-file) character. The remaining characters are not copied.

/B   The entire file is copied, regardless of any Ctrl-Z (end-of-file) character found in the file.

Destination

/A   The file is treated as an ASCII text file. A Crtl-Z (end-of-file) character is added to the end of the file.

/B   No Ctrl-Z (end-of-file) character is added to the file.

/V   The destination file is compared with the source file to verify the accuracy of the copy.

Notes The **/A** and **/B** options each apply to the file they follow and to the remaining files listed in the COPY command unless another **/A** or **/B** option is specified. The first source file can be preceded or followed by **/A** or **/B**.

The **/A** and **/B** options are only needed when ASCII and binary files are combined. They are not necessary if you are copying data, program or Batch files.

- *To copy a file called MYFILE.TXT, in the current directory on the default drive, to the current directory on Drive B and store it with the same filename and filetype, use the command line:*

COPY MYFILE.TXT B:

To store the copy under the name YOURFILE.TXT, use the command line:

COPY MYFILE.TXT B:YOURFILE.TXT

- *Use the following command line to copy all the files that match the file name template YOUR*.* in the default directory, to the current directory on Drive B. This will store them with the same names but YOUR will be replaced by MY:*

COPY YOUR*.* MY*.*

When making such a copy, check that none of the new names will be invalid, ie. that your new template does not lead to filenames more than eight (8) characters long or filetypes more than three (3) characters long.

- *To copy the file MYFILE.TXT as above but this time store the new copy with a new date and time stamp, use the command line:*

COPY MYFILE.TXT+,, B:

- *To use the COPY command to print out the file MYFILE.TXT, use the command line:*

COPY MYFILE.TXT PRN

- *To take input from the Serial Interface and place this in the file NEWFILE, use the command line:*

COPY AUX NEWFILE

All the data input through the Serial Interface will be put into this file until a Ctrl-Z character is sent. This signals the end of the file.

- *To combine the files MYFILE.1 and MYFILE.2 in a new file called NEWFILE, use the command line:*

  COPY MYFILE.1+MYFILE.2 NEWFILE

- *To append MYFILE.2 to MYFILE.1, use the command line:*

  COPY MYFILE.1+MYFILE.2

- *To append data input through the Serial Interface to MYFILE.1, use the command line:*

  COPY MYFILE.1+AUX

  All the data input through the Serial Interface will be added to the file until a Ctrl-Z character is transmitted, signalling the end of the file.

COUNTRY=

COUNTRY=xxx*[,[yyy][,[d:]filename.filetype]]*

Allows MS-DOS to use international time, date, currency and case conversions

COUNTRY= is a configuration command. It identifies, to MS-DOS, which country's character set you intend to use.

Note: Application programs are responsible for obtaining this information from MS-DOS. Not all such programs will do this, which means they may appear not to honour the country-specific information supplied by MS-DOS.

Form COUNTRY=xxx*[,[yyy][,[d:][path]filename.filetype]]*

where:

xxx	is the telephone country code
yyy	is the code page for the country
filename.filetype	is a file containing country information

The default value is the USA setting.

The table below gives the following information:

- Valid country codes for each country

- The date and time formats related to each country or language group. The Date entry shows the format MS-DOS would use to display January 3, 1989 for each country; the Time entry shows how MS-DOS would display 2:35pm with zero seconds and zero hundredths of a second, for each country.

- The default code page number followed by the secondary code page number

- The KEYB code, that is, the keyboard code for each country, as used with the KEYB command

- The character used to mark thousands from hundreds in four or more digit numbers

- The character used to mark decimal figures

Country or Language	Arabic countries	Belgium	Canada (Eng.)
Country code	785	032	001
Date	03/01/1989	03/01/1989	01-03-1989
Time	2:35:00,00	14:35:00,00	2:35:00.00
Code pages	437/850	437/850	437/850
KEYB code	--	BE	US
Thousands separator	.	,	,
Decimal separator	,	,	.

Country or Language	Canadian (Fr.)	Denmark	English (Int.)
Country code	002	045	061
Date	03-01-1989	03-01-1989	03-01-1989
Time	14:35:00,00	14.35.00,00	2:35:00.00
Code pages	863/850	865/850	437/850
KEYB code	CF	DK	UK
Thousands separator	,	.	,
Decimal separator	,	,	.

Country or Language	Finland	France	Germany
Country code	358	033	049
Date	03.01.1989	03/01/1989	03.01.1989
Time	2:35:00,00	14:35:00,00	14.35.00,00
Code pages	437/850	437/850	437/850
KEYB code	SU	FR	GR
Thousands separator			.
Decimal separator	,	,	,

Country or Language	Israel	Italy	Latin America
Country code	972	039	003
Date	03 01 1989	03/01/1989	03/01/1989
Time	14:35:00.00	14:35:00,00	14:35:00.00
Code pages	437/850	437/850	437/850
KEYB code	--	IT	LA
Thousands separator	,	.	,
Decimal separator	.	,	.

Country or Language	Netherlands	Norway	Portugal
Country code	031	047	351
Date	03-01-1989	03.01.1989	03/01/1989
Time	14:35:00,00	17.35.00,00	14:35:00,00
Code pages	437/850	865/850	860/850
KEYB code	NL	NO	PO
Thousands separator	.	.	.
Decimal separator	,	,	,

Country or Language	Spain	Sweden	Switzerland (Fr.)
Country code	034	046	041
Date	03.01.1989	1989-01-03	03.01.1989
Time	14:35:00,00	14.35.00,00	14.35.00.00
Code pages	437/850	437/850	437/850
KEYB code	SP	SV	SF
Thousands separator	.	.	'
Decimal separator	,	,	.

Country or Language	Switzerland (Ger)	United Kingdom	United States
Country code	041	044	001
Date	03.01.1989	03-01-1989	01-03-1989
Time	14.35.00.00	2:35:00.00	2:35:00.00
Code pages	437/850	437/850	437/850
KEYB code	SG	UK	US
Thousands separator	'.	,	,
Decimal separator	.	.	.

The COUNTRY= code affects five MS-DOS commands: DATE, BACKUP, RESTORE, DIR and TIME.

To change to Italian conventions of currency, time, date and case, set COUNTRY to Italy (039) by including the following command line in your CONFIG.SYS file:

COUNTRY=039

Additional information

The COUNTRY.SYS file contains country-specific information.

It is included in the COUNTRY= command, by default. That is, if you do not specify the filename when using the COUNTRY= command, MS-DOS will use the COUNTRY.SYS file for country specific information.

Note It is highly recommended that you provide a complete path to this file, for example:

COUNTRY=039, 437, C:\DOS\COUNTRY.SYS

CTTY

CTTY *device*

Change the device used to issue commands

Normally, all command lines are typed in at the keyboard. The CTTY command tells MS-DOS to expect, in future, all command lines to come from a different input device. For example, you may want to type in command lines from a terminal attached to the Serial Interface.

- **To use an auxiliary device to issue commands**

Form **CTTY AUX**

- **To again use the keyboard for issue commands**

Form **CTTY CON**

Notes The changeover to using the other device happens immediately.

The command, which allows you to go back to using the keyboard to issue commands, has to be entered from the auxiliary device currently being used for all commands. If you get into difficulties in returning to normal operation, you can always reset your PC by holding down [Ctrl] and [Alt] and pressing [Del] on your PC's keyboard.

Some programs take their input directly from your PC's hardware. The CTTY command has no effect when this is the case.

DATE

DATE *[dd-mm-yy]*

Set or read the date

DATE is used either to display or set the current date. The current date stored by the computer is used to date stamp files.

Any date you type in is checked before it is accepted. If the date is invalid, you will be asked to type in a new date.

Form **DATE**

or **DATE** *dd-mm-yy*

where *dd* represents the day (01...31), *mm* the month (01...12) and *yy* the last two digits of the year (00...99).

Note If you type DATE, the current setting is displayed and then you are asked to type in a new date. If the date is correct, just press [↵].

Example _____

To set the date to be 1st November 1990, either use the command line

DATE 01-11-90

which does the whole job in one go, or just:

DATE

If you use the second command, you will see something like this on the screen:

A>date
    Current date is Sat 12-11-1990
    Enter new date (dd-mm-yy):

Type:

01-11-90 [↵]

to set the date.

_____

DEL
ERASE

DEL *[d:][path]filename.filetype*
ERASE *[d:][path]filename.filetype*

Delete a file

DEL and ERASE are used to remove one or many files from a directory, freeing both directory space and data storage space for future files.

- You can delete one file in your current directory by typing DEL and the name of the file. If the file you want to delete is not stored in the current directory, you must specify the path to the file.

- You can delete a number of files at once by using filename templates (including wildcards * and ?) See Section 6.2 for instructions on how to use wildcards.

If you type **DEL *.*** to delete all the files in your working directory, MS-DOS will then display the message

Are you sure? (Y/N)

If you type Y (for yes) in response, MS-DOS will delete all the files in the working directory.

WARNING
Care should be taken when using wildcards to delete a number of files at once; you may delete files you intended to keep.

- You can delete the files in a directory other than the working directory by typing DEL followed by the name of the directory that contains the files that you want to delete.

Form **DEL** *[d:][path]filename.filetype*
     ERASE *[d:][path]filename.filetype*

Notes

   i)   Unless you use the *.* template, you will not be asked to confirm the deletion. That is, the file(s) will be deleted immediately.

ii) Once a file has been deleted, it cannot be retrieved.

Examples

- *To delete a file called OLDDATA.1 in the default directory, type either the command line:*

DEL OLDDATA.1

or

ERASE OLDDATA.1

These command lines are exactly equivalent.

If the file you wanted to delete was in the current directory on Drive C, your command line would become:

DEL C:OLDDATA.1

- *To clear the \DIR1 directory (a subdirectory of the Root directory on the default drive) of all the files stored in it, you might use the command line:*

DEL \DIR1*.*

Following this command, you will see the message:

Are you sure (Y/N)?

Type Y to delete all the files; type N to abandon this action.

These commands will not necessarily clear the directory completely; any subdirectories will not be affected.

DEVICE=

DEVICE=_[d:][path]filename.filetype [parameters]_

Load an installable device driver

This command installs the device driver in the specified pathname to the system list. Device drivers allow extensions to be made to the basic MS-DOS system to support new types of hardware and various other features.

The syntax of the DEVICE= command is:

Form DEVICE=_[d:][path]filename.filetype [parameters]_

The file specified is loaded and given control. The driver may then perform the necessary steps to configure itself and the system for its operation. See the MS-DOS Technical Reference Manual for information on how to create your own device driver.

Your MS-DOS disk contains five installable device drivers, ANSI.SYS, DISPLAY.SYS, DRIVER.SYS, PRINTER.SYS and RAMDRIVE.SYS which can be used for variable device configurations. They are all described in the following pages.

If you plan to use the extended screen handling facilities provided by ANSI escape sequences you would include the following command in your CONFIG.SYS file:

Form DEVICE=ANSI.SYS

Notes

Once installed, you can use an "ANSI escape sequence" to perform operations such as clearing the screen, changing colors or redefining the operation of the keyboard.

Each escape sequence begins with the ESC (ASCII code 27) character followed by some sequence of symbols and digits described below.

The standard ANSI screen control codes are as follows:

ESC [nA   Moves the cursor up n rows, unless it is already at the top of the screen. If n is omitted, the value 1 is assumed.

ESC [nB   Moves the cursor down n rows, unless it is already at the bottom of the screen. If n is omitted, the value 1 is assumed.

ESC [nC   Moves the cursor right n columns, unless it is already in the column furthest to the right. If n is omitted, the value 1 is assumed.

ESC [nD   Moves the cursor left n columns, unless it is already in the column furthest to the left. If n is omitted, the value 1 is assumed.

ESC [n;mf   Moves the cursor to row n, column m. If n or m is omitted the value 1 is assumed.

ESC [n;mH   Move the cursor to row n, column m. If n or m is omitted the value 1 is assumed.

ESC [n;mR   Specify current cursor position as row n, column m and report this position to the system.

ESC [=nh   Set screen width and type (see Table 1, below)
ESC [=h
ESC [=0h
ESC [?7h

ESC [=*n*l	Reset screen width and type (see Table 1, below).
ESC [=l	
ESC [=0l	
ESC [?7l	
ESC [2J	Clear the screen and return the cursor to its home position.
ESC [K	Erase to the end of the line.
ESC [*n*;...;*k*m	Set graphics parameters (see Table 2, below).
ESC [6n	Report cursor position to the system.
ESC [*sic*;*string*;...p	Map Standard Internal Code associated with a key, sic, onto another code or sequence of codes, thereby redefining the keyboard. *string* is either a decimal ASCII code number or string contained in quotation marks.
ESC [s	Save the cursor position.
ESC [u	Restore the cursor position.

Table 1: Screen width and type as used with ESC[=nh and ESC[=nl etc.

n=0	40x25 black and white
n=1	40x25 color
n=2	80x25 black and white
n=3	80x25 color
n=4	320x200 color
n=5	320x200 black and white
n=6	640x200 black and white
n=7	wrap at end of line

Table 2: Graphics parameters as used with ESC [*n*;...;*k*m *n*..*k* take values as follows:

0	All attributes off
1	Bold on
2	Faint on
3	Italic on
4	Underscore (mono display only)
5	Blink on
6	Rapid blink on
7	Reverse video on
8	Concealed on

30	Black foreground
31	Red foreground
32	Green foreground
33	Yellow foreground
34	Blue foreground
35	Magenta foreground
36	Cyan foreground
37	White foreground
40	Black background
41	Red background
42	Green background
43	Yellow background
44	Blue background
45	Magenta background
46	Cyan background
47	White background
48	Subscript
49	Superscript

• DEVICE=DISPLAY.SYS

DISPLAY.SYS is an installable device driver which supports code page switching for the console device. A code page is an alternative set of 256 characters which can be used in graphic display modes and with EGA/VGA display adapters in text modes.

To install DISPLAY.SYS include a command line of the following form in your CONFIG.SYS file:

Form DEVICE=DISPLAY.SYS CON[:]=([type][,hwcp][,n,m])

The CON= parameters are as follows:

type
: The display adapter in use consisting of MONO, CGA, EGA or LCD. Use EGA if a VGA adapter is being used. If no adapter type is given, DISPLAY.SYS will automatically determine the type of adapter being used.

hwcp
: The code page supported by the hardware as follows:

437	United States
850	Multilingual
860	Portugal
863	French Canadian
865	Norway

n
: The number of additional code pages that can be supported. This number is dependent on the hardware: MONO and CGA do not support other fonts, so n must be 0. For EGA, VGA, *n* can be 1 or 2.

m
: The number of sub-fonts that are supported by each code page.

The files, EGA.CPI and LCD.CPI are additional code page files for use with the MODE command of the form:

MODE CON: CP PREPARE=((cplist)[d:cpfile])

where:

cplist
: Is 850 if the hardware code page (hwcp) is 437. If the hardware code page is not code page 437, cplist is 850 plus the hardware code page. For example, Portuguese is (850,860).

drive:
: specifies the drive path where the display code page font file is loaded.

cpfile   is the name of the code page information (.CPI) file.

Note that this MODE commmand would normally be used in the AUTOEXEC.BAT file so that the code page(s) is prepared each time the machine is started.

DRIVER.SYS is an installable device driver that supports external drives. To install DRIVER.SYS, include a command of the following form in your CONFIG.SYS file:

Form **DEVICE=DRIVER.SYS /D:**dd [**/C**][**/F:**ff][**/H:**hh][**/N**][**/S:**ss][**/T:**tt]

Where:

/D:dd   is drive number (0-127:Floppy drives only)

and optionally:

/C   indicates changeline (doorlock) support required

/F:ff   indicates the form factor where:

0 =	5.25 inch floppy diskette, 320/360 Kilobytes
1 =	5.25 inch floppy diskette, 1.2 Megabytes
2 =	3.5 inch floppy diskette, 720 Kilobytes
3 =	8 inch floppy diskette, Single Density
4 =	8 inch floppy diskette, Double Density
5 =	Hard Disk
6 =	Tape Drive
7 =	3.5 inch floppy diskkette, 1.44 Megabytes.

/H:h   is the maximum head number(1-99)

/N   indicates non-removable block device

/S:ss   is the number of sectors per track(1-99)

/T:tt   is the number of tracks per side(1-999)

PRINTER.SYS is a printer driver which provides code page switching support for parallel ports LPT1, LPT2, and LPT3.

For information about code page switching see Part Two, Chapter 4.

Installation

To install PRINTER.SYS, insert a command line of the following form in your CONFIG.SYS file:

Form **DEVICE=**[d:][path]**PRINTER.SYS LPT**x=[type[,hwcp [,...]][,n]]

Options The PRINTER.SYS device driver accepts the following options:

OPTION	FUNCTION
type	The printer in use. The types of printers that can be used with code page switching are any of the following printer models, or compatibles:
	4201 IBM 4201 Proprinterr family IBM Proprinter XL
	5202 IBM 5202 Quietwriter III
hwcp	The code page supported by the hardware. The following values are allowed:
	437 (United States) 850 (Multilingual) 860 (Portugal) 863 (French-Canadian) 865 (Norway)
n	The number of additional code pages that can be supported. This number is dependent on the hardware.

• DEVICE=RAMDRIVE.SYS

RAMDRIVE.SYS is an installable device driver which enables the usage of a portion of the computer's memory as though it were a disk drive. This area of memory is referred to as a RAM disk or a virtual disk.

It is possible to use either LIM Expanded Memory which meets the (Lotus/Intel/Microsoft) Expanded Memory Specification, Base memory or (if you have an 80286 or 80386 based PC) Extended memory. See Part 1 for a full explanation of Extended, Expanded and Base memory.

To install RAMDRIVE.SYS, include a command of the following form in your CONFIG.SYS file.

Form DEVICE=RAMDRIVE.SYS *[disk size[sector size[entries]]][/***A***][/***E***]*

Where:

[disk size]   is disk size in kilobytes. Default is 64, maximum is 4096 and minimum is 16.

[sector size]   is the sector size. The value 128, 256, 512, and 1024 are allowed. Default 512.

[entries]   is the number of root directory entries. The default is 64, the minimum value is 4 and the maximum is 1024.

/A   indicates that you wish to use memory which meets the LIM Expanded Memory Specification. If this switch is used, the **/E** switch cannot be used.

There is an additional option for this driver which applies to 80286 & 80386 style CPU architecture with memory above the 1 Megabyte range. This option is as follows:

/E   indicates that Extended Memory (above 1MB) is to be used. If this switch is used, the **/A** switch cannot be used. Extended Memory cannot be fitted to an 8086 based PC.

NOTE: When you switch off or reset your computer, all the information stored in RAM Disks will be lost.

It is possible to have more than one RAM drive, simply include multiple RAMDRIVE commands, if you have sufficient spare memory.

DIR *[d:][path][filename.filetype][/P][/W]*

Display directory

The DIR command is used to:

- display details of the files in a directory

- display details of a particular file, a group of files or all the files in the directory

- test whether a particular file or group of files is present in a particular directory

- list all the files in a directory that match a given wildcard file specification

Alongside this information, you will also see:

- the disk label of the disk holding the files (if any)

- the amount of free space on the disk

Files are listed in the order they appear in the directory.

The information can be displayed in a couple of different forms. The style of display used, depends upon which of the optional parameters /**P** and/**W** are selected. The version with no parameters gives a list of each file's filename and filetype together with its size in bytes and the time and date it was last changed. If this list is more than one screenful, the display will continuously scroll up until all the directory has been displayed.

Forms

- **To display details of all the files and directories in a directory**

  DIR *[d:][path][/P][/W]*

- **To display details of a single file or a group of files**

  DIR *[d:][path]filename.filetype[/P][/W]*

  |

  File specification of
  particular file or wildcard
  file specification of a group
  of files

- **To display details of all the files with the same filename**

  Form **DIR** *[d:][path]filename[/P][/W]*

  Note Any directories with this name will also be displayed.

- **To display details of all files with the same filetype (this will only work in the current directory)**

  Form **DIR** *[d:][path].filetype[/P][/W]*

Options

/P   The display pauses after every screenful of information. Press
            a character key to see the next screenful.

/W   Just the filenames and filetypes, with five files catalogued on
            each line.

Examples

- *To display full details ie. filename, filetype, size and date when last changed of all the files in the default directory (ie. the current directory on the default drive), type the command line:*

  DIR

- *To display just the names of these files, five to a line, use the command line:*

  DIR/W

- *To display, five to a line, the names of all the files in the current directory on Drive C, use the command line:*

   DIR C:\ /W

- *To display full details i.e. filename, filetype, size and date when last changed of the files in the Root directory on Drive C, use the command line:*

   DIR C:\ /P

   the /P ensures that the output will pause at the end of each screenful of information. Press any character key (for example, the Space bar) to see the next screenful.

- *To display full details of just those files on the default drive that have a filename starting with the letter D and the filetype MY, use the command line:*

   DIR D*.MY

   Note the use of the wildcard character * to create a file name template against which to match the names of all the files in the directory. * represents any valid combination of characters including, in this instance, a blank space.

- *To search the current directory for files with the filetype MY, use the command line:*

   DIR .MY

   DIR interprets this command line as if it had the wildcard character * in front of the dot, allowing the template to match any valid filename.

- *To search the \DIR1 directory for files and directories with names starting MY, use the command line:*

   DIR \DIR1\MY*

   DIR interprets this command line as if it had .* at the end of the command line, allowing the template to match any valid filetype.

DISKCOMP

DISKCOMP *source-drive*: *[target-drive:][/1][/8]*

Compare contents of disk in target drive against contents of disk in source drive

Note that DISKCOMP and DISKCOPY apply only to floppy disks. You must use COPY, XCOPY, BACKUP, RESTORE, FC and COMP to make copies and comparisons between hard disks and floppy disks.

The DISKCOMP command is used to make a track-by-track comparison between two disks. These disks can either be in different drives or in the same drive. DISKCOMP first checks that the disks have the same format and then checks each track on the target disk against the corresponding track of the source disk. Where it finds a difference, it displays a **Compare error** message giving the track number and the side where the difference was found.

DISKCOMP normally compares both sides of the disks and all sectors on each track, but you can limit the comparison to just one side of the disks or to just the first eight sectors on each track by selecting the appropriate options. It compares a section of the disks at a time, reading first the source disk and then checking the target disk against this.

After the comparison has been completed, DISKCOMP asks you if you want to compare another pair of disks. Type [Y][↵] to compare another disk; type [N][↵] to leave DISKCOMP.

Form **DISKCOMP** *source-drive*: *[target-drive:][/1][/8]*

Options

/1	Compare just the first side of the disks
/8	Compare just the first eight sectors of each track

Notes If you do not specify a target drive, this is taken to be the default drive.

If the target drive is the same as the source drive, DISKCOMP will prompt you to insert the source disk and to insert the target disk as it compares the disks section by section.

You cannot use DISKCOMP on a drive that has been ASSIGNed, JOINed or SUBSTituted (see Section 7.1).

Some disk drives will not support the **/1** and **/8** options.

Additional Information

The DISKCOMP program returns the following exit codes:

0   Compared OK

1   Disks did not compare (were not the same)

2   CTRL-C was pushed

3   Hard Error - an uncoverable read or write error occurred.

4   Initialization Error - not enough memory, invalid drives
     or command syntax error

You can use the batch processing command, IF, for error processing based on the ERRORLEVEL returned by DISKCOMP.

Examples

- *To compare the disk in Drive A with the disk in Drive B, use the command line:*

DISKCOMP A: B:

(assuming that the external command DISKCOMP is stored either in the default directory or in a directory that MS-DOS searches automatically - see Section 7.1)

This is the command line to use if Drive A or Drive C is the default drive, but if Drive B is the default drive, your command line can be:

DISKCOMP A:

the result of this comparison could be something like this:

A>diskcomp a: b:
Insert FIRST diskette in drive A:
Insert SECOND diskette in drive B:
Press any key when ready ...

Comparing 80 tracks
18 sectors per track, 2 side(s)

Compare OK
or **Compare error on side 0, track 0**

Compare another diskette (Y/N)?

DISKCOPY

DISKCOPY *[source-drive:] [target-drive:] [/1]*

Copy contents of disk in source drive to disk in target drive

Note that DISKCOMP and DISKCOPY apply only to floppy disks. You must use COPY, XCOPY, BACKUP RESTORE, FC and COMP to make copies/comparisons between hard disks and floppy disks.

DISKCOPY is used to produce a track-by-track copy of one disk onto another. If the target disk is unformatted, it will format it identically to the source disk as part of making the copy.

The target drive does not have to be a different drive from the source drive. If these drives are the same, then DISKCOPY will read the source disk and then prompt you to change the disk in the drive to the target disk.

The /1 option allows you to copy only one side of the disk.

When the copy has been completed, DISKCOPY asks you whether you want to copy another disk. Type [Y][↵] to copy another; type [N] [↵] to leave DISKCOPY.

Form DISKCOPY *[source-drive:] [target-drive:] [/1]*

Notes If you only specify one drive, then the target drive is taken to be the default drive. If you do not specify any drives, DISKCOPY performs a single-drive copy that uses the default drive as both the source drive and the target drive.

If you want to use the default drive as the source drive but another drive as the target drive, you have to give the drive letters of both drives.

The target disk will be formatted before the copy is made if it has not been formatted already or if it does not have the same format as the source disk.

Some disk drives will not support the /1 option.

To copy the contents of a disk to a disk of a different type (e.g. from 3.5" to 5.25" or 3.5" to hard disk you must use the following form:

XCOPY *source destination* **/S**

Additional Information

The DISKCOPY program returns the following exit codes:

0   Compared OK

1   Non-fatal read/write error

2   CTRL-C was pressed

3   Hard Error - an uncoverable read or write error occurred

4   Initialization Error - not enough memory, invalid drives or command syntax error

You can use the batch processing command, IF, for error processing based on the ERRORLEVEL returned by DISKCOPY.

Example
_____

* *To make a copy of the disk in Drive A, use the command line:*

DISKCOPY A: B:

(assuming that the external command DISKCOPY is stored either in the default directory or in a directory that MS-DOS automatically searches - see Section 7.1)

This is the command line to use if Drive A or Drive C is the default drive. If Drive B is the default drive, you can use the command line:

DISKCOPY A:

If you have a single-drive PC, you will be prompted to insert the disk for Drive A (the disk you want to copy) and, once the contents have been read, to insert the disk for Drive B (the target disk, ie. the disk you want to store the copy on). If you have a two-drive system, put the target disk in Drive B (the righthand disk drive).

If the target disk has not been formatted or has a different format to the source disk, you will see the following message on the screen:

Formatting while copying
_____

DRIVPARM=

DRIVPARM=/D:*dd[/*F:*ff][/*T:*tt][/*S:*ss][/*H:*hh][/*C][/*N]

Sets parameters for a disk drive

The DRIVPARM= command allows overriding of the device parameters for a specific logical drive.

Form DRIVPARM=/D:*dd[/*F:*ff][/*T:*tt][/*S:*ss][/*H:*hh][/*C][/*N]

Where:

/D:*dd*	is drive number (0-255) (0=A, 1=B, 2=C...)

and optionally:

/T:*tt*	is the number of tracks per side (1-999)
/S:*ss*	is the number of sectors per track (1-99)
/H:*hh*	is the maximum head number (1-99)
/C	indicates changeline (doorlock) support required
/N	indicates non-removable block device
/F:*ff*	indicates the form factor where:

0 = 5.25 inch floppy diskette, 320/360K bytes.
1 = 5.25 inch floppy diskette, 1.2M bytes.
2 = 3.5 inch floppy diskette, 720K bytes.
3 = 8 inch floppy diskette, Single density.
4 = 8 inch floppy diskette, Double density.
5 = Hard drive.
6 = Tape Drive.
7 = 3.5 inch floppy diskette, 1.44M bytes.

Notes This command allows the overriding of default system parameters for a particular logical drive. This information would be used by the commands which create new diskettes (such as FORMAT and DISKCOPY) when writing out the directory and FAT (File Allocation Table) information. The information in the FAT is used when determining device characteristics for floppy disks, hard disks and tape drives.

If no form factor (/**F**:ff) is specified, a value of 2 is assumed (720K, 3.5 inch diskette).

Example _____

If an external 5.25" 1.2Mb floppy disk drive is added, the line:

DRIVPARM=/D:1 /F:1

added to the CONFIG.SYS file will ensure that when DISKCOPY, DISKCOMP or FORMAT are used, they work correctly. Note, however, that SETUP should be used in preference to DRIVPARM for identifying disk types.

_____

ECHO

ECHO *[ON|OFF|remark]*

Control echoing of commands on the screen

Normally, as a Batch file is being obeyed, each command line that MS-DOS executes is displayed on the screen just before it is executed.

The ECHO subcommand lets you:

- turn the display of command lines off

- turn the display of command lines on

- display a message, regardless of whether command lines are being displayed

Forms

- **Turn the display off:**

   ECHO OFF

- **Turn the display back on:**

   ECHO ON

- **Display a message**

   ECHO *remark*

Notes:

1) ECHO OFF stops REM messages and PAUSE special messages from being displayed on the screen. The PAUSE subcommand message **Press any key when ready ...** is still displayed.

2) ECHO *remark* displays the given message regardless of whether command line echoing is on or off.

3)   When ECHO is ON you can suppress the display of any line in your Batch file by putting an @ character before it.

- *You do not want any of the command lines and messages from your Batch file to appear on the screen. The first lines in your Batch file should therefore be:*

ECHO OFF
CLS

the CLS command clearing the screen ready for displaying the output from your programs.

- *You want to turn ECHO off and change the default directory, without the commands being displayed on the monitor. The command lines:*

ECHO OFF
CD\MYDIR

in your batch file, will execute the two commands without displaying them; the first because of the @ and the second because ECHO has now been turned OFF.

The only messages that you will see while ECHO is OFF will be messages contained within special ECHO commands and the Press any key when ready... message that goes with a PAUSE command.

- *To turn the display of messages back on, use the command line:*

ECHO ON

Include this in the Batch file immediately before the first command or message that you want to see on the screen.

- *To display messages only at strategic stages in the Batch process, begin the Batch file as above with the lines:*

@ECHO OFF
CLS

At the points in the Batch file you want messages displayed, put lines of the form:
ECHO *message*

For example, to tell you that Stage I has been completed and stage II is about to start, you might insert the line:

ECHO Stage 1 finished; Stage 2 started

EDLIN

EDLIN *[d:][path]filename.filetype[/***B***]*

Edit text

EDLIN is MS-DOS's text editor and can be used to modify files of ASCII characters (ie. text files), whether these are data files or BASIC programs. It can also be used to create new text files for storage on disk.

It can be used as an alternative to the PC text editor, RPED, see Chapter 6.

EDLIN opens an area of memory to act as a workspace and looks for the file you specify in the command line. If it finds the file, EDLIN copies the file into its workspace ready for editing - filling up to three-quarters of the workspace area. Any remaining contents of the file can only be read into the workspace after the previous section has been edited and stored as the new version.

If all the text is copied into the workspace, the message **End of input file** will appear on the screen. If EDLIN does not find the file, it displays the message **New file**. In either case, it will display a star on a fresh line when it is ready to receive editing commands. This star is the EDLIN prompt.

While you are in the editor, the commands you use are the special EDLIN ones: you cannot use any MS-DOS commands until you leave the editor. However, you can use the Command Line Editing keys (see Section 7.2) to help you prepare new lines based on existing lines of text.

The EDLIN commands copy text into and out of the workspace, edit particular lines and insert or delete groups of lines. There are also commands to move a group of lines from one place to another, to duplicate lines and to search and replace strings of characters. The commands are listed below. The lines you edit are displayed preceded by a line number which tells you how many lines down the file you are working. These numbers are kept constantly up to date and are not saved with the file. The current line you are working on is indicated by a star and line numbers may be given relative to this line (see 'Defining lines' below).

A number of EDLIN commands can be typed in one after another before the [↵] key is pressed to send the instruction for processing. The first command in a command line can be a line number, changing the current line: the remainder have to work with whatever current line has been set. If the combined instruction starts with a line number, the individual commands must be separated by semicolons. If the instruction does not start with a line number, the commands can be typed in without semicolons (or any other separators) between them.

When you want to finish the edit and save the edited version, type **E** [⏎] after a *
prompt. However, if there is not enough room for both the new version and the old
version of the file (the back-up) on the disk, the new version will either be completely
lost or only part of it will be saved. It is therefore advisable to check that there is enough
room for both the old and new versions of the file on the disk (see Section 7.2).

The modified file is given the *filename* and *filetype* of the original file. However, the
original file is not erased. Instead, it is renamed *filename*.**BAK** (replacing any file that
already exists with that name). Should you want to use the old version again, you will
need to give it some other filetype, as many commands (including EDLIN) do not work
on **.BAK** files.

Form EDLIN *[d:][path]filename.filetype[*/**B***]*

Notes The optional **/B** is used to tell EDLIN not to interpret Ctrl-Z characters as end-of-files.

EDLIN commands

n	Edit Line *n* (if omitted, it is taken to be the next line). Line *n* becomes the current line and is displayed, followed by a fresh line with the same line number. The Command Line Editing keys can then be used to construct a new line based on the present version of this line.
	If you do not want to change the line, just press [⏎]. Pressing [⏎] when you have copied some of the old line into the new one will delete everything to the right of the current cursor position.
*[n]***A**	Append n of the lines of text that have so far not been copied into the workspace to the end of the text currently in the workspace. If *n* is omitted, as many lines as possible will be copied but once again, the workspace is not allowed to become more than three quarters full.
*[n],[m],l[,c]***C**	Copy a range of lines to a different part of the file.
	n specifies the first line to be copied (if omitted, it is taken to be the current line).
	m specifies the last line to be copied (if omitted, it is taken to be the same as *n*).

l specifies the line before which the copy is to be inserted (which cannot be between *n* and *m*).

c specifies the number of copies to be inserted at this point (if omitted, one copy is made).

*[n][,m]*D   Delete a range of lines.

n specifies the first line to be deleted (if omitted, it is taken to be the current line).

m specifies the last line to be deleted (if omitted, it is taken to be the same as n).

E   End the edit, save the new file and return to MS-DOS.

*[n]*I   Insert the following lines immediately before Line n. If *n* is omitted, the lines are inserted before the current line; if *n* is #, the new text will be inserted after the last line currently in the workspace.

Type Ctrl-C after you have typed in the last new line.

To insert control codes in the file, type Ctrl-V followed by a character, where the code you want is Ctrl-character.

*[n][,m]*L   List a range of lines.

n specifies the first line to be displayed on the screen (if omitted, it is taken to be 11 lines before the current line).

m specifies the last line to be displayed (if omitted, 23 lines are displayed).

*[n],[+]m,l*M   Move a range of lines to a different part of the file.

n specifies the first line of the range (if omitted, it is taken to be the current line).

m specifies the last line of the range.

The lines are inserted immediately before line *l*.

If *n* is omitted and *m* is preceded with a plus (+) sign this indicates that the range of lines to be moved is from the current line to (current line + *m*).

*[n][,m]*P

Display a range of lines in pagefuls of 23 lines at a time. The last line becomes the new current line.

n specifies the first line to be displayed (if omitted, it is taken to be the current line).

m specifies the last line to be displayed (if omitted, 23 lines are displayed).

Q

Quit the edit, abandoning any changes made so far, and return to MS-DOS. EDLIN asks you to confirm that you do not want to save the edited version. Type Y to abandon the edit. Pressing any other key keeps you in EDLIN and allows you, for example, to End the edit and thus save the edited version.

*[n][,m][?]*R*old-string[*Ctrl-Z*[new-string]]*

Replace all occurrences of old-string in a range of lines with new-string. If both Ctrl-Z and new-string is omitted, EDLIN will delete old-string (ie.it will not replace it with anything).

n specifies the first line of the range (if omitted, it is taken to be the line following the current line).

m specifies the last line of the range (if omitted, it is taken to be the last line in the workspace).

Including ? makes EDLIN ask for confirmation before replacing the current instance of old-string with new-string. Press [Y] or [↵] to confirm the change.

*[n][,m][?]*S *string* [↵]

Search for the first occurrence of string in a range of lines and make the line in which it is found the 'current line'.

n specifies the first line to be searched (if omitted, it is taken to be the line following the current line).

m specifies the last line to be searched (if omitted, it is taken to be the last line in the workspace).

Including ? makes EDLIN ask if it has found the instance of string you want (the whole line is displayed on the screen). Press [Y] or [↵] to stop the search, press any other key to continue the search.

Note This must be the last command in the current instruction.

*[l]*T*[d:]path]filename.filetype*

> Transfer the whole of the named file into the workspace, inserting it immediately before line *l*. If *l* is omitted, it is inserted before the current line.

*[n]*W

> Write the first *n* lines in the workspace to the disk. If *n* is omitted, enough lines are copied to make the workspace only one quarter full.

Defining lines

There are a number of ways in which particular lines can be specified in these commands:

line-number   the actual line number.

Note: Give any number that is greater than the last line number but less than 65534 to get the line immediately following the last line.

+number-of-lines   the number of lines the chosen line is after the current line.

-number-of-lines   the number of lines the chosen line is before the current line.

                       the current line

the last line

Example _____

You can make the running of any program particularly convenient by including the instruction to run the program in the AUTOEXEC.BAT file of your Startup disk. The necessary changes can be made to the AUTOEXEC.BAT file using EDLIN.

For example, suppose you have a word processor installed in the directory C:\WP on your hard disk that is run by typing the command WP. You always want the program to start when you switch on and you also want it to be available in whatever directory you are using on your hard disk. This involves adding the command PATH C:\WP to AUTOEXEC.BAT and making the last line WP (to run the command).

The steps are as follows:

1) Start editing the AUTOEXEC.BAT file with the command line:

EDLIN AUTOEXEC.BAT

When this file is ready for editing, you will see on the screen:

End of input file

Note: *For many purposes, where working with small files, such as batch files, the small-file editor RPED will be found more convenient to use (see Chapter 6).*

2) Press the [L] key. This displays the whole of this short file on your screen. You will see something very like:

```
1: *@echo off
2: set comspec=c:\dos\command.com
3: path c:\dos
4: prompt $p$g
```

3) We want the instruction to run the word processor to be inserted after the last line, so type:

#I [↵]   *- to start inserting the new line after the last line*
wp[↵]   *- this is the text of the new line*
Ctrl-Z   *- to end the insert*

4) Press the [L] key to see the effect of these actions. You should see something very like:

```
1: @echo off
2: set comspec=c:\dos\command.com
3: path c:\dos
4: prompt $p$g
5: *wp
```

5) The next stage is to modify line 3, to add ;c:\wp to the PATH command, so type or press:

3   *to start editing line 3*

F3   *to copy the whole of the old line into the new line**

;c:\wp   *to add the new path onto the existing PATH command*

[⏎]   *to finish editing the line*

6) Press the [L] key to see the effect of all these actions. You should see something very like:

```
1: @echo off
2: set comspec=c:\dos\command.com
3: path c:\dos;c:wp
4: prompt $p$g
5: wp
```

7) Press the [E] key to finish the edit.

EXIT

External command

Exit the COMMAND.COM program (the command processor) and return to a previous level

There are two circumstances in which the EXIT program may be used. Firstly, if you start a new command processor using the COMMAND program, you can use the EXIT command to return to the old command processor. Secondly, whilst running certain application programs, you can run a copy the MS-DOS command processor, and then return to your program using EXIT.

Form EXIT

Note The facility of running an MS-DOS command processor from within an application program may be called something like, "Go to DOS", and you may get the impression that you have exited the application program. However, DOS is invoked from within the application program while the program is held in memory.

For information about command processors, see the COMMAND program, listed alphabetically in this chapter.

Example

You could start a new command processor using the following command:

COMMAND C:

and then return to the previous command processor by typing the EXIT command:

EXIT

FASTOPEN

FASTOPEN *[d:[=nnn][...]]*

Reduce the time taken to open frequently-used files and directories

This command reduces the time it takes to open frequently-used files and directories. Normally, opening and closing files in a complex directory structure, slows your computer down. Particularly when you run applications that use several files, such as a database application.

FASTOPEN works by tracking the location of files and directories on a disk for fast access. The name and location of all the files that are opened are recorded, then if one of these files or directories is reopened, access time is reduced.

FASTOPEN only works on hard disks and will not work over a network. It can be used with up to four hard disks at one time. For each hard disk, FASTOPEN will track a range of files or directories, from 10 to 999. The default number is 34.Therefore, you can use the command FASTOPEN once, to specify the number of files per drive for more than one drive.

Form **FASTOPEN** *[d:[=n][...]]*

where

n   is the number of files with which FASTOPEN will work. The range is 10 - 999

Notes

i)   You can invoke the FASTOPEN command only once.

ii)   If you want to change the FASTOPEN settings restart MS-DOS.

iii)   FASTOPEN needs approximately 48 bytes of memory for each file (*n*) directory location it tracks.

If you want MS-DOS to track the location of up to 100 files on drive C, type:

FASTOPEN c:=100

If you want MS-DOS to track the location of up to 100 files on drive C, and up to 50 files on drive D, type:

FASTOPEN C:=100 D:=50

FC

FC *[option[option...]] [d:] [path]filename.filetype*
[d:] [path]filename.filetype

Compare files

The FC command is used to compare two files. The files to be compared are either treated as text files or as binary files:

- text files are compared line-by-line

- binary files are compared byte-by-byte

Unlike the COMP command, FC is used to show the differences between files that may even be of different length. The COMP command, on the other hand, is just used to check that files that are supposed to be identical indeed are (such as after a copy operation).

Note that it is not possible to use filename templates with two sets of files.

When a difference is found between two text files, FC continues to look for lines from the two text files that match. Unless instructed otherwise, tab characters are converted to spaces up to the start of the next 8-character column before the comparison is made.

When FC finds two consecutive lines in one file that match two consecutive lines in the other, it resynchronises the comparison and carries on to the next place in the files where it finds a difference.

No attempt is made to resynchronise files compared byte-by-byte.

Notes

i)   There is a limit to how much FC can read when looking for lines which match. These lines are stored in the FC command's buffer. If the buffer becomes full before a match is found, FC declares the files "too different" and ends the comparison.

ii) You can control the size of the buffer.

Options

Select options to control the type of comparison. If no options are specified:

- files with the filetype EXE, COM, SYS. OBJ, LIB and BIN are treated as binary files; everything else is treated as a text file.
- the size of the buffer used for the comparison is set to 100 lines.

- tabs, spaces and upper and lower case in a text file are all significant- two lines of the text have to be identical for the comparison to resynchronise

- **Compare files line by line**

Form FC *[option[option...]][d:][path]filename.filetype [d:][path]filename.filetype*

$$\underbrace{\qquad\qquad}\qquad\underbrace{\qquad\qquad}$$

file to be compared   *standard for comparison*

Options

/A	To indicate where the difference is. Display the last line of the previous matching section and the first line of the following matching section, but not all the lines in between. (The lines in between are represented by...)
/C	Treat all letters as upper case in the comparison
/L	Force a line by line comparison. Use when the filetype of either file is EXE, COM, SYS, OBJ, LIB or BIN.
/LB*n*	Set the buffer size to *n* number of lines. The default is 100 lines. The maximum possible number depends on the memory space in your PC.
/N	Add line numbers when reporting where the differences are.
/T	Don't expand tab characters to spaces. (The default is to interpret each tab character as spaces up to the start of the next 8-character column).
/W	Interpret all tabs and multiple spaces as single spaces; ignore spaces at the beginning and the end of any line.
/*n*	Set the number of identical lines required, before the comparison resynchronises, to *n*. (The default number is 2 lines).

Notes

i)   If FC runs out of buffer space while reading lines which do not match, FC will not be able to resynchronise the comparison. If this happens the following message will be displayed:

Resynch failed. Files are too different

The comparison will then be abandoned. Use the **/LB***n* option to increase the size of the buffer.

ii)   You cannot use both the **/B** option for a byte by byte comparison as well as **/L** for a line by line comparison. If you try this MS-DOS will display the message:

Incompatible switches.

- **Compare files byte-by-byte**

Form FC /B *[/option[/option...]][d:][path]filename.filetype[d:][path]filename.filetype*

                        The file being compared   standard for the comparison

Notes

i)   The **/B** option should be used to force a byte-by-byte comparison if either of the files does not have the filetype EXE, COM, SYS, OBJ, LIB or BIN.

ii)   No attempt is made to resynchronise the comparison after a difference has been spotted.

Examples

To compare the two text files, MYFILE.1 and MYFILE.2, line by line, you might use the following command line:

FC MYFILE.1 MYFILE.2

This command line would search each line letter for letter, space for space with any
tab characters expanded to spaces, such that the next character began the next 8
character column. If MYFILE.2 was identical to MYFILE.1 except for four additional
lines, you might see a report like this:

```
fcA> myfile.1 myfile.2
****** myfile.1
When the hurly-burly's done
When the battle's lost and won
That will be ere set of sun
And where the place
Upon the heath
***** myfile.2
When the hurly-burly's done
Upon the heath
*****
```

If there are many differences between the files, the above report would be very long.
In that case you should use the /A option which will give only the last line of the previous
matching section and the first line of the following matching section. For example:

command line: **FC /A MYFILE.1 MYFILE.2**

response:

```
A>fc myfile.1 myfile.2/a
***** myfile.1
When the hurly-burly's done

...
Upon the heath
***** myfile.2
When the hurly-burly's done
Upon the heath
*****
```

If you want a comparison to also tell you whereabouts in the files the difference was
found, use the /N option, for example:

FC /N MYFILE.1 MYFILE.2

If you want to compare the files COMMAND.EXE and COMMAND.SYS use the
command line:

FC COMMAND.EXE COMMAND.SYS

FC would carry out a byte-by-byte comparison on these two files (because of their filetypes) and if any difference is spotted, no attempt will be made to resynchronise the files. So if COMMAND.SYS is identical to COMMAND.EXE except for two extra bytes, you would see a report like the following:

A>fc command.exe command.sys

```
00000646 6B 7A
00000647 1A 3F
00000648 1B 6B
00000649 23 1A
0000064A FB 1B
0000064B 00 23
```

fc: command.sys longer than command.exe

FCBS=

FCBS=*x,y*

Set number of File Control Blocks

The FCBS= command allows you to specify the number of file control blocks available to the system and consequently the number of files which can be opened at any one time.

The syntax of the FCBS= command is:

Form FCBS=x,y

Notes Where x is the number of FCBs (in the range 1 to 255) to allocate, and y is the number of FCBs protected from automatic closure when a program tries to open more than x files. The first y files opened will be protected. MS-DOS selects the least recently used (non-protected) FCB when it must automatically close a file.

If the FCBS= command is not used MS-DOS defaults x and y to 4 and 0 respectively. It is an error to set y greater than x.

Example

If the following line is added to the CONFIG.SYS file on your MS-DOS startup disk:

FCBS=20,8

MS-DOS will allocate room for 20 file control blocks and will ensure that 8 are protected against automatic closure.

FDISK

External Command

FDISK

Configure a hard disk

The FDISK command configures a hard disk for use with MS-DOS. A series of menus are displayed to help you create and delete partitions.

A partition is a division of the space available on your hard disk drive used to split it to appear as more than one logical drive. Although you may only have one physical hard disk drive it is possible, by partitioning it, to make it appear as one, two or more separate hard drives.

The reasons for dividing the hard disk in this way may either be because you want a definite division between certain types of data - a stronger division than that afforded by using separate subdirectories on a single disk, or you may have to divide a large hard disk into several smaller drives to comply with the MS-DOS 3.3 limit that no hard disk may be larger than 32Mb.

FDISK does not work on drives used in the SUBST or JOIN commands.

WARNING: Reconfiguring your disk with FDISK destroys all existing files. Make sure you have back up copies of all files on your disk before you create, delete or change an MS-DOS partition with FDISK.

Form FDISK

You can use it to:

- Check whether a hard disk is configured or formatted

- Create a primary or single DOS partition

- Prepare the hard disk with an active partition which can start up MS-DOS

- Create an extended DOS partition

- Create logical drives in extended partitions

- Change the active partition

- Delete a primary DOS partition

MS-DOS

8-79

- Delete an extended DOS partition

- Delete a logical drive in an extended DOS partition

- Display partition data

- Select the next hard disk drive for partitioning on a system with multiple fixed disks.

To check whether a hard disk is configured and formatted:

1.   Try to start MS-DOS from your hard disk. If it starts, your hard disk is both configured and formatted and the MS-DOS system files are on the disk.

2.   If MS-DOS does not start, you will be asked to insert a system disk into drive A. This could be because the machines battery backed memory has lost the information about the type of hard disk fitted (on AT type machines). In this case you should run SETUP to set the correct hard drive type.

     If the machine continues to ask for a system disk to be inserted, this may either be because the disk has not been configured at all or alternatively, it may have been configured (using FDISK) but not formatted. You can check to see if the disk has been configured with FDISK as follows:

     - Place the MS-DOS master floppy disk in drive A

     - Hold down the [Ctrl] and [Alt] keys and press [Del] to start MS-DOS

     - Run FDISK and select the **Display Partition Information** option to see if any MS-DOS Partitions exist

     If any partitions do exist, your disk has been configured.

     If no partitions exist, follow the instructions below to configure the disk.

Once FDISK has been run and partitions are set up as you require, the disk needs to be formatted to complete the preparation process. You should use the FORMAT command to format each of the logical drives you have created and in the case of the drive in the primary partition (which has been marked active) you would use the FORMAT /S command which both formats the drive and also copies the MS-DOS system files to it, so that MS-DOS can boot from it in the future.

How to start FDISK

- Place the MS-DOS disk in drive A
- Type FDISK at the **A:\\>** prompt, and press the [⏎] key

FDISK will display its main menu on your screen. If your computer has only one hard disk this menu will list four choices. If your computer has more than one hard disk it will list five choices:

FDISK options

Current Fixed Disk Drive:1

Choose one of the following:
1. **Create DOS Partition**
2. **Change Active Partition**
3. **Delete DOS Partition**
4. **Display Partition Information**
5. **Select Next Fixed Disk Drive**

Enter choice: [1]

Press ESC to return to DOS

Throughout the FDISK program you can use the [Esc] key to return to the previous menu or in some cases to DOS.

If you wish to choose the default value on any menu press the [⏎] key. To choose another value, type the value you want and press the [⏎] key.

How to create a Primary DOS Partition

When partitioning a hard disk, you must always start by creating a Primary partition. If the disk stores 32Mb or less you can instruct FDISK to use all the available space for this primary partition. If the disk is larger, then you must start by creating the primary DOS, then the space that remains is assigned to an "Extended DOS Partition" which will, in turn, be divided into one or more logical drives.

You must create a Primary DOS Partition before you can create an extended DOS Partition.

From the main menu select the 1. Create DOS Partition option.

The following sub-menu will then be displayed. Initially this shows two options - a third option will appear if an extended partition is later added.

```
Create DOS Partition

Current Fixed Disk Drive: 1

        1.    Create Primary DOS Partition
        2.    Create Extended DOS Partition
Enter choice:[1]

Press ESC to return to FDISK options
```

Press the [⏎] key to accept the default selection [1] of the above menu.

The Create Primary DOS Partition menu will appear:

```
Create Primary DOS Partition

Current Fixed Disk Drive: 1

Do you wish to use the maximum size
for a DOS Partition and make the DOS
partition active (Y/N)...........? [Y]

Press ESC to return to Fdisk options
```

Accept the default selection [Y], by pressing the [⏎] key, if you want to create a single partition, that is, if you want to use the entire hard disk for MS-DOS (up to 32 megabytes). If the hard disk is larger than 32Mb then the primamry partition will use the first 32Mb and the remainder will be available to be assigned to an extended partition

FDISK then displays the following message:
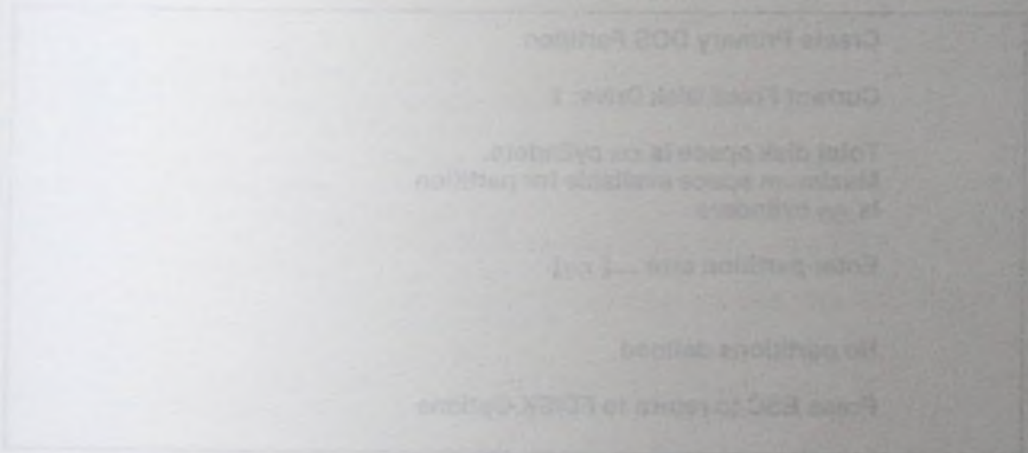
System will now restart

Insert DOS diskette in drive A:
Press any key when ready...

Put your MS-DOS disk in drive A and press any key to restart MS-DOS.

If you decided to create a single partition and the disk was 32Mb or less, you should now go ahead and format your disk, using the FORMAT /S command. Be sure to use the same version of MS-DOS for both FDISK and FORMAT.

Creating more than one MS-DOS Partition

As stated above, to partition the disk into more than one drive you must first create a Primary partition that does not occupy the entire disk. You must then create an extended partition to occupy the space that remains. Finally, within this extended partition you divide the space into logical drives.

As when creating just a single primary partition, from the FDISK Options menu select option 1. Create DOS Partition.

Then, from the Create DOS Partition menu, select option 1. Create Primary DOS Partition.

You will see the screen asking the following:

Do you wish to use the maximum size
for a DOS partition and make the DOS
partition active (Y/N)...? [Y]

Answer **N** to this question.

FDISK will display a second Create Primary DOS Partition menu which asks you to specify the size of the primary dos partition:

```
Create Primary DOS Partition

Current Fixed Disk Drive: 1

Total disk space is xxx cylinders.
Maximum space available for partition
is yyy cylinders

Enter partition size ....[ yyy]


No partitions defined

Press ESC to return to FDISK Options
```

Enter the size you want your Primary Partition to be and press the [↵] key.

The space on your disk is measured in cylinders (known also as tracks). This menu shows the total number of cylinders available for a hard disk partition.

Once you have defined the size of the Primary DOS Partition, a confirmation screen will appear:

Create Primary DOS Partition

Current Fixed Disk Drive: 1

Partition	Status	Type	Start	End	Size
C: 1		PRI DOS	0	xxx	yyy

Primary DOS partition created

Press ESC to return to FDISK Options

The message: **WARNING! No partitions marked active** now appears on the main FDISK Options screen because the partition you have created is not automatically made active. You will have to do this using the main menu, option 2. You will not be able to start up MS-DOS from this partition until it is made active.

Creating an extended DOS Partition

Once you have created a primary DOS Partition, if any space remains unused either because you created a small Primary partition or the Primary partition was set to its maximum size (32Mb) but this did not use up all the space on the disk, you should create an extended DOS Partition on your hard disk.

You must create an extended partition if you want to designate one or more logical drives for the disk. Use the Create DOS Partition menu, option 2. and press the [↵] key. FDISK will then display the following menu:

```
Create Extended DOS Partition

Current Fixed Disk Drive: 1

Partition    Status    Type      Start    End      Size
C: 1         A         PRI DOS   0        www      xxx

Total disk space is yyy cylinders
Maximum space available for partition
is zzz cylinders

Enter partition size........[ zzz]

Press ESC to return to FDISK Options
```

This menu shows the total number of cylinders available for an extended partition. The default for the partition size is the maximum available space remaining on the hard disk. Press the [↵] key if you want the default value. If not, type in the size (in cylinders) that you want for the partition, and press the [↵] key. The only reason you may not wish to leave some of the disk space assigned to neither the Primary or Extended paritions is if it is to be used by some other operating system. The space is inaccessible to MS-DOS and would otherwise be wasted.

NOTE: If FDISK finds any bad tracks it adjusts the partition boundaries to avoid those bad tracks.

Creating Logical Drives in the Extended DOS Partition

Once you have created an extended DOS partition, you must specify one or more drive letters for that area of the disk.

FDISK will automatically display the **Create Logical DOS Drive(s)** menu after you have created an extended partition.

Alternatively, if you do not define logical drives at this time you may do it later by choosing option 3 from the **Create DOS Partition** menu. In either case a screen similar to the following will appear:

```
Create Logical DOS Drive(s)

No logical drives defined

Total partition space is xxx cylinders.

Maximum space available for logical
drive is yyy cylinders.

Enter logical drive size ..... [ yyy]

Press ESC to return to FDISK Options
```

You may designate the entire extended partition as one logical drive, or divide it into two or more logical drives. For example, you may want to keep two applications in separate drives with their respective data files.

You must assign the whole of the extended partition to one or more logical disk drives because you cannot use an MS-DOS extended partition without a drive letter. FDISK will continue to prompt you for logical disk drive information until the whole partition has been assigned.

When you have finished this, FDISK displays this message:

**All available space in the Extended DOS
partition is assigned to logical drives**

Press ESC to return to the main FDISK menu. From there, you can restart MS-DOS, or select another option.

Changing the Active Partition

Select option 2 of the main menu and FDISK will display information about all the partitions on your hard disk: size, position, type, and whether active or not.

There can only be one active partition on a hard disk, and that is the one the computer uses when it is first turned on. All the other partitions are inactive. If you have only one partition, then it has to be active.

Only Primary or non-DOS partitions can be active. It is not possible to set an Extended partition to be active. Non-DOS partitions are those written by other operating systems (such as Xenix).

If you have more than one partition the screen would display information similar to the following:

```
Change Active Partition

Current Fixed Disk Drive: 1

Partition      Status      Type        Start     End      Size
C: 1                       PRI DOS       0        vvv      www
               2           EXT DOS      www       xxx      yyy

Total disk space is zzz cylinders

Enter the number of the partition you
want to make active.............[1]

Press ESC to return to FDISK options
```

In this case it is only Partition 1 that can be made active. If you had used some other operating system to allocate some of the disk space you would see entries for this with a Type of "non-DOS" these could also be made active.

Type the number of the partition you want to make active, and press the [RETURN] key. The computer will choose the currently active partition as the default, to reduce the risk of accidents.

If the entire hard disk contains only one or more MS-DOS partitions, then FDISK will inform you:

The only bootable partition on Drive 1
is already marked active.
Press ESC to return to FDISK Options

In that case, you will have to press [Esc] to return to the main menu. No other key will have any effect.

Deleting the DOS Partition

If you want to reorganise the allocation of space on your hard disk you must delete the existing paritions before the space can be used to create new ones.

Note: If FDISK is used to delete a partition then immediately that the action is performed all data in that partition will be lost forever. It is imperative that you back up any important data before performing such an action.

Choose option 3 from the main menu, **Delete DOS partition,** and FDISK will display the following menu, asking whether the partition you want to delete is a primary or extended DOS partition:

Delete DOS Partition

Current fixed disk drive: 1

    1.   Delete Primary DOS partition
    2.   Delete Extended Dos partition
    3.   Delete logical DOS drive(s) in
        the Extended DOS Partition

Enter choice: [   ]

Press ESC to return to FDISK Options

Enter your choice and press the [↵] key. The next menu will show the status of the partition you want to delete.

NOTE: FDISK can only be used to delete in a specific order, namely:

1   - logical drives
2   - extended partitions
3   - primary partition

If you try to delete in another order, FDISK will tell you that the deletion cannot be done while a lower element is in existence.

FDISK deletes the partition boundaries and any data that existed in that partition. Once deleted, you cannot recover the data that was on it.

NOTE: You cannot use FDISK to delete a non-DOS partition. You should delete them using the operating system that was used to place them on the disk.

Deleting Logical DOS Drives

Choose the **Delete DOS Partition** menu option 3.

FDISK will display a screen showing information on each logical drive on your hard disk. It will ask you which one you want to delete. After making your selection, you will be asked to verify your selection.

BEWARE: If you answer **Y** to that question, you will not be able to recover the logical DOS drive, nor all the data it contained.

The screen will look something like this:

```
Delete Logical DOS Drive

Drv          Start        End          Size
D:           ttt          uuu          vvv
E:           www          xxx          yyy

Total partition size is zzz cylinders

Warning! Data in the logical DOS drive
will be lost. What drive do you wish
to delete.............?  [D]

Are you sure..........?  [N]

Press ESC to return to FDISK Options
```

If you do not want to delete your logical DOS drive, press either the [↵] key or [Esc] to return to the main menu.

Otherwise, type **Y** and press the [↵] key. The logical drive will be deleted, and if there are more logical drives, as in the above example, FDISK will repeat the procedure.

When there are no more logical drives, you will be shown a confirmation screen and then returned to the main menu.

Deleting Extended DOS Partition

Once all logical drives have been deleted from an extended partition you can then remove the extended partition.

Choose menu option 2 if there are no logical drives. FDISK will display a screen showing information on each partition on your hard disk. You will be asked whether or not you want to delete the Extended DOS Partition.

The screen will look something like this:

```
Delete Extended DOS Partition

Current Fixed Disk Drive: 1

Partition    Status      Type         Start     End      Size
C: 1         A           PRI DOS          0     www      xxx
             2           EXT DOS        xxx     yyy      zzz


Warning! Data in the Extended DOS
partition will be lost. Do you wish
to continue ................? [N]

Press ESC to return to FDISK Options
```

If you do not want to delete your extended DOS partition, press the [↵] key, to accept the default, or the [Esc] key to return to the main menu.

Otherwise type **Y** and press the [↵] key. The partition will be deleted, you will be shown the confirmation screen and then returned to the main menu.

Deleting the Primary DOS Partition

Choose menu option 1 (but only if there is no extended partition and no logical drives) from the **Delete DOS Partition** menu.

FDISK will display a screen showing information on each partition on your hard disk. It will ask you whether or not you want to delete the Primary DOS Partition.

BEWARE: If you answer **Y** to that question, you will not be able to recover the primary DOS partition nor all the data that it contained. FDISK therefore selects **N** as the default.

The screen will look something like this:

```
Delete Primary DOS Partition

Current Fixed Disk Drive: 1

Partition     Status     Type       Start     End     Size
C: 1          A          PRI DOS    0         xxx     yyy

Warning!  Data in the Primary DOS
Partition will be lost.  Do you wish
to continue...............?  [N]

Press Esc to return to FDISK Options
```

If you do not want to delete your DOS partition, press either the [↵] key to accept the default answer, or [Esc] to return to the main menu.

If you do want to delete your DOS partition, type **Y** and press the [↵] key. The partition will be deleted, you will be shown the confirmation screen and then returned to the main menu.

Displaying Partition Data

In order to find the way in which the space on the hard disk is currently allocated you can use the Display Partition Information option on the main FDISK Options menu.

Choose the fourth main menu option.

FDISK will display a screen showing information about all the partitions on the disk. It will look something like this.

Display Partition Information

Current Fixed Disk Drive: 1

Partition	Status	Type	Start	End	Size
C: 1	A	PRI DOS	0	vvv	www
2		EXT DOS	www	xxx	yyy

Total disk space is zzz cylinders

{　　　　　The Extended DOS size partition contains
　　　　　logical DOS drives. Do you want to display
　　　　　logical drive information?　　　　　　[Y] }

Press ESC to return to FDISK Options

Note that the extra message, shown in brackets, in the above screen, will only be displayed when there are logical drives present. If you press **Y** and the [↵] key the screen will look like this.

Display Logical DOS Drive Information

Drv	Start	End	Size
D:	uuu	vvv	www
E:	xxx	yyy	zzz

Press ESC to return to FDISK Options

Pressing [Esc] will return you to the main menu.

Selecting the Next Fixed Disk Drive

This main menu option only appears if you have more than one hard disk attached to your computer.

If you choose this option FDISK changes the current drive that FDISK will act on to the next drive. For example, if the current disk drive is your first hard drive, choose option 5 to change it to the second one.

You can then choose any of the FDISK options to prepare the second fixed disk for MS-DOS. Or, you could select option 5 once again to select the next drive. For example, if there is not a third fixed disk, FDISK changes the current drive from the second back to the first.

After you have selected the next drive, FDISK displays the main menu again.

Note that there is a line near the top of the screen which looks like this:

Current fixed disk drive: 2

The activity you select will be performed on the disk shown on this line.

The drives are identified by unit numbers (1, 2, etc) rather than letters (C:, D:, etc) because, as you have seen, a single unit can appear as more than one drive letter - indeed it is the very function of FDISK to make this possible.

FILES=

FILES=*n*

Set number of MS-DOS file handles.

The FILES= command specifies the maximum number of file handles that can concurrently be opened. When a program opens a file or a device it is assigned an identifier called a "handle" which can be used by that program in referring to the file. The number of 'handles' available is set by the FILES= command.

Form FILES=*n*

where *n* is the number of handles in the range 8 to 255. When no FILES= command is used MS-DOS assumes a default value of 8.

Example

If the following line is included in the CONFIG.SYS file on your MS-DOS startup disk:

FILES=20

MS-DOS will allow up to 20 files to be opened concurrently using the "handle" technique.

FIND

FIND *[/V][/C][/N]* "*string*" *[[d:][path]filename.filetype...]*

Look for a string of characters in a file

FIND is used to search for a given string of characters in one or more files. These can be either files that are stored on disk or the output file from the previous program which is piped to the FIND filter or data that you type in at the keyboard (everything you type after issuing the FIND command until you enter Ctrl-Z).

The string of characters must be surrounded by quotation marks. If the string itself has quotation marks round it, then both sets of quotation marks must be typed.

The string of characters must be entered exactly as it is in the file if the string is to be found. In particular, it must contain the same upper and lower case characters.

The result of the search is displayed on the screen. This can be:

- the lines in which the string of characters was found

- the number of such lines

the lines in which the string was not found depending on which of the /V, /C and /N options were selected.

- If no option is selected, the lines in which the string of characters was found are displayed.

Forms

• **To find a given string of characters in one or more disk files**

FIND *[/V][/C][/N]* "*string*"*[[d:][path]filename.filetype[...]]*

Note Several files may be listed but wildcard characters may not be used.

• **To find a given string of characters in what you type at the keyboard**

FIND *[/V][/C][/N]* "*string*"

- **To find a given string of characters in the output of another program**

  COMMAND | FIND *[/V][/C][/N]* **"***string***"**

Options

/V	Display all lines except those containing the specified string
/C	Display the number of lines in which the string was found
/N	Number the lines according to their position in the file

Examples

- *You want to display all the lines in MYFILE.TXT that contain the word computer.*

  If you are interested in including all the variants (eg.microcomputer, computers, etc.) use the command line:

  FIND "computer" MYFILE.TXT

  (assuming that the external command FIND is stored either in the default directory or in a directory that MS-DOS automatically searches - (see Section 7.1).

  If you want just the word computer, you might use the command line:

  FIND "computer" MYFILE.TXT

  Since there is a space between r and ", the FIND program would not pick out the word computer if it was followed immediately by a full stop or comma, for example, or any other character, but only if it is followed by a space.

- *You want to display and number all the lines in MYFILE.TXT that contain the phrase "Best Fit", complete with both quote marks. The command line to use is:*

  FIND/N ""Best Fit"" MYFILE.TXT

Note: The use of two sets of quote marks.

- *You want to display full details of all the files in the current directory, that were last changed on a particular date, for example, 26 September 1987. To do this, use the instruction DIR to list the directory. Filter this list before it is displayed on the screen by using the FIND command; this will filter out just those lines containing the date 26-09-87. The FIND instruction you want is FIND "26-09-87", giving you a complete command line of:*

DIR|FIND "26-09-87"

FOR

FOR *%%parameter* **IN** (*value[value...]*) **DO** *command*

The FOR command is used to execute a number of similar commands.

The %%parameter is set to each value listed in the FOR command in turn. This value is then substituted for %%parameter in the command, and the command that this forms is then executed.

Your PC goes on to execute the next command in the Batch file when the list of values has been exhausted.

Form **FOR** *%%parameter* **IN** (*value[value...]*) **DO** *command*

where *parameter* is a single character.

Notes: Any character may be used as the parameter but digits are not recommended as the parameter in a FOR command because of the risk of confusion between these parameters and the dummy parameters substituted from the command line.

command cannot be another FOR subcommand.

The list of values can include a group of filenames represented by a file name template, created using the wildcards * and ? (see section 6.2 Using Wildcards). In this case MS-DOS takes as a different value each file in the directory with a matching file name.

Paths cannot be given to files mentioned in the FOR command. So all the files included in the list of values must be in the current directory of the drive.

FOR can also be used outside of any Batch file. In this case, replace %%parameter with %parameter.

Examples

* *To make a Batch file copy the files OLDDATA.1 and NEWFILE.2 from the default directory to the current directory on Drive C: include the command line:*

FOR %%A IN (OLDDATA.1 NEWFILE.2) DO COPY %%A C:

This is exactly equivalent to including the lines:

COPY OLDDATA.1 C:
COPY NEWFILE.2 C:

- To make the Batch file, first copy to Drive C, all the files with filenames beginning OLD and then all the files with filenames beginning NEW, include the command line:

FOR %%A IN (OLD*.* NEW*.*) DO COPY %%A C:

The files will be copied in the order they appear in the default directory.

- To process three programs FIRST, SECOND AND THIRD one after another, and when these all require the same complex command tail, you might type the following line at the MS-DOS system prompt:

FOR %A IN (FIRST SECOND THIRD) DO %A command-tail

This is exactly equivalent to the three lines:

FIRST	*command-tail*
SECOND	*command-tail*
THIRD	*command-tail*

FORMAT

FORMAT *d:[option[option...]]*

Format the disk in the specified drive

The FORMAT command is used to:

* prepare a new blank disk for storing data and programs

* to reclaim an old disk on which the data has been corrupted

   The simplest form of the command formats the disk according to the characteristics of the drive holding the disk. Thus a disk held in a standard floppy disk drive on the PC will be formatted to have 160 tracks (divided between its two sides) and to have 18 sectors per track.

   A floppy disk can be formatted in various ways, using the command options. They can be formatted as follows:

   - to be used to load MS-DOS

   - to have special numbers of tracks and sectors

   - only on one side of the disk

   As it finishes formatting one disk, FORMAT asks whether you want to format another. Type **Y** [⏎] to format another in the same way: type **N** [⏎] to leave FORMAT.

   Exit codes are set at the end of the format to record whether the format operation was successful. These can be used in an IF ERRORLEVEL command (see Section 7.4).

   You have to specify which drive will hold the disk to be formatted. This is to safeguard against accidentally formatting the default drive. Even so, if the FORMAT command is loaded from a floppy disk, it is a good idea to write-protect the disk by opening the write-protect shutter (or covering the write-protect notch) on the disk holding the FORMAT program: even the most careful user can make typing mistakes!

   Note that the FORMAT command can be used to format the hard disk; indeed this was performed as part of the hard disk installation process. Formatting the hard disk is potentially a very serious business, therefore, the FORMAT program issues two warnings before carrying out this process.

The first warning occurs if the drive has a volume label:

Enter current volume label for drive C:

You must then type the exact volume label, followed by [↵], otherwise the **FORMAT** program will abort. The volume label is displayed by the **VOL** command, or every time a **DIR** command is performed, and can be changed by the **LABEL** command. It is strongly recommended that you give your disks names, in order to identify directory printouts as well as preventing possible accidents with **FORMAT**.

The second warning is:

WARNING, ALL DATA ON NON-REMOVABLE DISK
DRIVE C: WILL BE LOST!
Proceed with Format (Y/N)?

Only enter Y if you are sure that you want to proceed.

Form FORMAT d:[option[option...]]

Options

/1	•Format as a single-sided disk
/8	•Format with 8 usable sectors per track
/B	Reserve space for hidden system files
/N:n	•Format with n sectors per track (n=8, 9, 15, 18)
/T:t	•Format with t tracks (t=40,80)
/S	Format and prepare for use as a Startup disk by copying the system files from the default drive to the newly formatted disk.
/V	If you use the /V option, you will be prompted to give the disk a label after the format operation is completed. It asks you to enter a label of up to 11 characters. The label can be displayed using the VOL command. It is also shown on the screen every time you use the DIR command to display the contents of the disk.

Notes: Support of the options marked • above, depends upon the type of drive used.

If you have the FORMAT external command stored on a floppy disk, write-protect this disk by opening the write-protect shutter (or, if it is a 5.25 inch floppy disk, by covering the write-protect notch with the small sticky label) before you type in a FORMAT command.

If you use the /S option, this must be the last option specified in your command line. You should also note that the hidden files, IO.SYS and MS-DOS.SYS, and the COMMAND.COM file are copied to the disk.

If your PC does not have a hard disk and you use the /S option with no MS-DOS Startup disk in the default drive, FORMAT will prompt you to insert a 'System' disk before copying the system files to the new disk. Insert a copy of MS-DOS SYSTEM Disk.

You should not use the FORMAT command with any ASSIGNed, JOINed or SUBSTituted drives (see Section 7.1).

If you use the /B option, you can put any earlier version of MS-DOS onto the disk. You are not restricted to MS-DOS Version 3.3.

Additonal Information

The FORMAT program returns the following exit codes:

0   Format successful

3   Terminated by user

4   Fatal error

5   Hard (Winchester) disk format abandoned

You can use the batch processing command, IF, for error processing which is based on the ERRORLEVEL returned by FORMAT

Examples

- *To format a floppy disk to use simply to store programs and data, put the disk holding the FORMAT command in Drive A, make Drive A the default drive (if it is not already) and use the command line:*

FORMAT B:

If you have a single-drive PC, you will be prompted when you need to insert the disk for Drive B (the floppy disk you want to format). If you have a two-drive system, insert this disk in Drive B.

- *To format a floppy disk, using a PC with a hard disk drive, make the directory that holds the FORMAT command, the current directory and type the following command:*

FORMAT A:

You will be prompted to insert a diskette into drive A. Then press the [⏎] key.

- *To format a hard disk you will need to know what the volume label is, if there is one, as you will be asked to enter it (you can find the volume label by using the command VOL C:).*

Make the directory which holds the FORMAT command, the current directory and type:

FORMAT C:

Then enter the label if there is one. You will then see a warning message

**WARNING, ALL DATA ON NON-REMOVABLE DISK
DRIVE C: WILL BE LOST!
Proceed with Format (Y/N)?**

Type Y and [⏎] to continue, but only if you are sure there is no data on the hard disk that you wish to keep.

- *To format a floppy disk for use as a Startup disk, ie. as a disk which loads the MS-DOS operating system immediately after switching on or resetting your PC, put a copy of the disk that holds the FORMAT command in Drive A, make Drive A the default drive (if it is not already) and use the command line:*

FORMAT B:/S

If you have a single-drive PC, you will be prompted when you need to insert the disk for Drive B (the floppy disk you want to format). If you have a two-drive system, insert this disk in Drive B.

The final stage of the process will copy the IO.SYS, MSDOS.SYS and COMMAND.COM files from the Startup and Utilities disk onto your new disk.

GOTO

GOTO *label*

Go to a labelled point in a batch file

Normally, the commands in a Batch file are obeyed in the order they appear in the Batch file. The GOTO subcommand changes this by directing MS-DOS to go to a labelled point in the Batch file and execute the commands that follow. It can therefore be used:

- to create a loop of commands within the Batch file

- with the IF subcommand, to execute commands only in certain situations

The next command to be executed is the one immediately after the label.

Form GOTO *label*

Where label is a labelled point in the Batch file.

Notes: The point in the Batch file is marked by a colon (:) followed by *label* on a line on their own. This name may not include tab, space or equals characters.

The label may be up to 40 characters long but the first eight characters must be different from the first eight characters of any other label in the file. If the label is not found, the rest of the Batch file is abandoned.

You can put as many labels into a Batch file as you like, MS-DOS ignores all lines starting with a colon unless it is looking for a label. Lines starting with a colon can therefore be used to space out a Batch file to make it more readable.

Example
_____

Suppose your Batch file contained the label

:Stage 2

To tell MS-DOS that the command lines that follow this label should be executed next, insert the following command line at the appropriate place in your Batch file:

GOTO Stage 2
_____

GRAFTABL

GRAFTABL *[437|860|863|865|/***status ?***]*

Load Graphics Table

GRAFTABL provides code page switching support for the display when a color graphics adaptor (CGA) is used. When using EGA or VGA adaptors, code page support is provided by the device driver, DISPLAY.SYS, and by the MODE command.

Use the GRAFTABL command to display an extended character set when using the display adaptor switched to function as a color graphics adaptor (CGA), in graphics mode.

A table of data is loaded into memory which defines the additional ASCII characters, 128 to 255.

Form **GRAFTABL***[437|860|863|865|/***STATUS|?***]*

Options

437	850	860	863	865	code page numbers:
437					United States
860					Portugal
863					Canada
865					Norway and Denmark

/STATUS — displays the number of the selected country code page

? — displays summary of parameters

Additional Information

The GRAFTABL command returns the following exit codes:

0   Command successful

1   Table already loaded

2   File error occured

3   Incorrect parameter; no action taken

4   Incorrect version of DOS

You can use the batch processing command, IF, for error processing based on the ERRORLEVEL returned by GRAFTABL.

Example:

If you are using a color graphics adaptor, you can load the table of graphics characters for the Portuguese code page by typing:

graftabl 860

ASCII characters, 128 through to 255, can then be displayed in the graphics modes.

GRAPHICS

GRAPHICS [printer][/R][/B]

Install support for printing a graphics display screen on a printer

The GRAPHICS command allows you to install support so that you can print a color graphics adaptor (CGA) graphics display screen on a printer.

Form GRAPHICS [printer][/R][/B]

where *printer* is one of the following:

VALUE	FUNCTION
COLOR1	Prints on an IBM Personal Computer Color Printer with black ribbon
COLOR4	Prints on an IBM Personal Computer Color Printer with RGB (red, green, blue, and black) ribbon.
COLOR8	Prints on an IBM Personal Computer Color Printer with CMY (cyan, magenta, yellow, and black) ribbon.
GRAPHICS	Prints on an IBM Personal Graphics Printer, IBM Proprinter, or IBM Quietwriter Printer.

Notes The GRAPHICS command only supports the graphics display modes of the CGA display adaptor.

The default value of the printer option is the GRAPHICS printer type. So if you do not specify otherwise, this option will be operative.

Options

The GRAPHICS command accepts the following switches:

/B	Prints the background in colour. This option is valid for COLOR4 and COLOR8 printers.
/R	Prints black and white (as seen on the screen) on the printer. The default setting is to print black where there is white on the screen; and white where there is black on the screen.

Notes To print the screen, press the [Print Screen] key.

GRAPHICS supports screen dumps in all CGA graphics modes:

if the computer is in 320 x 200 color graphics mode, and if the printer type is COLOR1 or GRAPHICS, the screen contents will be printed with up to four shades of grey.

if the computer is in 640 x 200 color graphics mode, the contents of the screen will be printed sideways on the paper.

The GRAPHICS command increases the size of MS-DOS resident in memory.

Example
_____

To print a graphics screen on your printer, type the following command:

GRAPHICS

Then, when the information you want to print is displayed on the screen, press the [Print Screen] key.
_____

IF

IF *(NOT) condition command*

Selectively execute statements in a batch file

The IF subcommand is used to make executing a command depend on whether particular statements are true or false.

- **When IF is used, the command is executed if the condition is true.**

- **When IF NOT is used, the command is executed if the condition is false.**

The conditions that can be tested are:

- the value of the exit code set by some programs to record the reason the program finished, that is, the ERRORLEVEL

- whether a dummy parameter (which may be a parameter representing an evironment string) is set to a particular string of characters

- whether a particular file exists

If a GOTO subcommand is included in an IF subcommand, as a substitute for the command placeholder, it can form a conditional loop in the sequence of commands, or conditionally leave out a whole series of commands.

Form

- **Execute command if the condition is true**

  IF*condition command*

- **Execute command if the condition is false**

Form

  IF NOT *condition command*

Testable conditions

- **ERRORLEVEL** *n*

  Returns TRUE if the previous command set an exit code of n or greater: otherwise FALSE.

- *STRING1==STRING2*

  Returns TRUE if the two strings of characters, however they are represented in the command line. are identical: otherwise FALSE.

  The strings you are most likely to compare are the environment variables (as set and displayed using the SET command), and the parameters to a batch file.

  Environment strings are identified by preceding and following the name of the environment variable with a per cent symbol (%).

  The parameters passed to a batch file are identified as %0 to %9. %0 is set equal to the name of the batch file, %1 to the first parameter, %2 to the second parameter and so on.

- **EXIST** *[d:]filename.filetype*

  Returns TRUE if the named file is in the current directory on the named drive: otherwise FALSE.

Notes   The total command line may not exceed 127 characters (including spaces).

   Of the MS-DOS commands, only BACKUP, FORMAT, GRAFTABL, KEYB, REPLACE, RESTORE and XCOPY return an exit code. However, the utilities described in PART 1 will usually return error codes and your own programs may return exit codes.

   The strings that are compared may not include tab, space or equals characters.

   The two strings will not be regarded as the same if they have the same characters but do not match where letters are upper and lower case.

- *To copy the file OLDDATA.1 on the default drive to Drive C at this point in the Batch process only if the previous conmand had failed (an exit code greater than O), use the command line:*

  IF ERRORLEVEL 1 COPY OLDDATA.1 C:

- *To copy the file OLDDATA to Drive C only if the previous command has been successful (an exit code of O), use the command line:*

  IF NOT ERRORLEVEL 1 COPY OLDDATA.1 C:

- *To check that the file NEWFILE.2 exists before copying it to Drive C, use the command line:*

  IF EXIST NEWFILE.2 COPY NEWFILE.2 C:

- *To copy NEWFILE.2 to Drive C and then rename the original file OLDDATA.2 at this point only if NEWFILE.2 exists, you need to divert the processing beyond the command lines to run these programs. You might, therefore, have lines similar to the following in your Batch file:*

  ...

  IF NOT EXIST NEWFILE.2 GOTO Diversion
  COPY NEWFILE.2 C:
  REN NEWFILE.2 OLDDATA.2
  :Diversion
  ...

- *To print out the file OLDDATA.1 using a COPY command only if an environment parameter that you have called PRINTER is currently set to the string ON, your IF command needs to compare the value of the parameter PRINTER with the string ON. Because PRINTER is an environment parameter, the string it is set to is represented in the IF command by "%PRINTER%", making the command line to use:*

  IF "%PRINTER%"=="ON" COPY OLDDATA.1 PRN

JOIN

JOIN *[d: [[d:]path][/D]*

Join a disk drive into another disk's directory structure

Join adds the directory structure on one drive onto the directory structure on a second drive, so that it appears that the whole directory structure of the first drive is a subdirectory leading from the root directory of the second drive.

After a JOIN command has been issued, references made to the first drive are rejected. However, the drive and all its subdirectories can still be accessed but this is now done by treating the drive as the named subdirectories of the second drive.

The directory to which the drive is joined must be empty and it must be in the root directory of the second drive. If the directory you specify in the JOIN statement does not already exist, the JOIN command will create it for you.

If you use the command without a command tail, JOIN displays a list of all the joins that are currently in force.

Forms

- **To join a drive to a directory**

  JOIN *d: [d:]path*

  this is the name of the root subdirectory that will be used to access the contents of the disk in the first named drive.

  the first named drive will be joined to this drive

  the drive to be added into the directory structure of the second named drive.

- **To break the join**

  JOIN *d:*/**D**

  The drive that had been joined

- **To display current joins**

JOIN

Notes After you have joined a drive to a directory, do not try to use the joined drive in the normal way. MS-DOS now regards this drive as an 'Invalid drive'.
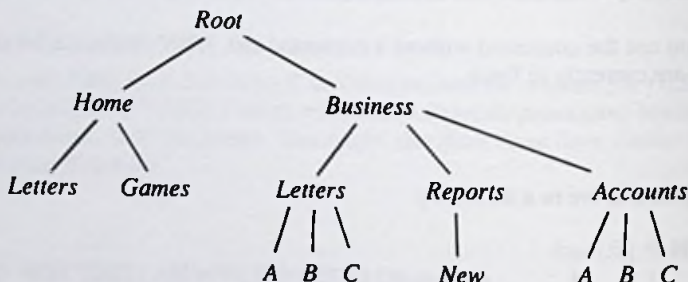
If the directory is not empty when you try to make the join, the message **Directory not empty** will be displayed.

If the JOIN external command is located on the JOINed drive, it can only be accessed via the subdirectory from which the JOIN is made.

Example

Suppose the directory structure on the disk in Drive A is like this:

- *To put the disk in Drive A, into this directory structure, you would type a command line of the form:*

JOIN A: C:\path

(assuming that the external command JOIN is stored either in the default directory or in a directory that MS-DOS automatically searches - see Section 7.1)

- *To make a specially created directory, called DRIVEA, represent the drive, use the command line:*

JOIN A: C:\DRIVEA

This will automatically create the new directory for you and position it in the Root directory, giving you the directory structure:

```
                         Root
                    /      |       \
               Home     Business    DriveA
              /    \     /    |    \      |
        Letters  Games Letters Reports Accounts
                       / | \    |     / | \      |
                      A  B  C  NEW   A  B  C  (DriveA)
```
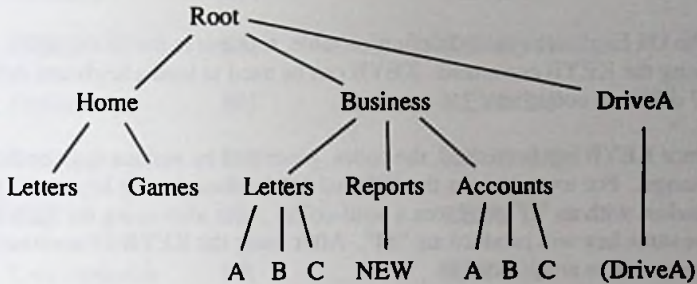
- *You might want to make Drive A part of the Home directory and so type the command line:*

JOIN A: C:\HOME

This will be rejected because the directory must be empty. The Home directory has at least two subdirectories in it (ie Letters and Games)

- *Knowing that the directory called New was empty, you might type the command line:*

JOIN A: C:\BUSINESS\REPORTS\NEW

This would be rejected by MS-DOS. The drive can only be joined to a subdirectory of the Root directory.

- *To break the connection between Drive A and the directory DRIVEA, use the command line:*

JOIN A:/D

KEYB

KEYB

KEYB*[xx[,[yyy],[[d:][path]filename.filetype]]]*

Load a keyboard program

The US English keyboard definition table, resident in the ROM BIOS, can be replaced using the KEYB command. KEYB can be used to load a keyboard definition table for 17 different countries.

Once KEYB has been used, the codes, generated by various keys on the keyboard, will change. For example, on the UK and US keyboards, the key to the right of the key marked with an "L" produces a semi-colon ; but after using the KEYB FR command, the same key will produce an "M". After using the KEYB SP command, the same key will produce an N-tilde (ñ).

For detailed information about code page switching see the command, CHCP, and the section entitled Code Page Switching in Chapter 4.

Form **KEYB***[xx[,[yyy],[[d:][path]filename.filetype]]]*

where:

xx is a two letter keyboard code

yyy is the code page which defines the character set

[[d:][path]filename.filetype] specifies the drive, path and filename of the keyboard definition file. If this parameter is omitted, KEYB will use the file KEYBOARD.SYS and will look for it in the root directory of the current drive.

Options

The above parameter *xx* is one of the following codes:

Country	ID Code	Command
Belgium	**BE**	**KEYB BE**
Canadian-French	**CF**	**KEYB CF**
Denmark	**DK**	**KEYB DK**
France	**FR**	**KEYB FR**
Finland	**SU**	**KEYB SU**
Germany	**GR**	**KEYB GR**
Italy	**IT**	**KEYB IT**
Latin America	**LA**	**KEYB LA**
Netherlands	**NL**	**KEYB NL**
Norway	**NO**	**KEYB NO**
Portugal	**PO**	**KEYB PO**
Spain	**SP**	**KEYB SP**
Swiss-French	**SF**	**KEYB SF**
Swiss-German	**SG**	**KEYB SG**
Sweden	**SV**	**KEYB SV**
United Kingdom	**UK**	**KEYB UK**
United States	**US**	**KEYB US**

The above parameter, *yyy*, is one of the available Code Pages, as follows:

VALUE	CODE PAGE
437	United States
850	Multilingual
860	Portuguese
863	French-Canadian
865	Nordic

If you type KEYB without options, MS-DOS will display a message similar to the following:

Current keyboard code: FR code page: 437
Current CON code page: 437

which shows the current keyboard code, its related code page and the current code page used by your console screen device (CON).

Notes Once the KEYB program is loaded, you can switch from the current keyboard to the default keyboard, by holding down the [Ctrl] and [Alt] keys and pressing the F1 key.

To switch back again, hold down the [Ctrl] and [Alt] keys and press the [F2] key.

The KEYB command allows you to use characters that are not part of the normal (QWERTY) keyboard format. Using the KEYB command with one of the two-letter codes above, you can type commands or text to MS-DOS using either the standard keyboard or a special keyboard. See the chapter on the keyboard, in Part One, for more information.

The KEYBOARD.SYS file contains tables which direct the KEYB.COM command to convert scan codes to ASCII characters. To change a keyboard, the new keyboard must support at least one of the currently prepared code pages for the CON device.

The MODE command is used to prepare the new code pages required by the new keyboard layout; only certain keyboards or code page combinations are allowed. If you do not match the correct keyboard and display, character keys may not be correctly translated in the respective code page. Incorrect characters may be displayed as a result.

Additional information

The KEYB program returns the following exit codes:

0   Successful execution and termination

1   Invalid language, code page, or syntax

3   KEYB could not create a keyboard table in resident memory

4   An error condition occurred when communicating with
    the CON device

5   Code page request has not been prepared

6   The translation table for the selected code page cannot
    be found in the resident keyboard table

7   Incorrect version of MS-DOS

You can use the batch processing command, IF, for error processing based on the
ERRORLEVEL returned by KEYB.

Example

*If you want the keyboard to function as a french keyboard, so that for example, the
QWERTY sequence becomes AZERTY, type:*

KEYB FR

LABEL

LABEL *[d:][label]*

Create, change or delete a disk volume label

The LABEL command is used to give your disks unique labels which you can thereafter quickly check when you want to find out which disk you have in a drive. The label is always displayed when you use a DIR command, even when you are looking at a directory which is low down in the directory tree. Disk labels can also help in cataloguing your disks.

The label can be up to 11 characters long, including spaces.

If you do not specify a label, LABEL prompts you with the following message:

Volume in drive *x* **is** *xxxxxxxxxx*
Volume label (11 characters, ENTER for none)?

Form **LABEL** *[d:][label]*

Notes You can use any characters in the disk label except: * ? / \ | . , ; : + = [ ]

Spaces are allowed, but if you try to use any of these characters, your new label will not be accepted and you will see an error message.

You can't label a disk if the drive it is in has been ASSIGNed to another drive or JOINed to a directory.

If you specify more than 11 characters, the first 11 are used as the label and all subsequent ones are ignored.

Example

To give the disk in Drive B the label RECORDS 86-7, either use the command line:

LABEL B:RECORDS 86-7

which does the whole job, or just:

LABEL B:

Then you will see something like this on the screen:

A>label b:
Volume in drive B label RECORDS
Volume label (11 characters, ENTER for none)?

To set the new label type:

RECORDS 86-7

Both these commands assume that the external command, LABEL, is stored either in
the default directory or in a directory on the search path - see section 7.1.

MKDIR

MKDIR [d:]path

Make a new directory

MKDIR adds a new directory to the directory structure on a particular DOS disk. The path to the new directory is defined through existing directories either from the disk's root directory or from the drive's current directory.

MKDIR can be abbreviated to MD

Form MKDIR [d:]path
   or **MD** [d:]path

Notes   Include a backslash at the start of the command if the path starts at the root directory. If the path starts from the current directory, leave this backslash out.

Examples

Suppose you wanted to create the following pattern of directories on a new disk, which you have placed in the default drive:
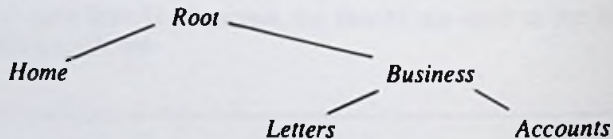
* *To create the Home and Business directories (both subdirectories of the Root directory) you would use the command lines:*

   MD \HOME
   MD \BUSINESS

- To create the Letters and Accounts directories - subdirectories of the Business directory, you could either use the command lines:

MD \BUSINESS\LETTERS
MD \BUSINESS\ACCOUNTS

or you could change the current directory to the BUSINESS directory and then create its subdirectories, with the command lines:

CD \BUSINESS
MD LETTERS
MD ACCOUNTS

Notice that you do not put a backslash in front of LETTERS or ACCOUNTS, to show that these are to be subdirectories of the current directory. If you had put a backslash, the new directories would have been formed in the Root directory.

- If, at a later date, you forget that you had created the Accounts directory, you might type the command:

MD \BUSINESS\ACCOUNTS

Because this directory already exists, you will see the message

Unable to create directory

This message would also appear if you have a file called ACCOUNTS in the Business directory.

MODE

MODE *device:setting[,setting...]*

Set Mode of Operation for Input and Output devices

The Mode command is used to:

- Prepare MS-DOS for communication with parallel printers

- Prepare MS-DOS for communication with asynchronous devices

- Prepare parallel printers and console screen devices for code page switching (See the section, Code Page Switching, in Part One, for further information)

- Redirect output

The various forms of the MODE commadn are described on the following pages.

• Parallel printer modes

Form MODE LPT*n*[:][*chars*][,[*lines*]][,**P**]]

where:

n   Specifies the printer number: 1, 2 or 3

chars Specifies characters per line: 80 or 132

lines Specifies vertical spacing, lines per inch: 6 or 8

P   Specifies that if a timeout error occurs, MODE will try continuously to send output to the printer. This option causes part of the MODE program to remain resident in memory.

Note: do not use the **P** switch when using the MODE command over a network.

The default settings are:

-LPT1
-80 Characters per line
-6 lines per inch

Notes
i)   To break out of a time-out loop, press the [Ctrl] and [Break] keys

ii)   For parallel printer modes, you can use PRN and LPT1 interchangeably.

Examples

• *If you want to print on a parallel printer that is connected to your computer's first parallel printer port (LPT1), with 80 characters per line and 8 characters per inch, type:*

MODE LPT1:80,8

or

MODE LPT1:,8

- *If you want your computer to keep trying to print a file until your printer is ready to print it, type:*

MODE LPT1:80,8,p

- *If you want the computer to stop continuously retrying to print, press the [Ctrl] and [Break] keys, or type the MODE command without the P option.*

• Asynchronous communications modes

Use the following form of the MODE command to prepare MS-DOS for communication with serial printers, modems and console screens.

Form **MODE COM***m[:]baud[,parity[,databits[, stopbits[,***P***]]]]*

where:

m	Specifies the asynchronous communications (COM) port number: 1, 2, 3 or 4
baud	Specifies at least the first two digits of the transmission rate: 110, 150, 300, 600, 1200, 2400, 4800, 9600 or 19200 i.e. 11, 15, 30 are specified
parity	Specifies the parity: N (none), O (odd), or E (even). The default value is E
databits	Specifies the number of databits: 7 or 8. The default value is 7
stopbits	Specifies the number of stop bits: 1 or 2. If baud is 110, the default value is 2. Otherwise the default value is 1.
P	Specifies that MODE is using the COM port for a serial printer and that it is will continuously retry to send output to the printer if time out errors occur

Note: do not use the **P** switch if you are using the MODE command over a network.

The default settings are:

- COM1
- even parity
- 7 databits

However, it is unwise to rely on the port being initialised. Always use a MODE command to set the serial interface to your own desired settings before sending data.

Example

* *To set the mode of operation for port 1 to 1200 baud rate, no parity, 8 databits and 1 stopbit, type:*

MODE COM1:12,n,8,1

• Display modes

Use the following form to set the MODE command for use with a display

Form MODE *display*
  or **MODE** *[display],shift[T]*
    where:

display	specifies one of the following values: 40, 80, BW40, BW80, CO40, CO80 or MONO
4O and 8O -	indicate the number of charters per line
BW and CO -	refer to a color graphics monitor adaptor with color disabled (BW) or enabled (CO)
MONO -	specifies a monochrome display adaptor with a constant display width of 8O characters per line
shift -	specifies whether to shift the display to the left or to the right. Valid values are:
	L - for left **R** - for right
T	tells MS-DOS to display the test pattern in order to align the display on the screen

To improve readability, you can shift a display to a color/graphics monitor adaptor: 1 character (for 4O columns) or 2 characters (for 8O columns) in either direction. If you specify t in the MODE command, and a prompt will appear you will be asked whether the screen is aligned properly. If you type Y, the command will end. If you type N, the shift is repeated, followed by the same prompt.

Example

If you type the following command line:

MODE 8O,R,T

the mode of operation will be set to 8O characters per line and the display will be shifted 2 characters to the right. The test pattern will be displayed, allowing the opportunity to further shift the display without having to enter the command again.

Note *Shifting the display causes all MODE resident code to be loaded.*

• Device code page modes

You can use the MODE command to set or display code pages for parallel printers or your console screen device.

Forms **MODE** *device* **CODEPAGE PREPARE**=*((cplist)[d:][path]filename.filetype)*

and

MODE *device* **CODEPAGE SELECT**=*cp*
MODE *device* **CODEPAGE REFRESH**
MODE *device* **CODEPAGE[/status]**

where:

device   specifies the device to support code page switching

                              Valid device names are:

                              - CON
                              - PRN
                              - LPT1
                              - LPT2
                              - LPT3

cp/cplist   specifies a code page or lists more than one code page,
                              separated by commas or spaces.

                              Valid code pages are:

437	United States
850	Multilingual
860	Portuguese
863	French Canadian
865	Nordic

filename.filetype   Identifies the name of the Code Page Information (.cpi) file
                              that MS-DOS should use to prepare a code page for the
                              specified device.

Keywords

There are four keywords that you can use with the MODE *device* CODEPAGE command.

Each keyword makes the MODE command perform a different function:

• **PREPARE**
Tells MS-DOS to prepare code pages for a given device

You must prepare a code page for use with a device

PREPARE can be abbreviated to PREP

To prepare your display to use code page 437 type:

MODE CON CP PREPARE=((437) C:\DOS\EGA.CPI)

To prepare your printer to use code pages 850 and 865, type:

MODE LPT1 CP PREPARE=((850,865) C:\DOS\42O1.CPI)

Note: Only certain printers (e.g. IBM 4201) provide support for code page switching.

• **SELECT**
Specifies which code page you want to use with a device

You must PREPARE a code page before you SELECT it.

SELECT can be abbreviated to SEL.

Having prepared code page 850, you can then use the MODE SELECT command to identify the code page to be activated. Type:

MODE LPT1: CP SELECT=850

- **REFRESH**

This keyword will reinstate prepared code pages that have been lost due to hardware, or other errors Refresh can be abbreviated to REF

If you are using code page 860, and the printer is switched off accidentally, it will return to its default code page. To make the printer regain the lost code page, type:

MODE LPT1 CP PREP=((860) C:\DOS\4201.CPI)

or

MODE LPT1 CP REFRESH

- **/STATUS**

Display the current code pages prepared and/or selected for a device

Typing **/STATUS** is optional

The following commands both produce the same results:

MODE CON CODEPAGE

MODE CON CODEPAGE/STATUS

/STATUS can be abbreviated to **/STA**

CODEPAGE can be abbreviated to **CP**

Redirecting output

If you want your computer to send its printer output to a serial printer, you will have to use the MODE command twice.

The first MODE command specifies the asynchronous communications modes, and the second MODE command redirects the computer's parallel printer output to the asynchronous communication port, specified in the first MODE command.

Example

If your serial printer operates at 4800 baud with even parity, and it is connected to the COM1 port, type:

MODE COM1:48,E,,,P
MODE LPT1:=COM1:

If you have redirected parallel printer output from LPT1 to COM1 and then decided you want to print a file using LPT1, type:

MODE LPT1

This command will disable any redirection of LPT1.

MORE

Display output one screenful at a time

THE MORE filter is used to control the display of the program output on the screen, so that it is only displayed one screenful at a time. The next screenful will only be displayed after you have pressed the [↵] key, and so on until all the output has been displayed.

Form *command* | **MORE**

Example
_____

Your program ANALYSIS.EXE displays its results on the screen. To see the results of processing the data stored in MYDATA.RAW, one page at a time, use the command line:

ANALYSIS MYDATA.RAW|MORE

(assuming that the external file filter MORE is stored either in the default directory or in a directory that MS-DOS automatically searches - see Section 7.2)

Then press [↵] to see the next page of output
_____

NLSFUNC

NLSFUNC*[[d:][path]filename.filetype]*

Load country-specific information

NLSFUNC supports the use of extended country-specific information and code page switching. See the CHCP command and the Code Page Switching section, in Chapter 4.

Form NLSFUNC*[[d:][path]filename.filetype]*

where: *filename.filetype* specifies the file containing country-specific information

The default value of filename.filetype is defined by the country command in your CONFIG.SYS file. If no COUNTRY= command exists in your CONFIG.SYS file, MS-DOS will use the COUNTRY.SYS file in your root directory for country-specific information.

Examples

Loading country-specific information:

If you want to use country-specific information from a file called, for example, GERCDPG.SYS, rather than from the COUNTRY.SYS file, type:

NLSFUNC GERCDPG.SYS

The default country-specific information is to be found in the COUNTRY.SYS file. To use this type:

NLSFUNC

PATH

PATH *[d:]\path[;[d:]\path...]*

Define a search path

Normally, if you do not say which directory a program file is in, MS-DOS tries to find it in the default directory. PATH sets up a sequence of directories which MS-DOS will search, for program files, alongside the default directory. In effect, what happens is that each path given in the PATH command is applied to the program filename in turn until the file is found. Each path specifies a separate directory. The default directory is always searched first.

This gives you a neat way of, for example, ensuring external commands are accessible without clogging up your current directory.

Forms

* **To set up a new path**

  PATH *[d:]\path[;[d:]\path...]*

* **To clear the existing path**

  PATH;

* **To see the current path**

  PATH

Notes Each path must start from a root directory.

The directories are searched one by one in the order given in the PATH command, until a file matching the file specification is found or the sequence of directories is exhausted.

You must keep the search path up to date. If MS-DOS tries to search a directory that no longer exists, your command will fail.

You have stored all the MS-DOS external commands in a directory called \COMMANDS on Drive C. To get MS-DOS to search for the external commands as if they were always in the default directory, use the command line:

PATH C:\COMMANDS

- *The current search path is:*

A:\MSDOS;A:\WP

and you want to extend this list to include C:\COMMANDS. The command line to use is:

PATH A:\MSDOS;A:\WP;C:\COMMANDS

- *You delete the \COMMANDS directory which you know is on the current search path. To bring the path up to date, first discover the current search path by typing the command line:*

PATH

If the response is:

A:\MSDOS;A:\WP;C:\COMMANDS

then type the command to remove the C:\COMMANDS entry:

PATH A:\WP

- *To clear the path, thus making the default directory the only directory to be searched, use the command line:*

PATH;

PAUSE *[remark]*

Pause while processing

Pause is used to halt the execution of a Batch file, so that you can change disks for example. The message Strike a key when ready... is automatically displayed.

If the PAUSE command includes a remark, this is displayed as processing stops. You can use this, for example, to prompt for a specific disk or to remind you to check that the printer is turned on.

Form **PAUSE** *[remark]*

Where:

Remark is a comment that you include in the batchfile you have created, which will subsequently appear when the batchfile pauses. The remark serves to remind you why you halted the batchfile. It will only be displayed if ECHO is switched ON. (See the ECHO command in this chapter)

To continue execution of the Batchfile, press any character key -for example, the Space bar. To abandon it, press either Ctrl-Break or Ctrl-C. You will then see the prompt:

Terminate batch job (Y/N)?

Press **Y** to end the execution of the batch file or **N** to allow it to continue.

The total length of the command line can be up to 127 characters long. There is no restriction on the characters that can be used in the remark.

The remark will not be displayed if the ECHO subcommand has been used to turn off the display of command lines on the screen. However, the standard message continues to be displayed. Use ECHO to display the message in this case.

Example

If you want a batch file to pause to allow you to exchange the disk currently in the drive for your disk labelled "Records", you could include the following command line in the batch file:

PAUSE Insert Records Disk now

When the batch file is processed, what you see on the screen will be:

PAUSE Insert Records Disk now
Strike a key when ready...

The second part of this message is always displayed - whatever message you set up. Press a character key, such as the Space bar, when you are ready for the Batch process to continue.

PRINT

PRINT *[d:][path]filename.filetype*
  [[d:][path]filename.filetype...][/P][/C][/T]

Print text files in the background

The PRINT command is used to print one or more text tiles on a line printer attached to your PC at the same time as you do other work. With the **/P, /C**, and **/T** options, the command can also be used to:

- add files to the list of those currently waiting to be printed

- remove files from this list

- abandon printing the remaining files in the list

You can use a wildcard file name template to insert or remove a number of files from the print queue. Files inserted in the list in this way will be printed in the order they appear in the directory.

If the PRINT command is used on its own, without a command tail, a list of all the files waiting to be printed is displayed.

The first time you use the PRINT command after you switch on or reset your PC, there are a number of other parameters which you can set including:

- the device name your printer has (see Section 3.2)

- the size of the print buffer

- how many files can be waiting to be printed

- how much of your PC's processing time is given over to printing the files

Notes The disk containing the files to be printed must remain in the specified drive until printing is completed. Files waiting to be printed may not be modified until after they have printed.

PRINT takes over the printer entirely. Any attempt, for example, to echo output sent to the screen on the printer or to produce screen images on the printer will just produce an **Out of paper** message until all the files in the print queue have been printed.

If PRINT encounters a disk error in reading a file, the file will be abandoned. PRINT then goes on to printing the next file in the queue.

Tab characters in the files are replaced by spaces up to the start of the next 8-character column.

The first time you use the PRINT command

Form **PRINT** *[d:][path]filename.filetype*
[[d:]][path]filename.filetype...][option[option...]]

Set-up options

/D:*device*

Specifies the device name used for your printer. (The default is PRN) **Note:** this option must be listed first.

If you do not include this option, MS-DOS displays the message **Name of list device [PRN]:** and gives you the opportunity to specify a different output device. If you have a parallel printer, just press the key. If you have a serial printer, give the device name **AUX**.

/B:*buffer-size*

Sets the size of the printer buffer. The default is 512 bytes. As a general rule, a bigger buffer improves the performance of the PRINT command.

/Q:*queue-size*

Sets the number of files you can have waiting to be printed (between 4 and 32). The default is 10 files.

/S:*time-share*

Sets how much computer time is devoted to your foreground task compared with that used on printing in the background. The value you set must be between 1 and 255.

The default is 8, ie your PC devotes eight times as much effort to programs you use while the files are being printed, as it does to printing the files. As a result, your files will take roughly nine times longer to print than they would have done if printing was the only job your PC was doing.

/U:*busyticks*

Sets how long your PC will wait for the printer to become ready to receive more data to print before going back to working on your foreground task. The default is 1 processor clock-cyle.

/M:*maxticks*	Sets the maximum length number of processor clock-cyles your PC will spend sending data to the printer before going back to working on your foreground task (between 1 and 255). The default is 2 clock-cyces.

Notes Be careful only to name an output device attached to your PC as the output device for the PRINT command.

Once the PRINT command has been used, the amount of memory available for running your programs is reduced until the next time you reset your PC.

If you try to use any of the set-up PRINT options in a subsequent PRINT command, the command will fail and MS-DOS will display the message Invalid parameters.

Subsequent occasions

• **To change the list of files to be printed:**

Form **PRINT** *[d;][path]filename.filetype[/P|/C]*
 [[d:][path]filename.filetype[/P|/C]...]

Options

/C	Remove this and the following files (up to the next file listed with the /P option) from the list of files waiting to be printed.
/P	Add this and the following files (up to the next file listed with the /C option) to this list of files waiting to be printed.

• **To abandon printing the current list**

Form **PRINT /T**

Note If a file is currently being printed when this command is being entered, a cancellation message will be printed. The paper is then advanced to the next page.

Examples _____

• *To print the file MYFILE.TXT on the default drive, accepting all the default settings, use the command line:*

PRINT MYFILE.TXT

(assuming that the external command PRINT is stored either in the default directory or in a directory that MS-DOS automatically searches - see Section 7.2)

If this is the first time you have used the PRINT command since switching on or resetting your PC, the following message will appear on your screen:

Name of list device [PRN]:

This message will not appear if you have already used a PRINT command.

If you have a parallel printer, just press the [return] key. If you have a serial printer attached to the Serial Interface, type AUX or COM1 before pressing [↵].

- *To set up a print queue of all your .TXT files (12 files in all) as your first PRINT job since switching on, use the command line:*

  PRINT *.TXT/Q:12

  You need the /Q option because otherwise PRINT will cut short your print queue at 10 files.

  If you have already used a PRINT command but with the standard print queue, you will need to reset your PC([Ctrl][Alt][Del]before using this command line.

  You must not change the disk in the default drive while these files are being printed, nor can you modify any file before it has been printed, but you can do other work while the files are being printed.

- *To abandon all the print queue after printing has started use the command line:*

  PRINT /T

- *If, after you have entered the command to print all your .TXT files, you decide that you did not want to print the file MYFILE.TXT, you can remove this file from the list with the command line:*

  PRINT MYFILE.TXT/C

- *If you did not want to print any file that matched the file name template MY*.TXT, you remove all these files with the command line:*

  PRINT MY*.TXT/C

If one of these files was being printed when you typed this command line, a cancellation message will be printed before PRINT goes on to print the next file in the list.

- *If, after starting printing, you decide to add the file MYFILE.BAS to the list of files to be printed, us the command line:*

PRINT MYFILE.BAS/P

This file will be added to the list, provided that there is room in the print queue for this additional file.

- *If you decide both to remove all the MY*.TXT files from the print queue and add MYFILE.BAS, you can do this with the command line:*

PRINT MY*.TXT/C MYFILE.BAS/P

Be careful to include the /P at the end of the command line or MS-DOS will try to remove MYFILE.BAS from the current print queue.

PROMPT

PROMPT *prompt-text*

Set up a new system prompt

The PROMPT command is used to set up a new system prompt message. This can contain simple text and/or information such as the date, the time and the MS-DOS version number as well as, or instead of, the standard details (the default drive). The new prompt is then used until the computer is reset.

The position of any special information you want to include in the prompt text (eg. the date) is marked by a $ followed by a particular character. This representation is also used for some special characters, including $ itself.

If no prompt text is given, the system prompt goes back to the standard prompt - the default drive followed by a >. However, the AUTOEXEC.BAT file will probably include a PROMPT command that overrides the default setting.

Form PROMPT *[[text][$character]...]*

$*character* is used to represent an information string or a special character as in the table below.

$t	Time
$d	Date
$n	The drive letter of the default drive
$p	The current drive and directory
$v	The MS-DOS version number
$$	A $ character
$g	A > character
$l	A < character
$b	A | character
$q	A = character
$h	A Backspace character
$e	An ESCape character
$_	A new line

Any other characters after a $ are ignored.

If you would like the system prompt to have the following form:

Date Time (hours and minutes)
Default-drive Current-directory>

You will need:

$d	*To give you the date*
A couple of spaces	*To separate the date from the time*
$t	*To give you the time*
hhhhhh	*To backspace over the seconds and hundredths of a second in the time*
$-	*To give you a new line*
$p	*To give the current drive and directory*
$g	*To give a > character*

The command line to use is therefore:

PROMPT $d thhhhhh_$n:pg

The system prompt will then look something like this:

Wed 2-01-1990 22:55
C:\\>

RECOVER

External command

RECOVER *[d:][path][filename.filetype]*

Recover a file or a disk containing bad sectors

You can use the CHKDSK command to find out if a sector on your disk is bad, and then the RECOVER command to recover the entire disk or just the file containing the bad sector. MS-DOS will read the file, sector by sector, skipping the bad sectors. When MS-DOS finds a bad sector, it will no longer allocate your data to that sector.

Form RECOVER *[d:][path]filename.filetype*

or RECOVER *[d:]*

WARNING

RECOVER will rename all files it encounters, changing both filename and filetype. A disk in such condition is almost impossible to work with. It is therefore recommended that RECOVER is only used by experts in the most extreme situations.

Example

To recover a disk in drive A, type:

RECOVER A:

To recover a file named PURCHASE.1, that has a few bad sectors, type:

RECOVER PURCHASE.1

Notes:

    i)   RECOVER does not work on a network from a remote work station.

    ii)   RECOVER does not work on drives used in the SUBST or JOIN commands

REM

REM *[text]*

Include remarks in a batch file

The REM command allows explanatory comments to be included in a batch file. If you precede these comments with a REM command, MS-DOS will not attempt to execute the comments as though they were command lines.

The syntax is to add REM to the start of the line which is not to be executed.

Form REM *[comment]*

Where:

comment is any text

Examples

If the following lines are added to the AUTOEXEC.BAT batch file on the MS-DOS startup disk:

REM The following enables extended CTRL C checking

REM BREAK=ON

then they will have no effect. If the word REM is removed from the start of the second line, that BREAK command will then effect next time MS-DOS is loaded.

RENAME

RENAME *[d:][path]old-name new-name*

Rename a file

RENAME is used to change the name of a file or a group of files. Renaming a file does not change its location on a disk.

RENAME can be shortened to REN.

Note: You cannot rename a directory. The only alternative is to create a directory with the new name and copy all the files in the current directory to the new directory.

Form RENAME *[d:][path]old-name new-name*

or **REN** *[d:][path]old-name new-name*

where *old-name* is: *filename.filetype*
new-name is: *filename.filetype*

Notes The wildcard characters * and ? may be used to specify a group of files in the same directory. However, their use in giving the new file template must be identical to their use in giving the old file template.

If a file already exists with the same file name as the new file name, then renaming will be abandoned. The message **Duplicate Filename or File not found** will be displayed on the screen.

Examples

- *To rename the file NEWDATA.1 in the default directory OLDDATA.1 use the command line:*

  REN NEWDATA.1 OLDDATA.1

  If the file was in the DIR1 directory on Drive C (a subdirectory of the Root directory), the command line would be:

  REN C:\DIR1\NEWDATA.1 OLDDATA.1

  Notice that you do not have to repeat the drive and directory information.

- *To rename all the MYFILE.* files in the default directory YOURFILE.*, use the command line:*

REN MYFILE.* YOURFILE.*

*The use of the wildcards * and ? in the new names must be identical to its use in the old names.*

REPLACE External command

REPLACE *[source-drive:][path]filename.filetype*
          [target-drive:][path][filename.filetype][option][option...]]

The REPLACE command is used to keep back-up disks up to date by:

- **replacing old files on your back-up disk with the latest version of the files**

- **adding new files to the backup disk**

  The standard REPLACE command looks for Read-Write files in the target directory which match the file name template given in the command line. It then looks for a file of the same name as a file in the source directory, and REPLACE replaces this file with the version from the source disk. The options allow you to:

  - add any new files to the back-up disk

  - replace Read-Only files as well as Read-Write files

  - only replace a file if the source file is newer than the version on the target disk

  - search subdirectories on the target disk for matching files

  - confirm, file-by-file, that the old version is to be replaced

  If an error occurs during the replacement process, REPLACE sets an exit code which can be used in an IF command (see SECTION 7.4).

Form REPLACE *[source-drive:][path]filename.filetype*
    [target-drive:][path][option[option...]]

where *filename.filetype* is a template representing a number of files

Options

/A	Add new files to the target directory as well as replacing any that already exist. This option cannot be used with the **/S** option.
/P	Prompt for confirmation before replacing a target file or adding a new source file
/R	Replace both Read-Write and Read-Only files

| /S | Search both the given target directory and its subdirectories for old versions of the files (cannot be used with the /A option) |
| /W | Wait until a key is pressed before starting to replace and add files (ie. allows you to swap the disks in your floppy disk drives after issuing the instruction) |

Notes   If you do not specify the /R option, any attempt to replace Read-Only files will cause the replacement process to stop.

If you do not specify the /W option, the process of replacing and adding files will start working immediately, with the disks currently in the drive(s).

You cannot use REPLACE to update the hidden files. Use the SYS command to do this.

REPLACE can return MS-DOS the error codes listed below.

Additional Information

The REPLACE program returns the following exit codes:

1   Command line error, eg. incompatible options

2   No matching source or target files were found

3   Either the source or the target path was not found

5   Access denied ie. you tried to update a write-protected file

8   Insufficient memory for REPLACE to operate

15   You specified a drive that does not exist

You can use the batch processing command, IF, for error processing based on the ERRORLEVEL returned by REPLACE.

Examples

• *To replace the existing back-up copies on Drive B of.TXT files on the default drive, u the command line:*

REPLACE *.TXT B:

(assuming the external command REPLACE is stored either in the default directory or in a directory that is automatically searched by MS-DOS-see Section 7.2)

This will replace each old version with the new version provided the old version allows Read-Write access. If you want to replace Read-Only files as well, you should use the command line:

REPLACE *.TXT B:/R

- *If you want to have new versions of all the .TXT files on the default drive on the disk in Drive B -ie. including copes of any new .TXT files that you have created, you should use the command line:*

REPLACE *.TXT B: /A

(Use the /R option if you want to replace any Read-Only files on the Drive B disk.)

If you want REPLACE to ask about each file before it copies the new version to your back-up disk, you need to use the /P option -that is, a command line like:

REPLACE *.TXT B: /A/P

RESTORE

RESTORE *drive1*: *[drive2:][path]filename.filetype[/S][/P]*
[/B:date][/A:date][/E:time][/L:time][/M][/N]

Restore backed up files

Use the RESTORE command to restore files that were backed up using the BACKUP program. RESTORE can restore files from similar or dissimilar disk types, for example, from floppy disk to hard disk.

Form **RESTORE** *drive1*: *[drive2:]filename.filetype[/S][/P]*
[/B:date][/A:date][/E:time][/L:time][/M][/N]

where:

drive1	contains the backed up files
drive2	is the target drive
filename.filetype	identifies the file(s) you want to restore

Options The RESTORE command accepts the following switches:

/S	Restores subdirectories
/P	Prompts for permission to restore any files which match the file specification and are read-only or that have changed since the last backup.
/B:*date*	Restores only those files last modified on or before date.
/A:*date*	Restores only those files last modified on or after date
/E:*time*	Restores only those files last modified at or earlier than the specified time
/L:*time*	Restores only those files last modified at or later than the specified time
/M	Restores only those files modified since the last backup
/N	Restores only those files that no longer exist on the target dis

Notes

i) RESTORE cannot restore the system files. Use the SYS command to restore these files.

ii) The MS-DOS 3.3 RESTORE command will restore files backed up with either the MS-DOS 3.3 BACKUP command, or a later version of BACKUP.

Additional Information

Once the command has been completed. RESTORE returns one of the following exit codes:

0   Normal completion

1   No files were found to restore

3   Terminated by user

4   Terminated by error

You can use the batch processing command, IF, for error processing based on the ERRORLEVEL returned by the RESTORE program.

Example

To restore the file MANUAL.APP from the backup disk in drive A, to the subdirectory WP on drive C:, type:

RESTORE A: C:\WP\MANUAL.APP

RMDIR *[d:]path*

Remove a directory

RMDIR is used to delete a directory from the directory structure of a disk.

RMDIR can be abbreviated to RD.

Form: RMDIR *[d:]path*

or RD *[d:]path*

Notes The subdirectory will not be deleted if it contains any files or if it has any references to directories other than the \. (current) and \.. (parent) directories.

The subdirectory will not be deleted if it is the current directory on any drive or if it is assigned to an imaginary drive (see Section 7.1).

If the path starts at a root directory, precede the path with a backslash (\); do not include it if the path starts at a current directory.

Examples

Suppose the pattern of directories on the disk in the default was like this:

```
                          Root
            Home                        Business
     Letters     Games        Letters   Reports   Accounts
```
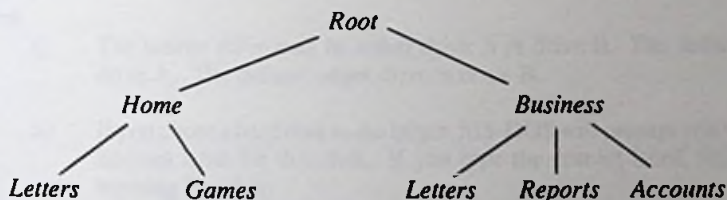
• *To remove the Reports directory from this directory structure, use the command line*

RD \BUSINESS\REPORTS

or, if BUSINESS is the current directory, use the command line:

RD REPORTS

Remember to clear the Reports directory of all files before using this command; otherwise you will see the message:

Invalid path, not directory, or directory not empty

- *To remove the HOME part of this directory structure, you need to clear and remove both the \HOME\LETTERS and the \HOME\GAMES directories and only then clear and remove the \HOME directory itself.*

  The first thing to do is to copy every file from all three directories you want to keep to another disk and/or another directory. When that has been completed, the command lines to use are:

CD \HOME
DEL GAMES
DEL LETTERS   *- Clear the Games and Letters directories*
RD GAMES
RD LETTERS   *- Remove both directories*
CD   *- Change to a different current directory (you cannot delete the current directory)*

DEL HOME
RD HOME   *- Clear and remove the Home directory*

SELECT

SELECT *[[drive1:][drive2:][path]][xxx][yy]*

Install MS-DOS on a new floppy disk, or hard disk, with desired country-specific information and keyboard layout

The SELECT command allows you to install MS-DOS on a new disk, with the keyboard layout, and date and time format of the country of your choice.

CAUTION
SELECT should only be used on new disks: the FORMAT command is used by SELECT, therefore, all data on the target disk is destroyed.

The SELECT command does the following:

- Formats the target disk

- Creates both the CONFIG.SYS and AUTOEXEC.BAT files on the new disk

- Copies the contents of the source disk file by file, to the target disk

Form **SELECT***[[drive1:] [drive2:][path]][yyy][xx]*

where:

drive1 is the source drive
drive2 is the target drive

Notes

i)   The source drive may be either drive A or drive B. The default source drive is drive A. The default target drive is drive B.

ii)   If you chose a hard disk as the target, MS-DOS will prompt you to type the correct internal label for that disk. If you type the correct label, SELECT displays a warning like this:

WARNING, ALL DATA ON NON-REMOVABLE DISK
DRIVE C: WILL BE LOST!
Proceed with Format (Y/N)?

Options

    xxx   specifies the country code.

                         MS-DOS gathers country-specific information, such as time and date formats, from the COUNTRY.SYS file for the specified country code.

    yy   specifies the keyboard code for the keyboard layout used.

Country and Keyboard Codes

Country	Country code	Keyboard Code
Arabic	785	
Australia	061	US
Belgium	032	BE
Canada (English)	001	US
Canada (French)	002	CF
Denmark	045	DK
Finland	358	SU
France	033	FR
Germany	049	GR
Hebrew	972	
Italy	030	IT
Latin America	003	LA
Netherlands	031	NL
Norway	047	NO
Portugal	351	PO
Spain	034	SP
Sweden	046	SV
Switzerland (French)	041	SF
Switzerland (German)	041	SG
United Kingdom	044	UK
United States	001	US

- *To create a new MS-DOS floppy disk which includes the country specific information and keyboard layout for Germany:*

  put the source disk in drive B:

  put the target disk in drive A: and type:

  SELECT b: a: 049 gr

  You will then see the following message:

  SELECT is used to install DOS the first time.
  SELECT erases everything on the specified
  target and then installs DOS

  Do you want to continue (Y/N)? Y

  If there is data on the disk in drive A and you type Y, it will be erased.

- *To install (or re-install) on a hard disk (drive C):*

  Put the source disk (MS-DOS System disk) in drive A:and type:

  SELECT a: c: 049 gr

  This message will be displayed:

  SELECT is used to install DOS the first time.
  SELECT erases everything on the specified
  target and then installs DOS.

  Do you want to continue? (Y/N)? Y

  You will then see the usual warning message from FORMAT giving you a second chance to terminate the process before drive C: is formatted.

  If there is data on the disk in drive C and you type Y it will be erased.

SET *parameter=string*

Set an environment string

The SET command is used to set an environment string, that is one of the special strings of characters that are available to each program you run. The program will respond to this string if it is designed to use the parameter to which it has been set. Environment strings can also be used by Batch processes (see Section 7.4).

MS-DOS records the parameter and the string you have set it to in the area of memory reserved for environment strings. If the parameter is already recorded, the new string replaces the one currently recorded. If you set the parameter equal to blank, the parameter is removed from the list of environment strings.

If you use the SET command on its own without a command tail, MS-DOS lists all the environment strings that have been set - both through SET commands and automatically, for example through the use of other commands.

Forms

- **To set or reset a parameter**

  SET *parameter=string*

- **To remove a parameter from the environment**

  SET *parameter=*

- **To list the current environment strings**

  SET

Notes   Details of which environment parameters a program needs to have set and what these should be set to should be given in the program's own user guide.

The list of current environment parameters and strings will contain a number of strings set automatically by MS-DOS. These are used by MS-DOS and should not be removed from the list unless you are fully aware of the role they play.

• *Suppose a program behaves differently depending on whether the environment string represented by the parameter, DISPLAY, is CGA or EGA. To set DISPLAY to CGA, type the command line:*

SET DISPLAY=CGA

Later, you can set it to EGA by typing:

SET DISPLAY=EGA

• *To list on the screen, the present set of environment parameters and strings, type the command line:*

SET

A list similar to the following will appear on the screen:

A>set
COMSPEC=C:\COMMAND.COM
DISPLAY=CGA
PATH=C:\DOS

Note the inclusion of parameters which were not set using the SET command. These have been set by other MS-DOS commands or by the operating system itself.

SHARE

SHARE [/F:*space*][/L:*locks*]

Install file sharing and locking

SHARE can be used on a PC network system or while a PC is using multi-tasking software.

SHARE prevents a program from accessing a file which has already been opened by another program. It could be disastrous if two programs tried to update the same file at the same time.

However, a file can be accessed by more than one program if the request to open the file is for the purpose of read-only. Each request to open a file is processed by SHARE. The success of this function relies on the programs making the correct type of "open" requests, and on whether the programs understand the errors that SHARE may return.

SHARE is only effective with multi-tasking and multi-user (network) software. Most other software will not be affected.

SHARE also enables some software to protect regions within a file. This allows more than one program to open a particular file, but each program can only access a limited region of the file.

Form SHARE [/F:*space*][/L:*locks*]

Options

The SHARE switches are:

/F:*space*   Allocates file space (in bytes) where MS-DOS stores recorded file-sharing information.

The default value for the **/F** switch is 2048.

An average pathname is 20 bytes in length, each open file requires enough space for the length of the full filename, plus 11 bytes.

/L:*locks*   Allocates the number of locks you want to allow. A lock is an area of memory in which SHARE records information about a region within a file that is locked. The default for the **/L** switch is 20.

Example

To load the SHARE command type:

SHARE

File sharing will be loaded with default values for the /F and /L switches.

SHELL=

SHELL=_[d:][path]filename.filetype[parameters]_

Identify the command processor to MS-DOS

The SHELL= command is used to specify an alternate top-level command processor in place of the standard COMMAND.COM file.

The syntax of the SHELL= command is:

Form SHELL=_[d:][path]filename.filetype[param1 [param2...[param n]]]_

This command is used in conjunction with major software packages which furnish their own command processors. The MS-DOS technical manual contains information on developing command processors.

Example

If the following line is included in the CONFIG.SYS file on your MS-DOS startup disk:

SHELL=C:\DOS\COMMAND.COM/P/E:256

then MS-DOS will load the command processor COMMAND.COM and will reserve 256 bytes of environment space. The COMSPEC environment variable will be set to C:\DOS\COMMAND.COM so that if the operating system has to re-load the command processor it will then load this file.

SHIFT

SHIFT

Shift the dummy parameters

Shift is used to change the value of each dummy parameter in a Batch file. This lets you work through a list of Batch file parameters.

Each time a SHIFT command is executed, the value of the %0 parameter is replaced by that of %1. The value of %1 is replaced by %2 and so on. The new value for %9 is taken from the command line used to execute the Batch file. The old meanings are forgotten.

This process lets you process more than ten items within a Batch file (though, you can still use only ten dummy parameters at a time). It also allows you to use one Batch file to process a number of files, when this number changes from one time you use the Batch file, to the next. There is an example of how to do this, below.

Form **SHIFT**

Examples

- *To shift the meanings of the dummy parameters so that %O takes the current value of %1, %1 takes the current value of %2, etc. include at the appropriate point in the Batch file the following command line:*

  SHIFT

- *To shift the meanings of the dummy parameters so that %O takes the current value of %2, %1 takes the current value of %3, etc., either put at this point in the Batch file:*

  SHIFT
  SHIFT

  or use a FOR command, such as:

  FOR %%A IN (1 2) DO SHIFT

- *You want the Batch file MYBAT.BAT to carry out the same sequence of commands on a number of files, one after another. The problem is that the number of files you want to process varies each time you want to use the Batch file.*

A possible solution is to have just the commands as the contents of the batch file, and to run it with each of the files in turn,ie. to enter the following command lines one after another.For example:

MYBAT File1
MYBAT File2
MYBAT File3

A less tedious option is to give the file the following structure:

```
:LOOP
IF "%1"=="" GOTO END
            •
            •
            •
      commands
            •
            •
            •
SHIFT
GO TO LOOP
:END
```

The command line to run this would be:

MYBAT File1 File2 File3

The first time through the commands %1 would be File1, the second time it would be File2 and the third time it would be File3. At the start of the next loop %1 would be blank and so the IF command will direct processing to the label:END

SORT *[/R][/+n][d:][path]filename.filetype[destination}*

Sort data

SORT is used to sort data into alphanumeric order. It can:

* **sort data stored in an existing file**

* **sort standard output from a different program**.

* **sort into reverse order as well as into the normal order**

* **sort lines into alphabetical order based on the character at a given column in each line, not necessarily Column 1**

    The style of the sort depends on which of the **/R** and **/+n** options are used. If no option is selected, the data is sorted into normal alphabetical order based on the character in Column 1 of each line.

    The result of the sort can be sent to a file or to a specified output device. If no destination is specified, the sorted data is sent to the screen.

* **To sort data in a file**

Form **SORT** *[/R][/+n]:[path]filename.filetype[destination]*

* **To sort data generated by a program**

Form *command* **| SORT** *[/R][/+n][destination]*

Options

/R	Reverse the sort, ie. sort from 9 to A
/+n	Sort at Column *n*

- *To sort the Root directory on Drive C before it is displayed, use the command line:*

  DIR C:|SORT

  (assuming that the external command SORT is stored either in the default directory or in a directory that MS-DOS automatically searches - see Section 7.2)

- *To sort the lines in a text file called ROUGH.TXT into alphabetical order and store the result in a file called SORTED.TXT, use the command line:*

  SORT <ROUGH.TXT > SORTED.TXT

- *To sort the lines in the file ROUGH.TXT in such a way that the characters which are eight character positions in on each line, are in alphabetical order, and to display the result on the screen, use the command line:*

  SORT/+8 GH.TXT

STACKS=

STACKS=*n,m*

Set the number and size of stacks used by MS-DOS

The STACKS= command allows you to override the default MS-DOS stack resource parameters. For each hardware interrupt which occurs, MS-DOS allocates a stack to it, from the pool of available stacks. When the interrupt process is completed, MS-DOS returns the stack to the available stack pool.

The syntax of the STACKS= command is:

Form **STACKS=*n,m***

Where:

n is the number of stacks. Valid values are 0..64. The default is 9

m is the size of each stack in bytes. Valid values are 0..512. The default is 128.

If there is no STACKS command in your CONFIG.SYS file then MS-DOS allocates default stack resources equivalent to the command STACKS=9,128. This, however, may not be sufficient if you are using multiple interrupting devices (such as LANs, 8O87 NDPs or Hard Disks) and under these circumstances you may experience a number of stack related messages such as "Internal Stack Failure" (most predominantly) or even "Divide Overflow". When a message such as this occurs, it is advisable to try increasing the stacks, bearing in mind that stacks do use up available system memory in the same way that buffers and FCBs do. The number of stacks allowable is from 8 to 64 and the stack size parameter may vary from 32 to 512 bytes.

Example

If the following line is included in the CONFIG.SYS file on your MS-DOS startup disk:

STACKS=2O,256

then MS-DOS will reserve space for 20 stacks, each of which will be 256 bytes long.

SUBST

SUBST *d*: *[d:]path*

Substitute the name of an imaginary drive for a path

The SUBST command creates an imaginary drive by associating a path with a drive letter that is not already used by MS-DOS. This tells MS-DOS to substitute the path wherever you use the drive letter in describing the task you want carried out.

If you use the command on its own without a command tail, SUBST displays a list of all the substitutions that are currently in force.

Forms

- **To set up the substitution**

  SUBST *d:[d:]path*

          | |
             | *The path that is substituted*
         The imaginary drive

- **To end the substitution**

  SUBST d:/D

      |
     The imaginary drive

- **To display the current substitution**

  SUBST

Notes You can form but cannot break a substitution that involves the directory holding the external command SUBST. You may need to reset your PC in order to break the connection with the imaginary drive.

If you try to use, in a new substitution, an imaginary drive that is already substituting for a directory, without first breaking the current association, you will see the message:

Invalid parameter

Break the current substitution first and then try again if you want to use this drive for a different directory.

To use imaginary drives above E:, include the LASTDRIVE= command (form: **LASTDRIVE = d**) in the CONGIG.SYS file. For example, to be able to substitute drives up to N:, use the command line:

LASTDRIVE = N

Example

_____

To assign the directory \BUSINESS\REPORTS on Drive A to the imaginary drive, Drive E, type the command line:

SUBST E: A:\BUSINESS\REPORTS

(assuming that the external command SUBST is stored either in the default directory or in a directory that MS-DOS automatically searches - see Section 7.2.)

_____

SYS

SYS *d*:

Copy system files to the disk in the specified drive

Use the SYS command to update the version of MS-DOS used on a particular Startup disk, by copying the system files onto the disk.

The SYS command copies the system files on the disk in the default drive to the disk in a specified drive.

The files copied are IO.SYS and MSDOS.SYS. COMMAND.COM is not transferred. Use a COPY command to add this file if you want to use the MS-DOS commands.

Form SYS *d*:

Notes

i) IO.SYS and MSDOS.SYS are both hidden files and so are not listed when the directory of a Startup disk is listed.

ii) SYS does not work on drives involved with the SUBST or JOIN commands.

iii) SYS does not work on a network

Example

To copy the IO.SYS and MSDOS.SYS files onto the disk in Drive B, use the command line:

SYS B:

(assuming that the external command, SYS, is either in the default directory or in a directory that is automatically searched by MS-DOS-see Section 7.2).

TIME

TIME *[hours:minutes[:seconds[.hundredths]]]*

Set or read the time

The TIME command is used either to display or set your PC's clock. Its settings are used to stamp files with the time.

Any time that you type in, is checked before it is accepted. If the time is invalid, you will be asked to type in a new time.

Form TIME

or TIME *hh:mm:ss.cc*

hh represents the hour (00..23)
mm represents the minute (00.59)
ss represents the second (00..59)
cc represents the hundredths of a second (0..99)

Notes

i)   You do not have to specify seconds and hundredths of seconds.

ii)   If you type TIME, the current setting is displayed and then you are asked to type in a new time. If the time is correct, just press [↵].

iii)   The clock is set when you press [↵]. To make the setting accurate, type in a time 15..30 seconds in the future and then press [↵] when this time is reached. The Speaking Clock can help you set the time accurately: press the [↵] key on the third stroke!

iv)   You can change the TIME command format by changing the COUNTRY command in the CONFIG.SYS file.

v)   You cannot specify a drive for this command.

To set the time to be 4:23pm (16.23h), either use the command line:

TIME 16:23

which does the whole job in one go - press the [⏎] key when it is exactly 4.23pm), or just:

TIME

If you use the second command, you will see something like this on the screen:

A>time
Current time is 12:24:31.33
Enter new time:

Type:

16:23

and press [⏎] when it is exactly 4.23pm.

TREE

TREE *[d:][path][/F]*

Display drive contents

The TREE command enables you to plot out the directory 'tree' for the disk. The full path of each directory on the disk, is listed, together with the names of any subdirectories this directory has. The full tree structure may be displayed starting from the root directory of the specified drive. If you specify a particular directory, the tree structure, from that directory will be displayed.

If the **/F** option is used, the names of the files in each directory are also listed.

Forms

* **To display just the details of the directories**

  TREE *[d:]*

* **To display the filenames in each directory**

  TREE *[d:]*/**F**

Notes If you do not specify a drive, the command lists information about the disk in the default drive.

Examples

* *To display details of all the directories on the default drive, use the command line:*

  TREE

  (assuming that the external command TREE is stored either in the default directory or in a directory on the search path - see Section 7.2).

  The result could be something like this:

```
A>tree
DIRECTORY PATH LISTING

Path: \SPREAD
Sub-directories:  RECORDS

Path:  \SPREAD\RECORDS
Sub-directories: None
```

- *If there is only a Root directory on the disk, TREE will display the message:*

  No sub-directories exist

- *To display details of all the files as well as the directories on Drive C, use the command line:*

  TREE C:/F

  The result could be something like this:

```
A>tree c:/f
DIRECTORY PATH LISTING

Path: \DIR1

Sub-directories: SUBDIR

Files:   MYFILE.1
         MYFILE.2
         MYFILE.3

Path: \DIR1\SUBDIR

Subdirectories:  None

Files:       SUBFILE.1
             SUBFILE.2
```

TYPE

TYPE *[d:][path]filename.filetype*

List a simple text file

TYPE displays the contents of the named file, on your screen. The only files suitable for being typed are simple ASCII text files.

If the file contains control characters, the display may be unreadable.

You can interrupt the listing by pressing Ctrl-S. Pressing Ctrl-Q restarts it. Pressing Ctrl-C abandons the listing.

You can only display one file at a time. Wildcards may not be used in the file specification.

Form **TYPE** *[d:][path]filename.filetype*

Note Tab characters are replaced by spaces, putting the next character at the beginning of the next column. The columns are eight characters wide.

Examples

- *To display the AUTOEXEC.BAT file in the default directory on the screen, use the command line:*

  TYPE AUTOEXEC.BAT

  The result of this command could be something like this:

  PATH \;
  KEYB UK 437
  ECHO OFF
  DATETEST
  IF ERRORLEVEL 1 GOTO SIGNON
  DATE
  TIME
  :SIGNON
  CLS
  VER

  A>

If the AUTOEXEC.BAT file you want to display is in the Root directory on Drive C, the command line you need is:

TYPE C:\AUTOEXEC.BAT

If you TYPE anything other than a simple text file on the screen, you will see lots of strange characters as TYPE tries to interpret special codes within the file as characters. For example, you might see something like this:

```
You≥ P├ wil∞ noſ bσ ablσ tⁿ ruє programs½á no≥ wil∞ iſ understanΣ ì
                                                         you≥ instruct
ions¼ withouſ ß disδ operatinτ system« MS-DOᵁ i≤ thσ ì
                                                     disk operating system supp
lied with your PC.
```

VER

VER

Display MS-DOS version number

VER displays the version number of the MS-DOS operating system you are using.

Form VER

Example _____

To see which version of MS-DOS you are currently using, type:

VER

A message similar to the following will appear on the screen:

MS-DOS Version 3.30

_____

VERIFY

VERIFY *[ON|OFF]*

Turn on and turn off verification of all writes to disk

The VERIFY command is used to tell MS-DOS to verify that each file written to a disk can be read back successfully, by checking for example, that it does not contain any bad sectors. It is also used to turn off the verification procedure.

If the VERIFY command is used on its own, without any parameters, your PC will display whether verification is currently turned on or off.

Forms

- **To turn verification on**

  VERIFY ON

- **To turn verification off**

  VERIFY OFF

- **To show current state**

  VERIFY

Notes While verification is turned on, you will only get a message on the screen when a disk error has been spotted.

Do not assume that verification is turned on because you have not entered a VERIFY OFF command. Verification can be turned off from within a program.

VOL

VOL [d:]

Display disk volume label

VOL displays a DOS disk's label, that is, the name by which the disk can be identified. The label could have been set when he disk was formatted, or by the use of the LABEL command.

Form VOL [d:]

Notes The disk label is also displayed when you list any directory on the disk with a DIR command.

As VOL is one of the internal MS-DOS commands, you should not attempt to precede the VOL command with a drive and path - to do so would probably generate an error.

For more information about volume labels, see the LABEL and FORMAT commands.

Examples

* *To display the disk label on the default drive, when it is in the default drive, use the command line:*

VOL

If the volume label is "manual", you will then see a message which reads:

Volume in drive A is MANUAL

If the disk in drive A does not have a volume label, you will see a message which reads:

Volume in drive A has no label

* *To display the disk label of the disk in Drive B, when it is not the default drive, use the command line:*

VOL B:

XCOPY

XCOPY *[d:][path]source[d:][path]destination[option[option...]]*

Copy files and directories

XCOPY is used:

- To make copies of individual source files

- To copy the directory structure as well

The source and the destination for each copy operation are directories on disk drives.

The directories that can be copied are those which branch off the source directory.

Empty directories can be copied as well as those containing files or further directories.

XCOPY sets an exit code to report the success of the copy. This can be used in an IF command (see Section 7.4).

Form

    XCOPY *[d:][path]filename.filetype*
                              [[d:][path]filename.filetype][option[option...]]

where *filename.filetype* is a template using wildcards to specify a group of files.

Options

/A	Only copy files that have the Archive attribute set (see Section 6.3) Note: the Archive attribute is not reset after copying (see the **/M** option)
/D:*dd-mm-yy*	Only copy files that have been changed on or after the given date
/E	Copy empty subdirectories as well as ones with files in them. Note: The **/S** option must be selected as well

/M	Only copy files that have the Archive attribute set (see Section 6.3) Note:the Archive attribute is reset after copying (see the /A option)
/P	Confirm each copy
/S	Copy files from both the given directory and from its subdirectories (retaining the subdirectory structure)
/V	Verify each copy as it is written, to check that the new file is identical to the original
/W	Wait until a key is pressed before starting the copy (allowing you to swap the disks after issuing the command line

Notes You must include at least one of the following:

source drive, directory or file name template

but you can leave out all details of the destination: the current directory on the default drive is assumed as the destination directory.*.* is the default file name template for both the source and the destination.

If you do not select the /S option, XCOPY will only copy files in the given directory. It will ignore any subdirectories to the directory and the files these contain.

If your chosen destination directory does not exist, XCOPY will create it for you. The directory must, of course, be a valid directory to create (see Section 6.1).

Additional Information

The XCOPY program returns the following exit codes:

0 No errors

1 No files found to copy

2 Copy terminated by user (pressing Ctrl-C)

4 Either you specified an invalid directory, or there was an error in the command line syntax, or the file you specified wasn't found, or the path you quoted was not found.

5 Copy terminated by user after a disk error.

You can use the batch processing command, IF, for error processing based on the ERRORLEVEL returned by XCOPY.

- *To copy all the files from the \DIR1 directory (a subdirectory of the Root directory) on the default drive to the \DIR2 directory on Drive C, you might use the command line:*

  XCOPY \DIR1*.* C:\DIR2

  (assuming that the external command XCOPY is stored either in the default directory or in a directory that MS-DOS automatically searches - see Section 7.2.4).

- *To copy all the files and all the subdirectories with files in them from the \DIR1 directory on the default drive to the \DIR2 directory on a different disk, use the command line:*

  XCOPY \DIR1*.* B:\DIR2 /S

  If you have a single-drive PC, MS-DOS will prompt you when to insert the disk for Drive A (your source disk) and when to insert the disk for Drive B (your destination disk). If you have a two-drive system, just use Drive B (the righthand disk drive) for the destination disk.

  If you wanted to copy empty subdirectories as well as some with files in them, your command line would become:

  XCOPY \DIR1*.* B:\DIR2 /S/E

- *If you have a single drive PC and the external command XCOPY is on a different disk to the files wait until you press a key before starting the copy. So, with the MS-DOS command disk in the drive, type the command line:*

  XCOPY \DIR1*.* B:\DIR2\S/W

  Then when the following message appears:

  Press any key to begin copying file(s)

  then release the MS-DOS disk from the drive and replace it with your source disk. Then press any character key (for example, the Space bar).

9. Summary of MS-DOS Commands

Full details of each command are given in Chapter 8.

APPEND External command

Set a search path for data files

APPEND *[d:]path[:[d:]path...][/E]*

ASSIGN External command

Assigns a drive letter to another drive

ASSIGN *requested-drive[=]searched-drive*

ATTRIB External command

Sets or displays file attributes.

ATTRIB *[+R|-R][+A|-A][d:][path]filename.filetype[/S]*

BACKUP External command

Backup files from one disk to another.

BACKUP *drive 1:[path][filename.filetype]drive2:[/S][/M][/A]*
[/F:size][/D:date][/T:time][/L:[[drive:][path]filename.filetype]]

BREAK Internal command

Sets how often MS-DOS checks for Ctrl-Break

BREAK *[ON|OFF]*

BUFFERS CONFIG.SYS command

Sets the amount of space used for MS-DOS disk buffers

BUFFERS=_n_

CALL Batchfile subcommand

Call a batchfile from within a batchfile

CALL *[d:][path]batchfile*

CHCP External command

Display or change the current code page for the command processor

CHCP *[nnn]*

CHDIR Internal command

Change the current directory

CHDIR *[d:][path]*
CD *[d:][path]*

CHKDSK External command

Check disk for errors and file for non-contiguous storage areas

CHKDSK *[d:][path][filename.filetype][/F][/V]*

CLS Internal command

Clear the screen.

CLS

COMMAND
>   External command
>
>   Start the command processor
>
>   **COMMAND** *[d:][path][ctty-dev][***/E:***nnnn][***/P***][***/C*** string]*

COMP External command
>   Compare files
>
>   **COMP** *[d:][path][filename.filetype][d:][path][filename.filetype]*

COPY Internal command
>   Copy files
>
>   **COPY** *[d:][path]source[***/A***][***/B***][d:][path]destination[***/A***][***/B***][***/V***]*

COUNTRY CONFIG.SYS command
>   Allows MS-DOS to use international time, date, currency and case conversions
>
>   **COUNTRY**=*xxx[,[yyy][,[d:]filename.filetype]]*

CTTY Internal command
>   Change the device used to issue commands
>
>   **CTTY** *device*

DATE Internal command
>   Set or read the date
>
>   **DATE** *[dd-mm-yy]*

DEBUG Debugging utility (not covered in this manual)
>   **DEBUG** *[d:][path][filename.filetype][argument[argument...]]*

DEL Internal command

Delete a file

DEL *[d:][path][filename.filetype[/P]*

DEVICE CONFIG.SYS command

Load an installable device driver

DEVICE=*[d:][path]filename.filetype[parameters]*

DIR Internal command

Display directory

DIR *[d:][path][filename.filetype][/***P***][/***W***]*

DISKCOMP External command

Compare contents of target drive against contents of source drive

DISKCOMP *source-drive***:** *[target-drive][/***1***][/***8***]*

DISKCOPY External command

Copy contents of source drive to target drive

DISKCOPY *[source-drive:][target-drive:]*

DRIVPARM
CONFIG.SYS command
Sets parameters for a disk drive

DRIVPARM=/D:*[/***F:***ff][/***T:***tt][/***S:***ss][/***H:***hh][/***C***][/***N***][/***I***]*

ECHO Batch subcommand

>   Control echoing of commands on the screen

>   **ECHO** *[***ON|OFF***|* *remark]*

EDLIN Text editor

>   Edit a file

>   **EDLIN** *[d:][path]filename.filetype[/***B***]*

ERASE Internal command

>   Delete a file

>   **ERASE** *[d:][path]filename.filetype*

EXE2BIN External command (not covered in this manual)

>   Convert EXE files to binary format

>   **EXE2BIN** *[d:][path]filename.***EXE***[d:][path][filename.filetype]*
>   where *filetype* is **COM** or **BIN**

EXIT External command

>   Exit from COMMAND.COM and return to the previous level (if any)

>   **EXIT**

FASTOPEN External command

>   Reduce time taken to open frequently-used files and directories

>   **FASTOPEN** *d:[=nnn]...*

FC External command

Compare files

FC *[option[option...]][d:][path]filename.filetype[d:][path]filename.filetype*

FCBS CONFIG.SYS command

Set number of File Control Blocks

FCBS=*x,y*

FDISK External command

Configure a hard disk

FDISK

FILES CONFIG.SYS command

Set number of MS-DOS file handles

FILES=*n*

FIND External command and external filter

Look for a string in a file

FIND *[/V][/C][/N]"string"[d:][path]filename.filetype[...]*

FOR Batch subcommand

FOR is used to execute a number of similar commands

FOR %%*parameter* **IN (***value[value...]***) DO** *command*

ORMAT External command

Format the disk in the specified drive

FORMAT *d:[option[option...]]*

GOTO Batch subcommand

>Go to a labelled point in the file

>**GOTO** *label*

GRAFTABL External command

>Load Graphics Table

>**GRAFTABL** */437|860|863|865|/STATUS|?/*

GRAPHICS External command (Only for use in CGA mode)

>Install support for printing black and white or color graphics display screen on a printer

>**GRAPHICS** *[printer][/R][/B]*

IF Batch subcommand

>**IF** *[NOT]* *condition command*

JOIN External command

>Join a disk drive into another disk's directory structure

>**JOIN** *d: [d:]path*

KEYB External command

>Load a keyboard program

>**KEYB** *[xx[,[yyy],[[d:][path]filename.filetype]]]*

LABEL External command

>Create, change or delete a disk volume label

>**LABEL** *[d:][label]*

LASTDRIVE

  CONFIG.SYS command

  Set the last drive letter MS-DOS recognises

  LASTDRIVE=*d*

  LINK Object Linker (not covered in this manual)

  LINK

  MKDIR Internal command

  Make a new directory

  MKDIR *[d:]path*
  MD *[d:]path*

  MODE External command

  Display status of devices and sets mode of operation of input and output devices

  MODE *device:setting[,setting...]*

  MORE External filter

  Make output be displayed one screenful at a time

  MORE

MULTITRACK

  CONFIG.SYS command

  Enable/disable multi-track disk operations

  MULTITRACK=ON|OFF

NLSFUNC External command

Load country-specific information

NLSFUNC *[[d:][path]filename.filetype]*

PARK External command (see Part 1).

Prepares your Hard Disk (if fitted) before moving it

PARK *[d:]*

PATH Internal command

Define a search path

PATH *[d:]path[;[d:]path...]*

PAUSE Batch subcommand

Pause while processing

PAUSE *[remark]*

PRINT External command

Print text files in the background

PRINT *[d:][path]filename.filetype[[d:][path]filename.filetype...]*

PROMPT Internal command

Set up a new system prompt

PROMPT *prompt-text*

RECOVER External command

Recover a file or disk containing bad sectors

RECOVER *d:[path][filename.filetype]*

REM CONFIG.SYS command and batch subcommand

Include remarks in the CONFIG.SYS file

REM *[text]*

RENAME Internal command

Rename a file

REN *[d:][path] old-name new-name*

RELACE External command

Insert new files and update old versions

REPLACE*[source drive:][path]filename.filetype*
[target drive:][path][option[option...]]

RESTORE External command

Restore files made by a previous BACKUP command

RESTORE *drive1:[drive2:][path]filename.filetype[*/**S**][/**P**]
[/**B***:date][*/**A***:date][*/**E***:time][*/**L***:time][*/**M**][/**N**]*

RMDIR Internal command

Remove directory

RMDIR *[d:]path*
RD *[d:]path*

SET Internal command

Set a parameter to a string

SET *parameter=string*

SHARE External command

>Install file sharing and locking

>**SHARE** *[/F:space][/L:locks]*

SHELL CONFIG.SYS command

>Identify the command processor to MS-DOS

>**SHELL=***[d:][path]filename.filetype[parameters]*

SHIFT Batch subcommand

>Shift the dummy parameters

>**SHIFT**

SORT External command and filter

>Sort data

>**SORT** *[/R][/+n][d:][path]filename.filetype[>destination]*

STACKS CONFIG.SYS

>Set the number and size of stacks used by MS-DOS

>**STACKS=***n,m*

SUBST External command

>Substitute the name of an imaginary drive for a path

>**SUBST** *[d:]path*

SYS External command

>Copy system files to the disk in the specified drive

>**SYS** *d:*

TIME Internal command

> Set or read the time
>
> **TIME** *[hours:minutes[:seconds[.hundredths]]]*

TREE External command

> Display the pattern of directories on a drive
>
> **TREE** *[d:][path][/**F**][/**A**]*

TYPE Internal command

> List a simple text file
>
> **TYPE** *[d:][path]filename.filetype*

VER Internal command

> Display MS-DOS version number
>
> **VER**

VERIFY Internal command

> Turn on and turn off verification of all writes to disk
>
> **VERIFY [ON|OFF]**

VOL Internal command

> Display disk volume label
>
> **VOL** *[d:]*

XCOPY External command

> Copy files and directories
>
> **XCOPY** *[d:][path]source[d:][path]destination[option[option...]]*

10. Troubleshooting - MS-DOS

Introduction

This Chapter covers the errors that can occur when using MS-DOS. If you cannot find the solution to your problem here, find out whether the problem relates to the PC hardware by checking the Troubleshooting section in Part One of this manual. If you still cannot solve the problem, consult your dealer.

10.1 When commands fail

Commands fail because:

- you have made a typing error in the command line

- you have not specified the location of a file correctly

- you have not got enough memory space for the program to run

- you have not got enough room on the disk to store the new files the program produces

- the file holding the program has been corrupted

- you are trying to use an external command or a program under the wrong operation system

You can usually tell why a command has failed from what appears on the screen.

- **If the operating system puts up a name followed by "Bad command or file name" or a question mark, it has not found the command, program or batch file you wanted to run.**

  The commonest reason for this is that you mis-typed the command name. For example, you have typed COYP instead of COPY. The other possibility is that the program file is not in the directory or directories the operating system searched. You may have mis-directed the operating system, for example, because you forgot which disk you had in the drive. Check where you told the operating system to look for the file.

- **If the operating system puts up a message like "File not found" together with a file specification, it has not found one of the files you asked it to process.**

  Either you mistyped the filename or the filetype, or the file is not in the directory you specified. Check where you told the operating system to look for the file.

  In both of these cases, you can either re-type the command line at the new system prompt or copy and then edit your previous command line. The keystrokes to help you do this are described in Section 7.2. When you have finished editing the command line, press the [↵] key.

- **If the operating system puts up some other message like "Memory insufficient to run program" or "Disk full", it has met some other problem in carrying out your command.**

  Look up the message in Section 10.2 (and the hardware error messages described in Part 1) and then take whatever action is appropriate. You may, for example, need to erase some files you no longer need from the disk or change what you are trying to do.

- **If the screen goes blank or your PC seems to stop working completely**

  If this happens immediately after you type the command line to run the program, check in the program's user guide precisely which operating system you are supposed to run this program under. This includes checking the version number. It could be that the program will only work with a specific version of, say, MS-DOS - for example MS-DOS 2.0.

  If the screen goes blank after the program has run for a little while, first try typing Ctrl-Q (by holding down the [Ctrl] key and pressing [Q]). It could be that you accidentally caused the program to pause.

  If these actions do not help you identify the problem, reset your PC by holding down the [Ctrl] and [Alt] keys and pressing the [Del] key, and then try again. If the same failure happens again and it is a program that you have written or edited, try again with your back-up copy of the program and/or check the program. If the program is one you have bought, try again using your master copy of the program: if that fails too, consult your dealer.

10.2 System Messages

This section describes MS-DOS messages, their causes, and how to correct them. The programs that generate these messages are given in square brackets [ ]. A full description of how to use each of the programs is given in Chapter 8, where all the MS-DOS programs are listed alphabetically.

A

• Abort edit (Y/N)?
[EDLIN]

This message is displayed when you choose the Edlin Q (quit) command. The Q command exits the editing session without saving any editing changes. Type Y (for Yes) or N (for No).

• Access denied
[ATTRIB][FIND][PRINT][REPLACE][XCOPY]

You tried to replace a write-protected, read-only, or locked file.

• Active Code Page: xxx
[CHCP]

xxx is the code page currently being used by the system.

• Active Code Page not available from con device
[KEYB]

The code page that the system is currently using is not supported on the console (screen) you are using. This means you will not see the characters of the current code page on your screen.

• Add filename? (Y/N)
[REPLACE]

The REPLACE command displays this prompt if you specify the /W switch. Type Y (for Yes) if you want the file to be added to the disk.

- **Adding** *filename*
  [REPLACE]

  The REPLACE command displays this message to let you know which file it is
  adding to the disk.

- **All files canceled by operator**
  [PRINT]

  MS-DOS displays this message when you specify the /T switch with the PRINT
  command.

- **All logical drives deleted in the Extended DOS Partition**
  [FDISK]

  Any logical drives previously associated with the extended DOS partition on your
  disk are now removed.

- **Allocation error, size adjusted**
  [CHKDSK]

  The size of the file indicated in the directory was not consistent with the amount of
  data actually allocated to the file. The file was cut short to match the amount of data
  allocated.

- **All specified file(s) are contiguous**
  [CHKDSK]

  All files are written sequentially on the disk.

- **APPEND already installed**
  [APPEND]

  You have already used the APPEND command once since you switched on your
  computer. Now you are trying to use either the /X or /E switch with this command,
  but these switches are only valid the first time you type the APPEND command.

  If you want to change the APPEND switch, reboot your computer. Then type the
  APPEND command with the switch you want to use.

- **APPEND/ASSIGN Conflict**
  [APPEND]

  You cannot use the APPEND command on an assigned drive. Cancel the drive
  assignment before using the APPEND command with this drive again.

- **Are you sure (Y,N)?**
  [MS-DOS]

  MS-DOS displays this message if you try to delete all the files in the working
  directory by using the *.* wildcard.

  Type Y (for Yes) to delete all the files, or N (for No).

- **Attempted write-protect violation**
  [FORMAT]

  The disk you are trying to format is write-protected. This means that the disk cannot
  have data written onto it.

B

- ***** Backing up files to drive *x*: *****
  Diskette Number: *n*
  [BACKUP]

  BACKUP displays this message while backing up files to the specified drive. Be
  sure to label backup disks with the appropriate backup disk number for use in
  restoring them later.

- **Bad call format reading (or writing) drive *x*:**
  [MS-DOS device error]

  The length of the request header passed to the device driver was incorrect.

- **Bad command error reading (or writing) drive *x*:**
  [MS-DOS device error]

  A device driver issued an incorrect command to the device specified in the error
  message.

- **Bad command or file name**
  [MS-DOS]

  MS-DOS cannot find the program you asked it to run.

  Check to see that you typed the command line properly, and that the file or command is on the disk, or in the command path.

- **Bad or missing Command Interpreter**
  [MS-DOS]

  MS-DOS cannot find the COMMAND.COM file on the disk; either the file is missing from the root directory, or the file is invalid. This message is also given if COMMAND.COM has been moved from the directory it was originally in when you started MS-DOS. Either restart the system with a disk that contains the COMMAND.COM file, or copy the COMMAND.COM file from your backup MS-DOS master disk onto the disk used to start MS-DOS.

- **Bad or missing** *filename*
  [MS-DOS]

  You specified a device incorrectly in the CONFIG.SYS file. Check the accuracy of the DEVICE command in the CONFIG.SYS file.

- **Bad or Missing Keyboard definition file**
  [KEYB]

  MS-DOS cannot find the KEYBOARD.SYS file that you specified with the KEYB command. Check to see that the file you specified exists on the disk. Also check to see that your path includes the directory in which this file resides. Then, re-type the command. If you get this message again, the KEYBOARD.SYS or KEYB.COM file may be corrupted.

- **Bad Partition Table**
  [FORMAT]

  This message means that there is no DOS partition on the hard disk. You must run FDISK to create a DOS partition on your hard disk.

- **Bad unit error reading drive** *x***:**
  [MS-DOS device error]

  Invalid numbers identifying the available drives were passed to the device driver.

- **BREAK is OFF (or ON)**
  [MS-DOS]

  This message tells you the current setting of the BREAK program.

C

- **Cannot CHDIR to** *path* **-**
  tree past this point not processed
  [CHKDSK]

  CHKDSK is checking the structure of the directory and is unable to go to the specified directory. All subdirectories underneath this directory will not be verified. To correct this error automatically, use the CHKDSK **/F** switch.

- **Cannot CHDIR to root**
  [CHKDSK]

  CHKDSK is checking the tree structure of the directory and is unable to return to the root directory. CHKDSK is not able to continue checking the remaining subdirectories.   Try to restart MS-DOS. If this error persists, the disk is unusable.

- **Cannot CHKDSK a Network drive**
  [CHKDSK]

  You cannot check drives that are redirected over the network.

- **Cannot CHKDSK a SUBSTed or ASSIGNed drive**
  [CHKDSK]

  You cannot check drives that have been substituted or assigned.

- **Cannot COPY from (or to) a reserved device**
  [XCOPY]

  You cannot copy files from or to a device.

- **Cannot create extended DOS partition while logical drives exist**
  [FDISK]

  Your disk has one or more logical drives assigned to it. These must be deleted
  before you can create an extended DOS partition. Delete all logical drives using
  FDISK. Then create the extended DOS partition.

- **Cannot create extended DOS partition without primary DOS partition on
  disk 1**
  [FDISK]

  You are trying to create an extended DOS partition, but your first hard disk does not
  contain a primary DOS partition. First, create the primary DOS partition on your
  first hard disk. Then, if you have more room on that disk, or if you have a second
  hard disk, you can create an extended DOS partition.

- **Cannot create a zero cylinder partition**
  [FDISK]

  You are trying to create a partition with a size of 0 cylinders. You must allocate a
  minimum of 1 cylinder to any partition you create.

- **Cannot create Subdirectory BACKUP on drive *x*:**
  [BACKUP]

  The disk may be write-protected, full, or the backup subdirectory may already exist
  and be read-only. Use another disk as a target disk.

- **Cannot DISKCOMP to or from an ASSIGNed or SUBSTed drive**
  [DISKCOMP]

  One of the drives that you specified is a drive that you created using the ASSIGN or
  SUBST command.

- **Cannot DISKCOMP to or from a network drive**
  [DISKCOMP]

  You cannot compare disks on drives that have been redirected over the network.

- **Cannot DISKCOPY to or from an ASSIGNed or SUBSTed drive**
  [DISKCOPY]

  One of the specified drives was created with the ASSIGN or SUBST command.

- **Cannot DISKCOPY to or from a network drive**
  [DISKCOPY]

  You cannot copy disks to or from drives that have been redirected over the network.

- **Cannot do binary reads from a device**
  [COPY]

  The copy cannot be done in binary mode when you are copying from a device. You should either not use the **/B** switch, or you should use the **/A** switch to specify an ASCII copy.

- **Cannot edit .BAK file--rename file**
  [EDLIN]

  You attempted to edit a file that had a filename extension of .BAK (a backup copy created by EDLIN). If you must edit a file that has an extension of .BAK, you must either rename or copy the file and give it a different extension.

- **Cannot format an ASSIGNed or SUBSTed drive**
  [FORMAT]

  You attempted to format a drive currently mapped to another drive by the ASSIGN or SUBST command. Run the ASSIGN command or SUBST command again and clear all drive assignments.

- **Cannot FORMAT a Network drive**
  [FORMAT]

  You cannot format drives that are redirected over the network.

- **Cannot FORMAT nonremovable drive** *x*:
  [BACKUP]

  You are trying to back up files with the **/F** switch. MS-DOS will not allow you to format the target disk specified. Be sure you want to back up files to a hard disk. If you do, you must use a hard disk that is formatted already.

- **Cannot JOIN a Network drive**
  [JOIN]

  You cannot join drives that are redirected over the network.

- **Cannot LABEL a Network drive**
  [LABEL]

  You cannot label a drive that is shared on a network server station.

- **Cannot LABEL a SUBSTed or ASSIGNed drive**
  [LABEL]

  You cannot label a drive if it has been substituted with the SUBST command or assigned with the ASSIGN command. Check the command line to be sure you specified a valid label.

- **Cannot perform a cyclic copy**
  [XCOPY]

  When you are using the **/S** switch, you may not specify a target that is a subdirectory of the source.

- **Cannot recover . entry, processing continued**
  [CHKDSK]

  The "." entry (working directory) is defective and cannot be recovered.

- **Cannot recover .. entry,**
  Entry has a bad attribute (or link or size)
  [CHKDSK]

  The ".." entry (parent directory) is defective and cannot be recovered. If you have specified the /F switch, CHKDSK tries to correct the error automatically.

- **Cannot RECOVER a Network drive**
  [RECOVER]

  You cannot recover files on drives that are redirected over the network.

- **Cannot SUBST a Network drive**
  [SUBST]

  You cannot substitute drives that are redirected over the network.

- **Cannot SYS to a Network drive**
  [SYS]

  You cannot transfer the system files to drives that are redirected over the network.

- **Cannot use FASTOPEN for drive *x*:**
  [FASTOPEN]

  FASTOPEN works only with local, fixed disks and can work with a maximum of four disks at a time. You may be trying to use FASTOPEN over a network, with a floppy disk, or with more than four disks at one time, none of which is possible with FASTOPEN.

- **CHDIR .. failed, trying alternate method**
  [CHKDSK]

  When checking the tree structure, CHKDSK was not able to return to a parent directory. It will try to return to that directory by starting over at the root and searching again.

- **xxxxxxxx code page drive cannot be initialized**
  [MS-DOS]

  MS-DOS cannot start either the PRINTER.SYS or DISPLAY.SYS program. Check
  the DEVICE= command line in your CONFIG.SYS file. You probably included an
  illegal parameter.

- **Code page not prepared**
  [MODE]

  You have selected a code page that has not yet been prepared for the system, or one
  that does not have the correct font to support the current video mode. To prepare a
  code page for the system, use the MODE PREPARE command. If you have
  installed the DISPLAY.SYS installable device driver, be sure the DEVICE=
  command line in your CONFIG.SYS file allows for additional subfonts. For more
  information, see Chapter 4, "Using foreign characters and national symbols" (Code
  Page Switching).

- **Code page *xxx* not prepared for all devices**
  [CHCP]

  You have selected a code page that is not currently supported by a device. First, be
  sure your device supports code page switching, and that it is currently on-line. If the
  device supports code page switching, use the MODE PREPARE command to
  prepare the device for the code page. Then retry the CHCP command.

- **Code page *xxx* not prepared for system**
  [CHCP]

  CHCP is unable to select a code page for the system. First, make sure that the
  NLSFUNC program is installed. If you have not used the DEVICE= command in
  your CONFIG.SYS file to install device drivers, you may now retry the CHCP
  command. If you are using installable device drivers with your system, you must use
  the MODE PREPARE command to prepare the specific code page for each device
  on your system. Then re-type the CHCP command.

- **Code page operation not supported on this device**
  [MODE]

  You have specified a device and code page combination which MS-DOS does not recognise as valid. Check to see that the device you specified exists and that you have listed a valid code page. Also check to see that the code page is supported on that device.

- **Code page requested *xxx* is not valid for given keyboard code**
  [KEYB]

  The keyboard code and code page specified are not compatible. Re-type the KEYB command with compatible keyboard code and code page.

- **Code page specified has not been designated**
  [KEYB]

  You have typed the KEYB command with an option the system doesn't recognize. You must first prepare the associated code page for your console screen device. Use the MODE PREPARE command to prepare the associated code page for CON. Then re-type the KEYB command.

- **Code page specified has not been prepared**
  [KEYB]

  You have typed the KEYB command with an option the system doesn't recognize. You must first prepare the associated code page for your console screen device. Use the MODE PREPARE command to prepare the associated code page for CON. Then re-type the KEYB command.

- **Code page specified is inconsistent with invoked code page**
  [KEYB]

  This warning message lets you know that the KEYB option you have selected does not coincide with the code page for your console screen device (CON). Use the MODE SELECT command if you also want to change the code page for CON.

- **Code page specified is inconsistent with selected code page**
  [KEYB]

  This warning message lets you know that the KEYB option you have selected does not coincide with the code page for your console screen device (CON). Use the MODE select command if you also want to change the code page for CON.

- **Code page** *xxx*
  [MODE]

  This is the code page currently being used by the device specified.

- **Code pages cannot be prepared**
  [MODE]

  You have either specified a duplicate code page for this device or tried to prepare more than the total number of code pages sup ported for this device. Check the DEVICE= command line in your CONFIG.SYS file to see how many prepared code pages are allowed for this device. Use the /**STATUS** option of the mode command to find out which code pages are already prepared for this device.

- **Compare another diskette (Y/N)?**
  [DISKCOMP]

  DISKCOMP displays this message when it has completed its comparison of the disks. Type Y (for Yes) if you want to compare more disks; or type N (for No) if you don't.

- **Compare error on disk**
  side *s*, **track** *t*
  [DISKCOMP]

  DISKCOMP found a difference on the disk in the specified drive, side *s*, track *t*.

- **Compare OK**
  [DISKCOMP]

  DISKCOMP displays this message if the disks are identical.

- **Compare process ended**
  [DISKCOMP]

  DISKCOMP displays this message if a fatal error occurred during the comparison.

- **Comparing _t_ tracks**
  _n_ sectors per track, _s_ side(s)
  [DISKCOMP]

  This message confirms the format of the disks that you are comparing.

- **COM port does not exist**
  [MODE]

  You have specified an invalid COM port.

- **Contains _n_ non-contiguous blocks.**
  [CHKDSK]

  The disk contains fragmented files. If you want to copy this disk, you should use the
  COPY or XCOPY command instead of the DISKCOPY command. The new copy
  will then store the new files sequentially.

- **Content of destination lost before copy**
  [COPY]

  The source file that you specified in the COPY command was overwritten before the
  copy process completed. Refer to the COPY command for the proper syntax.

- **Convert lost chains to files (Y/N)?**
  [CHKDSK]

  CHKDSK displays this message if it finds information on the disk that isn't
  allocated properly in the disk's File Allocation Table. If you type Y (for Yes) in
  response to this prompt, CHKDSK recovers the lost blocks it found when checking
  the disk. CHKDSK then creates a proper directory entry and a file for each lost
  chain with a filename of the form: filennnn.chk. If you type N (for No), CHKDSK
  frees the lost blocks so that they can be reallocated and does not recover any data
  that was in those lost blocks.

- **Copying** *t* **tracks**
  n **Sectors/Track,** *s* **Sides**
  [DISKCOPY]

  DISKCOPY displays this message during copying.

- **Copy process ended**
  [DISKCOPY]

  DISKCOPY could not copy the entire disk. Use the COPY or XCOPY command to
  copy specific files onto the disk.

- **Corrections will not be written to disk**
  [CHKDSK]

  There are errors on the disk, but CHKDSK will not correct them because you did
  not specify the /F switch. You must specify the CHKDSK switch to correct disk
  errors.

- **Current date is** *dd-mm-yy*
  [DATE]

  The DATE command displays this message. Enter the correct date and press the
  RETURN key.

- **Current keyboard code:** *xx* **code page:** *yyy*
  Current CON code page: *zzz*
  [KEYB]

  This message displays the current keyboard code and its associated code page, and
  current code page used by your console screen device (CON).

- **Current keyboard does not support this code page**
  [KEYB]

  The code page selected is not compatible with the current keyboard code. Check
  the code page you have selected. If it is correct, change the keyboard code with the
  KEYB command.

- **Current time is** *hh:mm:ss.hh*
  [TIME]

  The TIME command displays this message. Enter the correct time and press the [⏎]
  key.

D

- **Data error reading drive** *x*:
  [MS-DOS device error]

  MS-DOS could not read the data from the disk properly. This is often due to a
  defective disk. Try typing R (for Retry) several times, or type A (for Abort) to end
  the program. (It's a good idea to make a new copy of the disk, because if it's
  defective, you may lose information.)

- **Delete current volume label (Y/N)?**
  [LABEL]

  If a current volume label exists, Label displays this message in response to the
  prompt to enter the new volume label for this disk. If you want to delete the volume
  label, type Y (for Yes); otherwise, type N (for No).

- *xxxxxxxx* **device driver cannot be initialized**
  [MS-DOS]

  You are trying to install a device driver by using a DEVICE= command line in your
  CONFIG.SYS file. The syntax on that command line is wrong. See the DEVICE=
  command in Chapter 8 for the correct syntax.

- **Device Error during Status**
  [MODE]

  MS-DOS found an error with the specified device when it was checking the status
  of that device. The problem may be due to a device that does not support code
  pages, a device not properly prepared for code page switching, a device which
  cannot support more code pages than those already prepared, or a device with a bad
  or irregular font file.

  Check the DEVICE command line in your CONFIG.SYS file. Make sure that the
  command syntax and limits for subfonts and additional code pages are all correct.

Also check to see if your device supports code page switching. Consult your dealer if you are unsure.

- **Device Error during Prepare**
  [MODE]

  MS-DOS found an error with the specified device when preparing that device for code page switching. The problem may be due to a device that does not support code pages, a device not properly prepared for code page switching, a device which cannot support more code pages than those already prepared, or a device with a bad or irregular font file.

  Check the DEVICE= command line in your CONFIG.SYS file. Make sure that the command syntax and limits for subfonts and additional code pages are all correct. Also check to see if your device supports code page switching. Consult your dealer if you are unsure.

- **Device Error during Select**
  [MODE]

  MS-DOS found an error with the specified device. The problem may be due to a device that does not support code pages, a device not properly prepared for code page switching, a device which cannot support more code pages than those already prepared, or a device with a bad or irregular font file.

  Check the DEVICE= command line in your CONFIG.SYS file. Make sure that the command syntax and limits for subfonts and additional code pages are all correct. Also check to see if your device supports code page switching. Consult your dealer if you are unsure.

- **Device Error during write of font file to device**
  [MODE]

  MS-DOS found an error when it tried to write the font file to the specified device. The problem may be due to a device that does not support code pages, a device not properly prepared for code page switching, a device which cannot support more code pages than those already prepared, or a device with a bad or irregular font file.

  Check the DEVICE= command line in your CONFIG.SYS file. Make sure that the command syntax and limits for subfonts and additional code pages are all correct. Also check to see if your device supports code page switching. Consult the hardware vendor if you are unsure.

- **Device or code page missing from font file**
  [MODE]

  MS-DOS did not find a definition of the indicated code page for this device in the font file. Use the mode command to specify another code page for this device. Also check to see that the font file supports the code page you want to use. This error also may cause specified code pages to be undefined. Use the MODE command to prepare and refresh lost code pages.

- **Device *ddd* not prepared**
  [MODE]

  No code page has been prepared for this device.

- **DEVICE Support Not Present**
  [DISKCOMP][DISKCOPY]

  The disk drive does not support MS-DOS 3.3 device control.

- **Directory is joined**
  [CHKDSK]

  CHKDSK does not process directories that are joined. Use the JOIN /D command to break the connections between the directories, and then run CHKDSK again.

- **Directory is totally empty,**
  no . or ..
  [CHKDSK]

  The specified directory does not contain references to working and parent directories. Delete the specified directory and recreate it.

- **Directory not empty**
  [JOIN]

  You can only join onto an empty directory.

- **Disk error reading (or writing) drive *x*:**
  [MS-DOS device error]

  MS-DOS could not read the data from the disk properly. This is often due to a defective disk.

  Try typing R (for Retry) several times, or type A (for Abort) to end the program. (It's a good idea to make a new copy of the disk, because if it's defective, you may lose information.)

- **Disk error reading (or writing) FAT**
  [CHKDSK]

  One of your File Allocation Tables has a defective sector in it. MS-DOS automatically uses the other FAT.

  You should copy all your files onto another disk. To correct this error automatically, you simply specify the CHKDSK /F switch.

- **Diskette bad or incompatible**
  [DISKCOPY]

  The source disk is not formatted, or was formatted incorrectly. You cannot copy it.

- **Disk full. Edits lost**
  [EDLIN]

  EDLIN was not able to save your file due to lack of disk space. You should always make sure that there is enough room on the default disk to save your file before you use the EDLIN E (end) command. You should also make sure that the default disk is not write-protected.

- **Disk unsuitable for system disk**
  [FORMAT]

  The FORMAT program detected a bad track on the disk where system files should reside. You should use this disk to store data only.

- **Do not specify filename(s)**
  Command format: **DISKCOMP** *d: d:[/1][/8]*
  [DISKCOMP]

  You specified an incorrect switch or gave a filename in addition to a drive name.

- **Do not specify filename(s)**
  Command format: DISKCOPY *d: d:[/1]*
  [DISKCOPY]

  You specified an incorrect switch or gave a filename in addition to a drive name.

- **Do you see the leftmost 0? (Y/N)**
  [MODE]

  MODE displays this message to help you align the test pattern on your screen. Type Y (for Yes) if you can see the leftmost 0 in the test pattern, or type N (for No) if you want to shift the display to the right.

- **Do you see the rightmost 9? (Y/N)**
  [MODE]

  MODE displays this message to help you align the test pattern on your screen. Type Y (for Yes) if you can see the rightmost 9 in the test pattern, or type N (for No) if you want to shift the display to the left.

- **Do you wish to use the maximum size for a DOS partition and make the DOS partition active (Y/N)........[]**
  [FDISK]

  You are formatting your hard disk. Type Y (for Yes) and press the [↵] key if you want to format your entire hard disk as the primary DOS partition. Otherwise, type N (for No) and press the [↵] key.

- **Does name specify a file name
  or directory name on the target
  (F = file D = directory)?**
  [XCOPY]

  XCOPY displays this prompt if the target directory does not exist. Type F if the
  name specifies a file, or D if the target specifies a directory that does not currently
  exist.

- **(.)(..) Does not exist**
  [CHKDSK]

  This is a message from CHKDSK to inform you that either the "." or ".." directory
  entry is invalid.

- **DOS 2.0 or later required**
  [ATTRIB][BACKUP][FC][GRAPHICS][JOIN][MODE][RESTORE][SUBST]

  You cannot use these utilities with 1.xx versions of MS-DOS.

- **Drive D already deleted**
  [FDISK]

  You tried to delete drive D, but it had already been deleted.

- **Drive deleted**
  [FDISK]

  You deleted a hard drive from the system.

- **Drive has been changed or deleted**
  [FDISK]

  You changed or deleted a hard drive on the system.

- **Drive letter must be specified**
  [FORMAT]

  You did not specify the drive letter for the drive that you want to format. You must specify the name of the drive that you want to format.

- **Drive x: not ready**
  Make sure a diskette is inserted into
  the drive and the door is closed
  [DISKCOPY][DISKCOPY]

  The drive is empty, or you did not close the door of the disk drive.

- **Drive types or diskette types**
  not compatible
  [DISKCOMP][DISKCOPY]

  You must have the same size and type of disks to run these commands. For example, you cannot copy from a single-sided disk to a double-sided disk, or compare a high-density disk with a low-density disk.

  You should use FC if you want to compare the files on the disks. If you want to copy the disk, you can use the COPY command or the XCOPY command, or reformat the target disk so that it's the same type as the source disk, or use a disk of the same type.

- **Duplicate file name**
  [RENAME]

  You tried to rename a file to a filename that already exists, or the name you specified could not be found.

E

- **ECHO is off (or on)**
  [MS-DOS]

  This message tells you the current status of Echo.

- **End of input file**
  [EDLIN]

  The entire file was read into memory. If the file was read in sections, this message indicates that the last section of the file is in memory.

- **Enter current Volume Label for drive** *x*:
  [FORMAT]

  FORMAT asks you to enter the current volume label for verification before it formats the hard disk in the specified drive. If you do not know what the volume label is, press CONTROL-C to abort this command, and give the VOL command for the specified drive. Then give the format command again.

- **Enter new date:** (*dd-mm-yy*)
  [DATE]

  You must respond to this prompt when you start MS-DOS, or when you use the DATE command. Type the date in the format indicated by the prompt, or press the [↵] key to accept the current date.

- **Enter new time:**
  [TIME]

  You must respond to this prompt when you start MS-DOS. Type the time in the format indicated by the prompt, or press the [↵] key to accept the current time.

- **Entry error**
  [EDLIN]

  The last command you typed contained a syntax error. Re-type the command with the correct syntax and press the [↵] key.

- **Entry has a bad attribute (or link or size)**
  [CHKDSK]

  This message may be preceded by one or two periods that show which subdirectory is invalid. If you have specified the /**F** switch, CHKDSK tries to correct the error automatically.

- **Error during read of Font file**
  [MODE]

  MS-DOS found an error when it tried to read the font file for the code page specified.

- **Error in COUNTRY command**
  [MS-DOS]
  You used the incorrect syntax for the COUNTRY command in your CONFIG.SYS file.

- **Error in .EXE file**
  [MS-DOS]

  The .EXE file you have asked MS-DOS to load has an invalid internal format. You cannot run this program. Check to make sure that you are using the correct version of MS-DOS.

- **Error opening log file**
  [BACKUP]

  MS-DOS cannot open the BACKUP.LOG file. Check the drive and path specified with this command. Remember that the LOG file cannot be located on the target drive. If you did not specify a filename for the LOG, then the error occured when MS-DOS tried to open and create BACKUP.LOG on the source disk.

- **Error reading/writing partition table**
  [FORMAT]

  FORMAT could not read or write the partition table. You should run FDISK on the disk and then try formatting it again.

- **Errors found, F parameter not specified**
  Corrections will not be written to disk
  [CHKDSK]

  CHDKSK found errors on the disk. If you have not specified the /F switch, CHKDSK continues printing messages but will not correct the errors. You should run CHKDSK with the /F switch if you want to correct the problems encountered by the CHKDSK command.

- **Errors on list device indicate that it**
  may be off-line. Please check it.
  [PRINT]

    Your printer is not turned on.

- **Error trying to open BACKUP.LOG file**
  Continuing without making log entries.
  [BACKUP]

    You specified the BACKUP /L switch, but BACKUP could not create the
    BACKUP.LOG file.

- **Error writing to device**
  [MS-DOS]

    You tried to send too much data to a device, so MS-DOS was unable to write the
    data to that device.

- **EXEC failure**
  [MS-DOS]

    MS-DOS either found an error when reading a command, or the FILES command in
    the CONFIG.SYS file is set too low. Increase the value of the files command in the
    CONFIG.SYS file, and restart MS-DOS.

- **Extended DOS partition already exists**
  [FDISK]

    You cannot create another extended DOS partition.

- **Extended DOS partition created**
  [FDISK]

    You have created an extended DOS partition on your hard disk.

- **Extended DOS partition deleted**
  [FDISK]

    You have deleted an extended DOS partition from your hard disk.

F

- **Failure to access code page font file**
  [MODE]

  MS-DOS cannot open the font file for the specified code page.

  Check to see that you typed the font file name, and its pathname correctly. Also check the CONFIG.SYS file to see that the device driver for this device has been properly installed. If the CONFIG.SYS file is incorrect, correct it and restart MS-DOS before retyping the MODE command.

- **Failure to access COUNTRY.SYS**
  [SELECT]

  MS-DOS cannot open the COUNTRY.SYS file. Check to see that your path points to the directory in which COUNTRY.SYS resides. Then re-type the command.

- **Failure to access device:** *xxx*
  [Mode]

  You are trying to specify a code page for a particular device, but MS-DOS cannot access the device listed. Re-type the command using an existing device. Make sure you are typing the device name correctly.

- **Failure to access keyboard.sys**
  [SELECT]

  MS-DOS cannot open the KEYBOARD.SYS file. Be sure KEYBOARD.SYS exists on your source disk.

- **FCB unavailable reading (or writing) drive** *x*:
  [MS-DOS device error]

  An unusual error has occurred. This error usually requires an experienced programmer to fix it.

  Type R (for Retry) or A (for Abort).

- **FC: cannot open filename - No such file or directory**
  [FC]

  One of the files that you specified doesn't exist. Check the directory for the correct filename.

- **FC: filename longer than filename**
  [FC]

  After reaching the end of one of the files in a file comparison, the other file still has data left that was not yet compared.

- **FC: incompatible switches**
  [FC]

  You have specified switches that are not compatible. (For example, /**B** and /**L**.)

  You should not combine binary and ASCII comparison switches.

- **FC: no differences encountered**
  [FC]

  The files are the same.

- **FC: out of memory**
  [FC]

  You do not have enough memory to perform the comparison.

- **File allocation table bad**
  [MS-DOS]

  The disk may be defective.

  Run CHKDSK /F to check the disk.

- **File allocation table bad drive x:**
  [CHKDSK]

  This message means that the disk was not formatted or was not formatted properly. It could also mean that an operating system other than MS-DOS is on the disk. Run CHKDSK /F to check the disk. If this message is displayed again, you must reformat the disk.

- **File** *filename* **cancelled by operator**
  [PRINT]

  MS-DOS displays this message when you specify the /T switch with the PRINT command.

- **File cannot be converted**
  [ExE2BIN]

  The input file is not in the correct format.

- **File cannot be copied onto itself**
  [COPY][REPLACE][XCOPY]

  The source filename you specified is the same as the target filename.

- **File creation error**
  [MS-DOS][EDLIN][RESTORE][XCOPY]

  You tried to add a new filename or replace a file that already exists in the directory, or there was not enough space for the file. If the file already exists, it is a read-only file and cannot be replaced. This error message may also occur if the root directory is full, out of files, or if the filename is the same as a volume or directory, or a hidden (or system) file.

- **File is READ-ONLY**
  [EDLIN]

  The file is designated read-only, so you may not change it.

- **File name must be specified**
  [EDLIN]

  You did not specify a filename when you started EDLIN. You should type the EDLIN command followed by a filename.

- **File not found**
  [CHKDSK][EDLIN][FC][FIND][PRINT][RECOVER][RENAME][XCOPY]

  MS-DOS could not find the file that you specified, or you tried to rename a file with a name already in the directory. Check to see that you entered the filename correctly.

- ***** Files were backed up
  at time on date *****
  [RESTORE]

  This is an information message only.

- **FIND: Access denied**
  [FIND]

  You cannot access the file. Make sure that the disk is not write-protected, read-only, or locked.

- **FIND: File not found**
  [FIND]

  MS-DOS could not find the file that you specified. Make sure you have typed the filename correctly.

- **FIND: Invalid number of parameters**
  [FIND]

  You specified either too many or too few options in the command line.

- **FIND: Invalid Parameter**
  [FIND]

  One of the switches you specified is wrong.

- **FIND: Read error in filename**
  [FIND]

  The FIND command could not read the specified file.

- **FIND: Syntax error**
  [FIND]

  Check to make sure that you have typed the command correctly.

- **First cluster number is invalid,**
  entry truncated
  [CHKDSK]

  The file directory entry contains an invalid pointer to the data area. If you specified
  the **/F** switch, the file is truncated to a zero-length file.

- **FIRST diskette bad or incompatible**
  [DISKCOMP]

  DISKCOMP cannot recognize the format on the source disk. You should run
  CHKDSK to help you identify the problem.

- **Fixups needed - base segment hex:**
  [EXE2BIN]

  The source (.EXE) file contained information indicating that a load segment is
  required for the file. You must specify the absolute segment address where the
  finished module is to be located.

- **Font File contents invalid**
  [MODE]

  MS-DOS cannot use the contents of the font file specified. Make sure you are typing the name of the font file correctly. Re-type the command. If this message is displayed again, your font file may have been altered or corrupted. Recopy this file from the master MS-DOS disk. Type the command again. This error may also cause existing selected code pages to be undefined. Use the MODE command to prepare these code pages again, and to refresh them.

- **For cannot be nested**
  [MS-DOS]

  You cannot nest FOR commands in a batch file.

- **Format another (Y/N)?**
  [FORMAT]

  FORMAT displays this message when it has finished formatting a disk. Type Y (for Yes) if you want to format another disk, or type N (for No) if you don't. If you accidentally type Y, you can abort the format process by typing CONTROL-C in response to the message "Strike any key."

- **Format complete**
  [FORMAT]

  FORMAT displays this message when it has finished formatting the disk in the specified drive.

- **Format failure**
  [FORMAT]

  MS-DOS could not format the disk. This message is usually displayed with an explanation as to why the command failed.

- **Format not supported on drive** *x*:
  [FORMAT]

  You cannot use FORMAT to format this drive. You may have specified device parameters that your computer cannot support.

- **Formatting while copying**
  [DISKCOPY]

  DISKCOPY displays this message if the target disk has never been formatted.

G

- **General failure reading (or writing) drive** *x*:
  [MS-DOS device error]

  An unusual error has occurred. This error often indicates that an attempt has been made to read or write to a floppy disk that has not been formatted. If you are not attempting to read or write to such a disk, the problem will require an experienced programmer to fix it.

  Type R (for Retry) or A (for Abort).

- **GRAFTABL needs DOS version 2.0 or later**
  [GRAFTABL]

  You cannot use GRAFTABL with 1.*xx* versions of MS-DOS.

- **Graphics characters already loaded**
  [GRAFTABL]

  The GRAFTABL command displays this message if you have already loaded the table of graphics characters into memory.

- **Graphics characters loaded**
  [GRAFTABL]

  The GRAFTABL command displays this message after it loads the table of graphics characters into memory.

H

- **Hardware code pages:**
  Prepared code pages:
  [MODE]

  This message lists the current code pages prepared for the device specified.

- **Has invalid cluster, file truncated**
  [CHKDSK]

  The file directory entry contains an invalid pointer to the data area. If you specified the /F switch, the directory entry will remain, but the file, that the directory entry identifies, will not contain any data.

- **Head:** *hhh* **Cylinder:** *ccc*
  [FORMAT]

  FORMAT displays the head and cylinder number of the track currently being formatted.

- **Illegal device name**
  [MODE]

  Your computer does not recognise this device name.

- **Incompatible system size**
  [SYS]

  The system files occupy more space on the source disk than is available on the target disk. You cannot use the SYS command to transfer the system files to this disk.

- **Incorrect APPEND Version**
  [MS-DOS]

  You are not using the MS-DOS 3.3 APPEND command. You are using another version which is incompatible.

- **Incorrect DOS Version**
  [APPEND][ATTRIB][BACKUP][CHKDSK][DISKCOMP][DISKCOPY]
  [EDLIN][FC][FIND][FORMAT][GRAPHICS][JOIN][KEYB*xx*]
  [LABEL][MODE][MORE][PRINT][RECOVER][REPLACE][RESTORE]
  [SHARE][SORT][SUBST][SYS][TREE][XCOPY]

Some MS-DOS utilities will not run on older versions of the operating system, and many are written to run only on the exact version of MS-DOS that they were created for. You must use the correct version of MS-DOS to run this command.

- **Incorrect DOS Version, use DOS 2.00 or later**
  [LINK]

  Some MS-DOS utilities will run only on MS-DOS version 2.00 or later versions.

- **Incorrect number of parameters**
  [JOIN][SUBST]

  You specified either too many or too few options in the command line.

- **Incorrect parameter**
  [ASSIGN][SHARE]

  One of the options you specified is wrong.

- **Infinite retry on parallel printer timeout**
  [MODE]

  Your printer is probably off-line or not ready. If the printer appears to be ready, you may have to press the [Ctrl][Alt][Delete] keys to reset the computer.

- **Insert backup diskette *n* into drive *x*:**
  [BACKUP][RESTORE]

  This message prompts you for the *n*th back up disk. Put the next disk into the specified drive. Be sure to label each back up disk in the appropriate order for use when restoring the files.

- **Insert destination disk in drive *x*:**
  and strike any key when ready
  [SYS]

  This message appears when you are using SYS to transfer the operating system with a single disk drive. You should insert a disk in the appropriate drive and press any character or number key to begin processing.

- **Insert disk with \COMMAND.COM in drive A**
  and strike any key when ready
  [MS-DOS]

  The program you have just run used up almost all of memory. MS-DOS must now reload the COMMAND.COM file from disk. However, MS-DOS cannot find COMMAND.COM on the disk from which COMMAND.COM was originally loaded.

  Insert a disk that contains a copy of COMMAND.COM into the default drive (it must be the same version with which you started MS-DOS).

- **Insert diskette for drive** x:
  and strike any key when ready
  [MS-DOS]

  This message appears when MS-DOS is copying and formatting. You should insert a disk in the appropriate drive and press any character or number key to begin processing.

- **Insert diskette with batch file**
  and press any key when ready
  [MS-DOS]

  The disk containing your batch file is not in the drive you originally specified. Re-insert the disk that contains the batch file in the appropriate drive.

- **Insert DOS diskette in drive** x:
  and strike ENTER when ready
  [FORMAT]

  You typed the FORMAT /S command, but the disk in the default drive does not contain MS-DOS system files. Insert a disk with the files IO.SYS and MSDOS.SYS in the drive specified and press any key.

- **Insert FIRST diskette into drive** x:
  [DISKCOMP]

  This message prompts you for the first disk that you want to compare.

- **Insert last backup diskette in drive** *x*:
  Strike any key when ready
  [BACKUP]

  This message prompts you for the final back up disk. After you have put the final
  back up disk into the drive specified, press any alphanumeric key to continue the
  back up process.

- **Insert restore target diskette into drive** *x*:
  [RESTORE]

  RESTORE displays this prompt if you are restoring files to a floppy. Put the target
  disk into the specified drive.

- **Insert SECOND diskette into drive** *x*:
  [DISKCOMP]

  This message prompts you for the disk that you want to compare with the first disk.

- **Insert source disk**
  [BACKUP]

  This message prompts you to put the disk which contains the data to be copied into
  the drive.

- **Insert SOURCE diskette into drive** *x*:
  [DISKCOPY]

  This message prompts you to put the disk to be copied into the specified drive.

- **Insert system diskette in drive** *x*:
  and strike any key when ready
  [SYS]

  SYS needs a disk from which to read the IO.SYS and MSDOS.SYS files. Insert a
  system disk into the specified drive and press any character or number key to start
  the system copy process.

- **Insert TARGET diskette into drive** *x*:
  [DISKCOPY]

  DISKCOPY displays this message to prompt you to place the target disk into the specified drive. If your computer has one floppy drive, this message prompts you to put the proper disk into the drive.

- **Insufficient disk space**
  [MS-DOS][REPLACE][SORT][XCOPY]

  The disk is full and does not contain enough room to perform the specified operation.

- **Insufficient memory**
  [BACKUP][CHKDSK][DISKCOMP][DISKCOPY][EDLIN][REPLACE]
  [RESTORE][SORT][XCOPY]

  There is not enough memory in your computer to perform the specified operation. Before retrying this operation, you must free memory by deleting files. In EDLIN, you may be able to free memory by typing a W (WRITE) command followed by an A (APPEND) command.

- **Insufficient memory for system transfer**
  [FORMAT]

  Your memory configuration is insufficient to transfer the MS-DOS system files IO.SYS and MSDOS.SYS with the FORMAT /S switch.

- **Insufficient room in root directory.**
  Erase files in root and repeat CHKDSK
  [CHKDSK]

  The CHKDSK command always recovers lost files into the root directory. In this case, your root directory is full. Delete some files in your root directory, or move them to another directory to make room for the lost files.

- **Intermediate file error during pipe**
  [MS-DOS]

  The pipe operation uses temporary files on the disk that are deleted automatically once the piping process is complete. An error has occurred in one of these files. Make sure that there is enough room on the disk for the temporary file and that the disk is not write-protected, and try the command again.

- **Internal error**
  [FC][MODE][SHARE]

  This message indicates an error in the utility.

- **Internal stack overflow**
  System Halted
  [MS-DOS]

  The system tried to use more stacks than were available. This caused a series of hardware interrupts and halted the system. Restart MS-DOS. Then edit your CONFIG.SYS file and allocate more stack resources. For more information see the STACKS command in Chapter 8.

- **Invalid argument**
  [BACKUP][FC][RESTORE]

  You have specified an invalid argument. Check the syntax of the command you are using with the command description in Chapter 8.

- **Invalid baud rate specified**
  [MODE]

  You have specified an incorrect baud rate. Valid choices are 110, 150, 300, 600, 1200, 2400, 4800, and 9600. You must specify at least the first two digits of the baud rate.

- **Invalid characters in volume label**
  [FORMAT][LABEL]

  The volume label should only contain up to 11 alphanumeric characters.

- **Invalid code page specified**
  [CHCP]

  You selected an invalid code page number. Re-type the command with the correct code page.

- **Invalid COMMAND.COM**
  Cannot load COMMAND, system halted
  [MS-DOS]

  The progam you have just run has used up almost all of memory. MS-DOS must now reload the COMMAND.COM file from disk. However, the copy of COMMAND.COM it finds is either corrupt or is, perhaps, an older version. The system cannot continue. You must restart the system.

- **Invalid country code**
  [MS-DOS]

  In your CONFIG.SYS file you have specified a country number that is not in the table of files configured in this version of MS-DOS. Country codes must be in the range 1-99 and are set by your computer manufacturer.

- **Invalid country code or code page**
  [MS-DOS]

  MS-DOS found an invalid country code or code page number in your CONFIG.SYS file. Correct the COUNTRY command line in your CONFIG.SYS file.

- **Invalid current directory**
  [CHKDSK]

  Your disk has an invalid directory on it. You may be able to recover some of the files on this disk by copying them with the COPY command. Otherwise, you must replace the disk.

- **Invalid date**
  [DATE][XCOPY]

  You specified an invalid date in response to the prompt for the date. Enter a valid date. The syntax of the date command is given in the DATE command description listed in Chapter 8.

- **Invalid Date/Time**
  [BACKUP]

  You specified an invalid date with one of the BACKUP command switches. Refer to Chapter 3, "MS-DOS Commands," for the proper syntax of the BACKUP command, then try again.

- **Invalid device**
  [MS-DOS]

  The device specified was not AUX, CON, NUL, or PRN.

- **Invalid device parameters from device driver**
  [FORMAT]

  FORMAT displays this message when the number of hidden sectors is not evenly divisible by the number of sectors per track (that is, the partition does not start on a track boundary). This might happen if you tried to format a hard disk that previously had been formatted with MS-DOS 2.x without first running FDISK, or if you have set the device driver parameters incorrectly. Check the CONFIG.SYS file for incorrect DEVICE or DRIVPARM commands.

- **Invalid directory**
  [MS-DOS]

  The directory you specified either does not exist or is invalid. Check to see that you entered the directory name correctly.

- **Invalid disk change reading (or writing) drive** *x:*
  [MS-DOS device error]

  You changed the disk in a drive when you weren't supposed to. Put the disk back in the drive and type R (for Retry).

- **Invalid drive in search path**
  [MS-DOS]

  The drive does not exist.

- **Invalid drive or filename**
  [EDLIN][RECOVER]

  You did not type a valid drive name or filename. Enter a valid drive name or filename.

- **Invalid drive specification**
  [BACKUP][CHKDSK][DISKCOMP][DISCOPY][FORMAT][LABEL]
  [PRINT][REPLACE][RESTORE][SYS][TREE][XCOPY]

  The drive is incorrect or does not exist. Enter a valid drive name.

- **Invalid environment size specified**
  [COMMAND]

  You gave an invalid number of bytes with the /E switch. You must specify a number between 160 and 32,768 (bytes).

- **Invalid keyboard code specified**
  [KEYB]

  You selected an invalid keyboard code with the KEYB command. Re-type the command with the correct keyboard code.

- **Invalid language specified**
  [KEYB]

  You typed an invalid keyboard code with the KEYB command. See the KEYB command in Chapter 8, for a list of valid keyboard codes. Re-type the command using a valid keyboard code.

- **Invalid number of parameters**
  [ATTRIB][BACKUP][FC][FIND][RECOVER][RESTORE][XCOPY]

  Either you did not specify an option or string, or you specified the wrong number of options in the command line.

- **Invalid parameter(s)**
  [BACKUP][CHKDSK][DISKCOMP][DISKCOMP][EDLIN][FIND]
  [FORMAT][JOIN][MODE][PRINT][REPLACE][RESTORE][SORT]
  [SUBST][SYS][TREE][XCOPY]

  One of the switches you specified is wrong or does not exist. Refer to Chapter 8, to make sure you are using the correct switches.

- **Invalid path, not directory, or directory not empty**
  [MS-DOS]

  You are unable to remove the directory requested for one of the specified reasons.

- **Invalid path (or file not found)**
  [ATTRIB][BACKUP][COPY][RESTORE][TREE][XCOPY]

  You have entered a pathname or filename that does not exist. Enter a valid pathname or filename with the command.

- **Invalid path or parameter**
  [APPEND]

  You specified a file or directory that does not exist. Enter a valid pathname or filename with the APPEND command. See Chapter 8 for a description of the APPEND command.

- **Invalid signature in COUNTRY.SYS file**
  [SELECT]

  Select reads the COUNTRY.SYS file to verify the country code. Select quits if it cannot find a proper file header or a specific country code.

- **Invalid signature in KEYBOARD.SYS file**
  [SELECT]

  SELECT reads the KEYBOARD.SYS file to verify the keyboard code. SELECT quits if it cannot find the proper file header or a specific keyboard code.

- **Invalid STACK parameter**
  [MS-DOS]

  The syntax of the STACK command in your CONFIG.SYS file includes an invalid parameter. See Chapter 8 for the correct syntax of that configuration command.

- **Invalid sub-directory entry**
  [CHKDSK]

  The subdirectory that you specified either does not exist or is invalid. Check whether you typed the subdirectory name correctly.

- **Invalid syntax**
  [MS-DOS]

  You used the wrong syntax when typing a command. See Chapter 8, for the correct syntax of an MS-DOS command.

- **Invalid syntax on DISPLAY.SYS code page driver**
  [MS-DOS]

  You used the wrong syntax when you typed the DEVICE= command in your CONFIG.SYS file to load DISPLAY.SYS. See Chapter 8 for the correct syntax of the DEVICE= command.

- **Invalid syntax on PRINTER.SYS code page driver**
  [MS-DOS]
  You used the wrong syntax when you typed the DEVICE= command in your CONFIG.SYS file to load PRINTER.SYS. See Chapter 8 for the correct syntax of the DEVICE= command.

- **Invalid time**
  [TIME]

  You specified an invalid time. See Chapter 8, for the correct syntax, and try the command again.

- **Invalid Volume ID**
  [FORMAT]

  FORMAT displays this message if you enter a volume label that doesn't match the label on the hard disk you want to format. It then quits the format process. Use the VOL command to find out what the volume label for the hard disk is, then try the command again. The VOL command is listed in Chapter 8.

- **Invalid working directory**
  process cannot continue
  [CHKDSK]

  The current directory of the disk being checked is damaged and unusable.

- *X* **is not a choice, Please enter** *y-z*
  [FDISK]

  You tried to select an invalid option *x*. Select a valid option from the range shown (*y-z*).

K

- **KEYB has not been installed**
  [MS-DOS]

  No alternate keyboard code has been installed for your system. If you want to use keyboard code other than the default U.S. (QWERTY) keyboard, use the KEYB command to install it.

L

- **Label not found**
  [MS-DOS]

  Your batch file contains a GOTO command to a non-existent label.

- **Last backup diskette not inserted**
  Insert last backup diskette in drive *x***:**
  Strike any key when ready
  [BACKUP]

  This message prompts you for the final back up disk. After you have put the final backup disk into the drive specified, press any alphanumeric key to continue the back up process.

- ***** Last file not backed up *****
  [BACKUP]

  BACKUP could not back up the last file on the disk. This message may occur if there is no more room on the target disk. It may also occur if there was an error in the source file, or on the target disk. You may have to back up this file separately to another disk.

- **Line too long**
  [EDLIN]

  During an EDLIN R (REPLACE) command, the string given as the replacement caused the line to expand beyond the limit of 253 characters. You should divide the long line into two lines and retry the R command.

- **List output is not assigned to a device**
  [PRINT]

  When you first type the PRINT command, MS-DOS asks you what device you want to specify as a printer. This message appears if PRINT is set up for a device that does not exist.

- **Lock violation reading (or writing) drive** *x***:**
  [MS-DOS device error]

  A program tried to access part of a file that another program was using. Type **A** (for Abort), or wait awhile and type **R** (for Retry).

- *x* **lost cluster(s) found in** *y* **chains**
  Convert lost chains to files (Y/N)?
  [CHKDSK]

  CHKDSK displays this message if it finds information on the disk that isn't
  allocated properly in the disk's File Allocation Table. If you type Y (for Yes) in
  response to this prompt, CHKDSK recovers the lost blocks it found when checking
  the disk. CHKDSK then creates a proper directory entry and a file for each lost
  chain with the filename of the form: FILE*NNNN*.CHK. If you did not specify the **/F**
  switch, CHKDSK displays: **"x bytes would be freed."** If you type N (for No),
  CHKDSK frees the lost blocks so that they can be reallocated and does not recover
  any data that was in those lost blocks. If you did not specify the **/F** switch,
  CHKDSK does nothing.

- **Logging to file** *x*
  [BACKUP]

  The BACKUP command is writing a backup log to the file specified.

- **Logical DOS drive created, drive letters changed or
  added**
  [FDISK]

  You have created or revised one or more logical drives.

- **LPT*x*: not redirected**
  [MODE]

  MODE could not redirect the parallel printer port. Check to see whether you have
  specified the proper options.

- **LPT*x*: redirected to COM*x*:**
  [MODE]

  Output on the parallel printer port will now be sent to this asynchronous
  communications port.

- **LPT*x*: set for 80**
  [MODE]

  The parallel printer port has been set for 80 columns.

- **LPT*x*: set for 132**
  [MODE]

  The parallel printer port has been set for 132 columns.

M

- **Maximum number of logical DOS drives installed**
  [FDISK]

  You have installed the maximum number of logical DOS drives allowed by
  MS-DOS. You may not create any more logical DOS drives.

- **Memory allocation error.**
  Cannot load MS-DOS, system halted
  [MS-DOS]

  Restart MS-DOS. If this error persists, make a new copy of the MS-DOS disk from
  your backup copy of the system disk.

- **Missing from the file is either the device ID or the code**
  page
  [MODE]

  The code page specified is not supported in the code page information (.cpi) file, or
  the .cpi file does not support the printer specified. For a list of valid cplist values in
  the MODE command, see the MODE command in Chapter 8.

- **--More--**
  [MORE]

  Press the Spacebar to view more of the file or directory.

- **MORE: Incorrect DOS version**
  [MORE]

  The MORE command does not run on MS-DOS versions before 2.0.

- **Must specify COM1, COM2, COM3 or COM4**
  [MODE]

  You must specify a serial port.

- **Must specify destination line number**
  [EDLIN]

  You did not specify the destination line number for an EDLIN C (copy M (move)
  command. Re-type the command with a destination line number.

- **Must specify ON or OFF**
  [MS-DOS]

  The command requires either an ON or an OFF argument.

N

- **Name of list device [PRN]:**
  [PRINT]

  This prompt appears the first time that PRINT is run and the **/D** switch is not
  specified. You can specify the name of any valid device, which then becomes the
  print output device. If you press the [↵] key, MS-DOS uses the default list device
  PRN.

- **New file**
  [EDLIN]

  EDLIN prints this message if it does not find a file with the name you specified. If
  you are creating a new file, ignore this message. If you do not intend to create a new
  file, check to see whether you have correctly typed the name of the file that you
  wish to edit.

- **NLSFUNC already installed**
  [NLSFUNC]

  NLSFUNC stays resident in memory once it is initialized. You have already loaded it into memory.

- **No Append**
  [APPEND]

  No paths have been appended. If you would like to append a path for data files, use the APPEND command.

- **No code page has been selected**
  [CHCP]

  No code pages have been selected for the system. If you would like to select a code page, use the CHCP command.

- **No COM: ports**
  [MODE]

  Your computer does not have an asynchronous communications (serial) port.

- **No files added (or replaced)**
  [REPLACE]

  The REPLACE command did not add or replace any files.

- **No files found filename**
  [REPLACE]

  REPLACE could not find matching source or target files.

- **No free file handles.**
  Cannot start COMMAND.COM, exiting
  [MS-DOS]

  Restart MS-DOS. If this message recurs, increase the FILES command value in the CONFIG.SYS file.

- **No logical drives defined**
  [FDISK]

  There are no logical drives defined for your system.

- **Non-DOS disk error reading (or writing) drive** *x***:**
  [MS-DOS device error]

  MS-DOS does not recognize the disk format because the disk has information
  missing or contains another operating system. Try running the CHKDSK command
  to correct the problem. (See Chapter 8, for information about CHKDSK.) If running
  CHKDSK does not solve the problem, you should reformat the disk by using the
  FORMAT command, - even though this will destroy all the files on the disk.

- **Non-standard version of Graphic Character Set Table is
  already loaded**
  [GRAFTABL]

  MS-DOS cannot recognize the current table of graphics characters because it has
  been modified since it was loaded.

- **Non-system disk or disk error
  Replace and strike any key when ready**
  [FORMAT][SYS]

  Replace the disk with the proper disk and press any alphanumeric key to continue.

- **No paper error writing device dev**
  [MS-DOS DEVICE= error]

  The printer is either out of paper or not turned on.

- **No path**
  [PATH]

  You typed PATH and pressed the [↵] key to find out what your search path is, but
  you didn't set a command search path.

• No primary DOS partition to delete
[FDISK]

You have selected the FDISK option to delete your primary DOS partition, but that partition does not exist.

• No room for system on destination disk
[SYS]

There is not enough room for the system files on the target disk. Delete some files to make room for the system files or use another disk. You may need to reformat the disk to put the system on it.

• No room in directory for file
[EDLIN]

You tried to create or save a file to the root directory, but it is either full, or you specified an invalid disk drive or filename. Check the command line that you used to start EDLIN for an invalid filename or disk drive entry. If your command contains no invalid entries, you should run the CHKDSK program for the specified disk drive. If the status report shows that the disk directory is full, and if there is still enough memory left on the disk, you may be able to create the file in a subdirectory. (This is because subdirectories are not limited in size as is the root directory.) Otherwise, remove the disk and replace it with another formatted disk.

• No room in root directory
[LABEL]

There is not enough room in the root directory for a volume label. Delete or move some of the files from the root directory to make room for the volume label.

• No source drive specified
[BACKUP]

You must specify a source drive.

- **No space left on device**
  [BACKUP][FC][RESTORE]

  You cannot back up or restore any more files, and you cannot send any more output from a file comparison to your disk because the target disk is now full. If you want to use the same disk, you could make some more room by deleting some of the files that are already on the disk.

- **No space to create logical drive**
  [FDISK]

  You are trying to create a logical drive, but there is no space available to do so.

- **No sub-directories exist**
  [TREE]

  You have specified the /S switch, but the directory does not contain subdirectories.

- **No such file or directory**
  [BACKUP][FC][RESTORE]

  One or more of the files or directories that you specified does not exist.

- **No target drive specified**
  [BACKUP]

  You must specify a target drive for this command.

- ***** Not able to back up (or restore) file *****
  [BACKUP]

  This message may occur if there was an error in the source file or on the target disk.

  Use the CHKDSK command on the source disk to see if you can determine the prob\

- **Not enough memory**
  [JOIN][SHARE][SUBST]

  There is not enough memory for MS-DOS to run the command.

- **Not enough room to merge the entire file**
  [EDLIN]

  There was not enough room in memory to hold the file during an EDLIN T (transfer) command.

  You must free some memory by writing some files to a disk or by deleting some files before transferring this file.

- **Not found**
  [EDLIN]

  You specified an EDLIN S (search) or R (replace) command that was unable to find a further occurrence of the specified search or replace string.

- **Not ready error reading (or writing) drive** x:
  [MS-DOS device error]

  The device (usually a drive or printer) specified in the error message is not ready to accept or transmit data.   This often happens when the disk drive door is open. If this is the problem, close the door and type R (for Retry), or check to see if the printer is on and ready to print.

O

- **O.K.?**
  [EDLIN]

  This prompt occurs during EDLIN S (search) or R (replace) command processing. If you press any key except Y (for Yes) or the [↵] key, the search or replace process continues.

- **One or more CON code pages invalid for given language**
  [KEYB]
  KEYB examined all prepared code pages, and has found that at least one code page is incompatible for your screen console device (CON). This is only a warning to let you know that your keyboard and screen console device are working from different code pages.

- **Only non-bootable partitions exist**
  [FDISK]

  You cannot load MS-DOS from any of the remaining partitions.

- **Only partitions on drive 1 can be made active**
  [FDISK]

  You are trying to create an active partition on a hard disk other than that found on the first hard disk drive. This is not allowed.

- **Out of environment space**
  [COMMAND][MS-DOS]

  There is not enough room in the program environment to accept more data. To increase the size of the existing environment, use the **/E** switch with the COMMAND command or remove some of the existing environment variables by using the SET command.

P

- **Parameters not compatible**
  [FORMAT][REPLACE]

  You have specified switches that cannot be used together.

- **Parameters not compatible with fixed disk**
  [FORMAT]

  You have used a switch that is not compatible with the specified drive.

- **Parameters not supported**
  [MS-DOS][FORMAT]

  You have specified parameters that MS-DOS does not support.

- **Parameters not supported by Drive**
  [FORMAT]

  FORMAT displays this message when the device driver for this drive does not support Generic IOCtl function requests.

- **Partition selected (*x*) is not bootable, active partition not changed**
  [FDISK]

  You are trying to change active partitions, but MS-DOS cannot be booted from the partition selected.

- **Path(name) too long**
  [PRINT][REPLACE][XCOPY]

  The pathname you specified was too long. You may have to change directories to use this command with files in deep subdirectories.

- **Path not found**
  [CHKDSK][REPLACE][SUBST][XCOPY]

  You specified an invalid pathname.

- **Press any key to begin adding (replacing) file(s)**
  [REPLACE]

  When you specify the /W switch, REPLACE displays this message to prompt you to start replacing files.

- **Press any key to begin formatting *x*:**
  [FORMAT]

  This prompt is issued before you format a disk. Press any key to begin the format process. Or, if you wish to end this command, press CONTROL-C.

- **Press any key to begin recovery of the _n_ file(s) on drive _x_:**
  [RECOVER]

  This prompt is issued before you recover a disk or file.

  Press any key to begin the recovery. Recovered files are named FILE*NNNN*.REC. If you wish to end this command, press CONTROL-C.

- **Press any key when ready . . .**
  [DISKCOMP][DISKCOPY]

  This prompt gives you time to insert the appropriate disks before copying them. When you have inserted the disks into the appropriate drives, press any key to begin the diskcopy process. Or, if you wish to end this command, press CONTROL-C.

- **Previously prepared code page replaced**
  [MODE]

  This command changed the selected code page for a specific device by using another prepared code page.

- **Primary DOS partition already exists**
  [FDISK]

  You are trying to create a primary DOS partition, but one already exists. If there is space available on your hard disk, try to create an extended DOS partition instead.

- **Primary DOS partition deleted**
  [FDISK]

  You have deleted the primary DOS partition from your disk.

- **Printer error**
  [MODE]

  The printer is off, or is not ready to print.

- **Printer lines per inch set**
  [MODE]

  The MODE command has set the number of lines per inch for the printer.

- **PRINT queue is empty**
  [PRINT]

  There are no files waiting to be printed.

- **PRINT queue is full**
  [PRINT]

  There is only room for 10 files in the list of files waiting to be printed. You can make room for more by using the print **/Q** switch. The limit is 32 files.

- **Probable non-DOS disk**
  Continue (Y/N)?
  [CHKDSK]

  The disk you are using is not recognized by this version of MS-DOS. The disk was either created by another system with a format that is not supported on this version of MS-DOS, or it is not an MS-DOS disk.

  Do not continue processing if CHKDSK returns this message for a floppy disk. If this message returns for a hard disk, the information describing the characteristics of the disk to MS-DOS has been destroyed. In this case, you may continue CHKDSK processing by typing **Y** (for Yes). This error may mean that the File Allocation Table (FAT) is bad and that the disk is unusable.

- **Processing cannot continue**
  [CHKDSK]

  There is not enough memory in your machine to run CHKDSK for this disk. You must obtain more memory to run CHKDSK.

- **Program too big to fit in memory**
  [MS-DOS]

  You need more memory to run your application. It is possible that some programs you have run are still using some memory. You may try to restart MS-DOS; however, if you still receive this message, you still need more memory.

R

- **Read error, COUNTRY.SYS**
  [MS-DOS]

  MS-DOS cannot read the COUNTRY.SYS file. Retry the command. If you get the same message, the COUNTRY.SYS file is probably corrupted. Restore the file from backup.

- **Read error in filename**
  [EDLIN][FIND]

  MS-DOS could not read the entire file.

- **Read error, KEYBOARD.SYS**
  [MS-DOS]

  MS-DOS cannot read the KEYBOARD.SYS file. Retry the command. If you get the same message, the KEYBOARD.SYS file is probably corrupted. Restore the file from backup.

- **Read fault error reading drive _x_:**
  [MS-DOS]

  MS-DOS is unable to read data from the device (usually a disk drive). Check to see that the disk is properly inserted in the drive, then type R (for Retry).

- **Reading source file(s)...**
  [XCOPY]

  XCOPY is now reading the source files that you specified.

- **Replace the file (Y/N)?**
  [RESTORE]

  The file that you want to restore from backup already exists on your target disk.

  Type Y (for Yes) and press the [⌐] key to overwrite the file. Type N (for No) and press the [⌐] key if you don't want to replace the file on your target disk with the file from the backup disk.

- **Replacing filename**
  [REPLACE]

  REPLACE displays this prompt to let you know that it is replacing this file that exists on your disk.

- **Requested logical drive size exceeds the maximum available space**
  [FDISK]

  You are trying to create a logical drive that is larger than the space available.

- **Requested partition size exceeds the maximum available space**
  [FDISK]

  You are trying to create a partition on your hard drive that is larger than the space available.

- **Requested Screen Shift out of range**
  [MODE]

  You cannot shift the display any farther.

- **Resident part of PRINT installed**
  [PRINT]

  This is the first message that MS-DOS displays when you issue the PRINT command. It means that to process the PRINT command with other processes, available memory has been reduced by several thousand bytes.

- **Resident portion of MODE loaded**
  [MODE]

  Part of the MODE program is now resident in memory, and available memory has been reduced by several thousand bytes.

- **Restore file sequence error**
  [RESTORE]

  You have restored files in the wrong order. You must insert the backup disks in the same order that they were backed up.

- ***** Restoring files from drive *x*: *****
  Diskette: *n*
  [RESTORE]

  This message is displayed during the restore process.

- **Resynch failed. Files are too different**
  [FC]

  FC compares data that can be loaded into memory. If no lines match in the portion of the files in the buffer space, FC displays this message.

S

- **Same drive specified more than once**
  [FASTOPEN]

  You tried to activate FASTOPEN for the same drive more than once. There is no need to reactivate it for the same drive.

- **SECOND diskette bad or incompatible**
  [DISKCOMP]

  The second disk does not contain the same format as the first disk, or DISKCOMP does not recognize the format of the second disk. You should run CHKDSK to help you identify the problem.

- **Sector not found error reading (or writing) drive** *x*:
  [MS-DOS device error]

  This error usually means the disk has a defective spot so that MS-DOS cannot find the requested information on it. You should copy all files from the disk onto a good disk and then try to reformat the defective disk.

- **Sector size too large in file filename**
  [MS-DOS]

  The specified device driver, loaded by instructions in the CONFIG.SYS file, uses a sector size larger than that of any other device driver on the system. You cannot run this device driver.

- **Seek error reading (or writing) drive** *x*:
  [MS-DOS device error]

  MS-DOS is unable to locate the information on the disk. Make sure that the disk is properly inserted in the drive, or try a different drive.

- **SHARE already installed**
  [SHARE]

  SHARE can only be installed once.

- **Sharing violation reading drive** *x*:
  [MS-DOS device error]

  A program tried to access a file that another program was currently using.

  Type A (for Abort), or wait awhile and type R (for Retry).

- **SORT: Incorrect DOS version**
  [SORT]

  The SORT command does not run on MS-DOS versions before 2.0.

- **SORT: Insufficient disk space**
  [SORT]

  The disk is full.

- **SORT: Insufficient memory**
  [SORT]

  There is not enough memory to run the SORT program.

- **Source and target drives are the same**
  [BACKUP][RESTORE]

  You specified the same drive for the source and target disks.

- **Source disk is Non-removable**
  [BACKUP]

  This is an informational message indicating that the source disk is a hard disk.

- **Source does not contain backup files**
  [RESTORE]

  You are attempting to restore files from a disk that does not contain backup files.

- **Source is a floppy (or hard) disk**
  [RESTORE]

  This message is simply for your information.

- **Source path required**
  [REPLACE]

  You did not specify a source path for the REPLACE command.

- **Specified drive does not exist,
  or is non-removable**
  [DISKCOMP][DISKCOPY]

  You cannot compare or copy hard disks with this command. You must specify the
  name of a valid floppy drive.

- **Specified MS-DOS search directory bad**
  [MS-DOS]

  The SHELL command in the CONFIG.SYS file is incorrect. Make sure that the
  COMMAND.COM file exists and that MS-DOS can find it.

- **Strike a key when ready...**
  [MS-DOS]

  This prompt occurs during command processing and is always accompanied by
  another message. This message is also displayed if you have inserted a PAUSE
  command in a batch file. Usually, MS-DOS asks you to insert disks into appropriate
  drives before this prompt. To begin command processing, press any character key,
  any number key, the Spacebar, or the [⏎] key.

- **Syntax error**
  [ATTRIB][FIND][MS-DOS]

  You have entered a command incorrectly. Check to make sure you have typed the
  command correctly. Remember to enclose the FIND command string in double
  quotation marks.

- **System transferred**
  [FORMAT][SYS]

  The system files were transferred during FORMAT or SYS command processing.

- **Target cannot be used for backup**
  [BACKUP]

  Either the target disk has an unrecognizable format, or it is bad. Do not use the disk, or try to format the disk with the format command, or run CHKDSK on it to determine the problem.

- **Target disk is Non-removable**
  [BACKUP]

  This is an informational message that the target disk is a hard disk.

- **Target diskette is write protected**
  [DISKCOPY]

  The target disk has a write-protect tab on it. If you have a 5.25 inch floppy disk that has a cover over the write-protect notch, you can remove the cover to allow data to be written to the disk and give the command again. If you are using a 3.5 inch floppy disk, the write-protect notch must be OPEN to protect the disk, and it must be CLOSED to allow data to be written to the disk. You may have a write-protected disk that does not have a notch. You would not be able to change the status in this case.

- **Target diskette may be unusable**
  [DISKCOPY]

  Either the target disk has an unrecognizable format, or it is bad. Try to format the disk with the format command, or run CHKDSK on it to determine the problem.

- **Target is full**
  [RESTORE]

  There is no more room on the target disk for restored files. You must delete some ' the files on the disk to make room for these files, or use another disk.

- **Terminate batch job (Y/N)?**
  [MS-DOS]

  If you press CONTROL-C while in batch mode, MS-DOS asks you whether or not you wish to end batch processing. Type Y (for Yes) to end processing, or type N (for No) to continue.

- **The last file was not restored**
  [RESTORE]

  There was not enough room on the target disk for the file, or the last file was bad. Use the CHKDSK command to determine the problem.

- **The only bootable partition on drive 1 is already marked active**
  [FDISK]

  You are trying to change the active partition. The active partition must reside on the first hard disk drive on your system and must be bootable. The only bootable partition on the first hard disk drive is already the active partition.

- **Too many drive entries**
  [FASTOPEN]

  You can use FASTOPEN with up to four hard drives. You have tried to specify a fifth drive.

- **Too many files open**
  [EDLIN][LABEL]

  MS-DOS could not open the .bak file or write the volume label due to the lack of available system file handles. Increase the value of the files command in the CONFIG.SYS file.

- **Too many name entries**
  [FASTOPEN]

  The total number of entries specified for a drive exceeded the maximum of 999.

- **Too many open files**
  [BACKUP][FC][RESTORE][XCOPY]

  MS-DOS could not open the files that you want to compare due to the lack of available system file handles. Increase the value of the files command in the CONFIG.SYS file.

- **Track 0 bad - disk unusable**
  [FORMAT]

  The FORMAT command can accommodate defective sectors on the disk, except for those near the beginning. You must use another disk.

U

- **Unable to create directory**
  [MKDIR][XCOPY]

  MS-DOS could not create the directory you specified. Check to see that there is not a name conflict. You may have a file with the same name, or the disk may be full.

- **Unable to create KEYB table in resident memory**
  [KEYB]

  MS-DOS tried to create a country-specific table for the keyboard code specified, but failed. Check the amount of available memory. There may not be enough memory available to create this table.

- **Unable to erase**
  [BACKUP]

  The BACKUP command could not erase the files on the target disk. Check to see that the files on the backup disk are not read-only, and that the disk is not write-protected.

- **Unable to shift Screen**
  [MODE]

  MODE is unable to shift the test pattern on the screen any farther.

- **Unexpected DOS Error** n
  [REPLACE]

  An unexpected error, n, occurred, where n is the MS-DOS error number.

- **Unrecognized command in CONFIG.SYS**
  [MS-DOS]

  There is an invalid command in your CONFIG.SYS file. See Chapter 8 for a list of all the commands that can be used in the CONFIG.SYS file.

- **Unrecognized printer**
  [GRAPHICS]

  You are using an invalid printer. See the GRAPHICS command, described in Chapter 8, to see whether you entered the command properly, or whether you have specified a valid printer name.

- **Unrecognized printer port**
  [GRAPHICS]

  The printer device name that you specified was invalid. You may need to set the printer port by using the MODE command.

- **Unrecoverable error in directory**
  Convert directory to file (Y/N)?
  [CHKDSK]

  This message is displayed if CHKDSK is unable to correct an error in a directory. If you respond Y (for Yes) to this prompt, CHKDSK converts the bad directory into a file. You can then fix the directory or delete it. If you respond N (for No) to this prompt, you may not be able to write to or read from the bad directory.

- **Unrecoverable read (or write) error on drive** x:
  [MS-DOS device error]

  MS-DOS is unable to read or write data to the specified device. Make sure that the disk is properly inserted in the disk drive. Then type R (for Retry). If the error occurs again, type A (for Abort).

- **usage: fc** *[/a] [/b] [/c] [/l] [/lb n] [/w]*
  [t] [/n] [/NNNN] file1 file2
  [FC]

  One of the switches that you have specified in your FC command line is invalid.

V

- *nnn* **version of Graphic Character Set Table is already loaded**
  [MS-DOS]

  You tried to load the Graphic Character Set Table with the GRAFTABL command.
  This table already exists in memory.

- **Volume in drive** *x:* **is** *filename*
  [DIR][LABEL][VOL]

  This message is displayed in response to the DIR, LABEL, or VOL command and
  displays the name given to the disk.

- **Volume label (11 characters, ENTER for none)?**
  [FORMAT][LABEL]

  This message is displayed when you specify the LABEL command, or the /V switch
  in the FORMAT command. Type a volume label, or press the [↵] key to indicate
  that you do not want a volume label for this disk. It's a good idea, though, to
  specify a volume label to help you identify your disks.

W

- **WARNING, ALL DATA ON NON-REMOVABLE DISK**
  DRIVE *x:* **WILL BE LOST!**
  Proceed with Format (Y/N)?
  [FORMAT]

  This message appears when you try to format a hard disk that already contains data.
  If you type Y (for Yes) the data on the disk will be erased. If you do not want the
  files on your hard disk erased, type N (for No). Copy the files to a floppy disk and
  repeat the format command.

- **Warning! Data in the extended DOS partition could be destroyed.**
  Do you wish to continue.......? [n]
  [FDISK]

  You are trying to delete an extended DOS partition. Be sure this is what you want to do. If you do want to delete the extended DOS partition specified, type Y (for Yes) and press [↵]. If not, the default response N is already typed. Press [↵].

- **Warning! Data in the primary DOS partition could be destroyed.**
  Do you wish to continue.......? [n]
  [FDISK]

  You are trying to delete the primary DOS partition. If you are sure you want to delete your primary DOS partition, type Y and press [↵]. If not, press [↵]; MS-DOS will not delete the partition.

- **Warning - directory full**
  [RECOVER]

  The root directory is too full for RECOVER processing. Delete some files in the root directory to free space for the recovered files, and try the command again.

- **Warning! Diskette is out of sequence**
  Replace diskette or continue if okay
  Strike any key when ready
  [RESTORE]

  You should restore the diskettes in the order that you backed them up.

- **Warning! File filename**
  is a hidden (or read-only) file
  Replace the file (Y/N)?
  [RESTORE]

  This message prompts you as to whether you want to replace a hidden or read-only file. Type Y (for Yes) if you want to restore the hidden or read-only file from the backup disk. Type N (for No) if you do not want to restore this file.

- **Warning! File filename**
  was changed after it was backed up
  Replace the file (Y/N)?
  [RESTORE]

  This message prompts you as to whether you want to replace a backup file that has been changed.

  Type Y (for Yes) if you want to restore this file, or type N (for No) if you do not.

- **Warning! Files in the target drive**
  \BACKUP (or root) directory will be erased
  [BACKUP]

  The BACKUP command found files in the target drive, and you did not specify the **/A** switch to append files.

- **Warning! No files were found to back up**
  [BACKUP]

  The BACKUP command did not find any files to back up on the disk you specified.

- **Warning! No files were found to restore**
  [RESTORE]

  RESTORE did not find the file that you wanted to restore from the backup disk.

- **Warning: Read error in EXE file**
  [EXE2bin]

  The amount read was less than the size of the header. This is a warning message only.

- **Warning! The partition marked active is not bootable**
  [FDISK]

  The active DOS partition must be bootable.

- **Write fault error writing drive** *x*:
  [MS-DOS device error]

  MS-DOS is unable to write data to the specified device. Make sure that the disk is properly inserted in the disk drive. Then type R (for Retry). If the error occurs again, type A (for Abort).

- **Write protect error writing drive** *x*:
  [MS-DOS device error]

  You tried to write data on a write-protected disk. If the disk has a write-protect tab on it, you must remove the tab before you can write on the disk. (You should consider first why the disk was write-protected.) If the disk doesn't have a write-protect notch, you cannot write on that disk.

INDEX

A

B

C

D

E

F

G

H

I

J

K

L

M

T

U

V

W

X

UK-2

616Z001-i1331