Eurosoft
pc reliability solutions

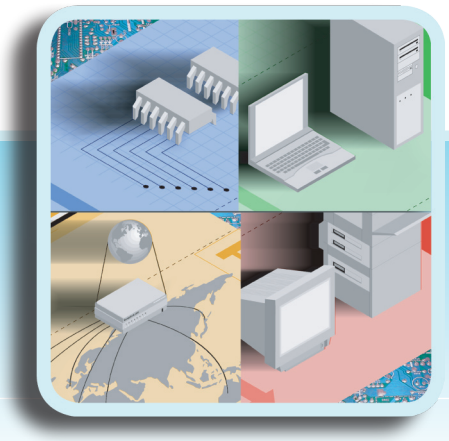
Pc-Check®

Diagnostic Software

Easy to Use Hardware Tests

Reduces E Service Call-o

Core system testing
maximizes component reliability



www.eurosoft-uk.com

This page is intentionally left blank.

Pc-Check®

Diagnostic Software

102006MPCCV6.05

DISCLAIMER

Eurosoft (UK) Ltd has endeavoured to meet all technical areas associated with the products in this manual. Any changes, omissions or errors are of no liable consequence, actual or otherwise to the company, its authors or publishers. Further, any changes to the products or documentation may take place at any time without obligation of Eurosoft (UK) Ltd, to notify any person of these changes.

Products mentioned or noted in this document are for identification purposes only and may be trademarks and/or registered trademarks of their respective companies or owners.

ACKNOWLEDGMENT

Floating point arithmetic in *Pc-Check* is implemented via “SoftFloat”.

Eurosoft (UK) Ltd.

Head Office
3 St. Stephen's Road
Bournemouth
Dorset BH2 6JL
United Kingdom
Tel +44 (0)1202 297315
Fax +44 (0)1202 558280
Email: info@eurosoft-uk.com
Website: www.eurosoft-uk.com

Eurosoft (US) Inc.

North American Sales Office
Suite 101, One Davol Square
Providence, RI 02903
USA
US Toll Free Tel +1 (888) 980-9595
International Tel +1 (401) 751-9595
Fax +1 (401) 751-0088
Email: info@eurosoft-us.com
Website: www.eurosoft-us.com

Information & Sales

Europe	info@eurosoft-uk.com
United States	info@eurosoft-us.com
Pacific Rim	info@eurosoft-au.com

Support

Europe	support@eurosoft-uk.com
United States	support@eurosoft-us.com
Pacific Rim	support@eurosoft-au.com

Visit our website for fast on-line sales and the latest news about the best Eurosoft solutions for you. Thank you!

Please contact your nearest Eurosoft office should you require additional software, accompanying manuals, or site license.

This page is intentionally left blank

Contents

Section 1 INTRODUCTION 1.1

Section 2 GETTING STARTED WITH *Pc-Check*® 2.1

2.1 Package Contents 2.1

2.2 Important Notes on running ***Pc-Check***® 2.1

2.3 Program Diskette Generation 2.3

2.4 Loading ***Pc-Check***® Self-Boot 2.3
- 2.4.1 Configuring the Boot Sequence 2.3
- 2.4.2 Loading ***Pc-Check***® 2.4

2.5 Limitations of Self-Boot Mode 2.5

2.6 Overview of Running Mode Options 2.5
- 2.6.1 Interactive Mode 2.5
- 2.6.2 Command Line Mode 2.5

2.7 Menu Controls 2.6

2.8 Advanced Start-Up Options 2.6

Section 3 COMMAND LINE OPERATION 3.1

3.1 Overview 3.1

3.2 The Command Line File 3.1

3.3 Command Line Switches 3.2

3.4 Command Line Example 3.11

3.5 Creating Command Line Files 3.11
- 3.5.1 Options 3.11
- 3.5.2 Advanced Start-Up Options 3.12
- 3.5.3 Start-Up Options (System Information Menu) 3.13

3.6 Creating Self-Boot Batch Jobs 3.13

Section 4 SYSTEM INFORMATION MENU 4.1

4.1 System Overview 4.1

4.2 Hardware ID Image Menu 4.1
- 4.2.1 Write System HII as XML File 4.2
- 4.2.2 Compare System HII with XML File 4.2
- 4.2.3 Write System HII as TXT File 4.3

4.3 System Management Information 4.3
4.4 PCI Bus Information 4.4
4.5 IDE Bus Information 4.4
4.6 PCMCIA/CardBus Information 4.4
4.6.1 PCMCIA Host Adapter Information 4.5
4.6.2 PCMCIA Socket Information 4.7
4.6.3 PCMCIA Card Information 4.8
4.7 Interrupt Vectors 4.10
4.8 IRQ Routing Information 4.11
4.9 Device Drivers 4.11
4.9.1 Pc-Check Self-Boot 4.11
4.9.2 Pc-Check under full DOS 4.12
4.10 APM Information 4.12
4.10.1 Select Device 4.12
4.10.2 Change Power State 4.13
4.10.3 View Power Status 4.13
4.10.4 Indicate CPU Usage 4.13
4.10.5 Get PM Event 4.14
4.10.6 Change Interface Mode 4.15
4.11 I/O Port Browser 4.15
4.11.1 Output Device 4.16
4.11.2 I/O Search Start 4.16
4.11.3 Show Active Ports Only 4.16
4.11.4 Accept Settings as Shown Above 4.16
4.11.5 I/O Port Browser 4.17
4.12 Memory Browser 4.17
4.13 Sector Browser 4.18
4.14 CPU Frequency Monitor 4.19
4.15 CMOS RAM Utilities 4.20
4.15.1 Save CMOS to File 4.20
4.15.2 Restore CMOS from File 4.20
4.16 SCSI Utilities 4.21
4.16.1 Important Information Before You Begin 4.21
4.16.2 Identify SCSI Devices 4.21
4.16.3 SCSI Low Level Format 4.21
4.16.4 Assign SCSI Bad Blocks 4.22

4.17 Text File Editor 4.25
4.18 Start-Up Options 4.26

Section 5 ADVANCED DIAGNOSTIC TESTS 5.1

5.1 Processor Diagnostics 5.1
5.2 Memory Diagnostics 5.3
5.2.1 Test System Memory 5.4
5.2.2 Test Module 5.4
5.2.3 Test Range 5.4
5.2.4 User Pattern Test 5.5
5.2.5 Test Cache Memory 5.5
5.2.6 Benchmark Memory 5.5
5.2.7 Cache Profiler 5.5
5.2.8 Part Details 5.5
5.2.9 Test Video Memory 5.5
5.2.10 Set Test Set 5.6
5.2.11 Set Test Reps 5.6
5.2.12 Set uTL Test Time 5.6
5.3 Motherboard Diagnostics 5.7
5.4 Floppy Disk Diagnostics 5.9
5.4.1 The Select Drive Menu 5.10
5.4.2 The Test Settings Menu 5.10
5.4.3 Read Test 5.11
5.4.4 Read Verify Test 5.12
5.4.5 Non-destructive Write Test 5.12
5.4.6 Mechanics Stress Test 5.12
5.4.7 View Error Log 5.13
5.5 Hard Disk Diagnostics 5.13
5.5.1 Menu Layout 5.13
5.5.2 The Hard Disk Tests Menu 5.13
5.5.3 The Select Drive Menu 5.13
5.5.4 The Test Settings Menu 5.14
5.5.5 Read Test 5.19
5.5.6 Read Verify Test 5.20
5.5.7 Non-Destructive Write Test 5.20
5.5.8 Destructive Write Test 5.21
5.5.9 Mechanics Stress Test 5.21
5.5.10 Internal Cache Test 5.22
5.5.11 SMART Test Menu 5.22

5.5.12 View Error Log 5.24
5.5.13 The Utilities Menu 5.24
5.6 CD-ROM/DVD Diagnostics 5.25
5.6.1 Configuration requirements 5.25
5.6.2 Select CD/DVD Device 5.26
5.6.3 CD/DVD Transfer Test 5.26
5.6.4 CD/DVD Random Seek Test 5.27
5.6.5 CD/DVD Tray Test 5.27
5.6.6 Audio CD Disc Player 5.27
5.6.7 CD/DVD Test Disc Read 5.28
5.6.8 DVD Laser Refocus Test 5.28
5.7 ATAPI Devices 5.28
5.7.1 Linear Read Test 5.29
5.7.2 Non-Destructive Write Test 5.29
5.7.3 Random Read/Write Test 5.29
5.7.4 ATAPI Device Test Results 5.29
5.8 TPM (Trusted Platform Module) 5.29
5.9 Serial Port Diagnostics 5.30
5.9.1 Serial Port Selection Menu 5.30
5.9.2 Serial Port Tests Menu 5.31
5.9.3 Select Another Serial Port 5.31
5.9.4 Run All Serial Port Tests 5.31
5.9.5 Serial Port Line Control Test 5.31
5.9.6 Serial Port Handshake Test 5.31
5.9.7 Serial Port Loopback Test 5.32
5.9.8 Serial Port Internal FIFO Test 5.32
5.9.9 Serial Port Internal Loop Test 5.32
5.10 Parallel Port Diagnostics 5.32
5.10.1 Parallel Port Selection Menu 5.33
5.10.2 Parallel Port Tests Menu 5.33
5.10.3 Select Another Parallel Port 5.33
5.10.4 Run All Parallel Port Tests 5.33
5.10.5 Parallel Port Controller Test 5.33
5.10.6 Parallel Status Port Test 5.33
5.10.7 Parallel Port Interrupt Test 5.34
5.11 Modem Diagnostics 5.34
5.11.1 Modem Selection Menu 5.35
5.11.2 Modem Tests Menu 5.35
5.11.3 Select Another Modem 5.36
5.11.4 Change Local Baud Rate 5.36

5.11.5 Modem Register/Loopback Test 5.36
5.11.6 User Interactive Modem Test 5.36
5.11.7 Pc-Check Dumb Terminal 5.37

5.12 ATA 5.37
5.12.1 Parallel ATA Test 5.38
5.12.2 Serial ATA Test 5.38

5.13 USB 5.38
5.13.1 Test USB Controllers 5.38
5.13.2 USB Functional Tests 5.38
5.13.3 USB Device Information 5.38
5.13.4 Exit USB Tests 5.39

5.14 Firewire (IEEE 1394) 5.39
5.14.1 Test Controllers 5.39
5.14.2 Controller Information 5.39

5.15 System Stress 5.39

5.16 Keyboard Diagnostics 5.40
5.16.1 Verify Keyboard 5.40
5.16.2 Keyboard Controller Tests 5.41
5.16.3 Key Repeat Test 5.41
5.16.4 Keyboard LED Test 5.41

5.17 Mouse Diagnostics 5.42

5.18 Joystick Diagnostics 5.43

5.19 Audio Tests 5.43
5.19.1 Internal Speaker Test 5.43
5.19.2 Real-time PCM Test 5.44
5.19.3 Streamed PCM Test 5.44
5.19.4 SPDIF Run DMA Test 5.44

5.20 Video Diagnostics 5.45
5.20.1 Warning – Video Test Initialisation 5.45
5.20.2 Video Driver Information 5.45
5.20.3 Select Modes for Testing 5.46
5.20.4 Check Gamma 5.46
5.20.5 Colour Linearity 5.46
5.20.6 Colour Purity Test 5.46
5.20.7 True/High Colour Test 5.46
5.20.8 Alignment Test 5.47
5.20.9 LCD Test 5.47
5.20.10 Test Card 5.47

5.20.11 Video Memory 5.48
5.20.12 Exit Tests 5.48
5.21 Printer Diagnostics 5.48
5.21.1 ***Pc-Check***® Print Test 5.49
5.22 ACPI 5.51
5.22.1 General Information 5.51
5.22.2 Verify ACPI Tables 5.52
5.22.3 System Description Tables 5.52
5.22.4 Show ACPI Address Ranges 5.53
5.23 PCI Express Links 5.54

Section 6 CONTINUOUS BURN-IN TEST 6.1

6.1 Immediate and Deferred Burn-In 6.1
6.2 The Burn-In Menu 6.2
6.2.1 Load Burn-In Script 6.2
6.2.2 Save Burn-In Script 6.2
6.2.3 Change Options 6.2
6.2.4 Select Tests 6.3
6.2.5 Perform Burn-In Tests 6.4
6.3 Running ***Pc-Check***® with Beep Codes 6.5
6.4 SIB (Status Indicator Box) 6.6
6.5 Post Codes and Beep Codes 6.6

Section 7 SHOW RESULTS SUMMARY 7.1

Section 8 WRITE RESULTS REPORT 8.1

Section 9 PROBLEM REPORTING 9.1

9.1 Introduction 9.1
9.2 Technical Problem Report Forms (TPRs) 9.1
9.3 Technical Support Contact Information 9.2

Appendix A RUNNING *PC-CHECK*® UNDER DOS A.1

A.1 Reasons for running under DOS A.1
A.2 Preparing to run ***Pc-Check***® under DOS A.1
A.2.1 Issues to be considered A.1
A.2.2 Implications of Extended Memory Managers A.2

A.2.3 If DOS is installed on the test machine A.2
A.2.4 If DOS is NOT installed on the test machine A.2
A.2.5 Implications of a need for Device Drivers..... A.2
A.2.6 Generating and Using a Bootable DOS Diskette..... A.4

A.3 Operational constraints A.5

A.4 Running ***Pc-Check***® under DOS..... A.5
A.4.1 Loading ***Pc-Check***® A.5
A.4.2 Command Line Syntax under full DOS A.6
A.4.3 Command Line operation under DOS..... A.6

Appendix B LIST OF POWER MANAGEMENT EVENTS .. B.1

Appendix C DRIVE LETTER ALLOCATION..... C.1

Appendix D ADVANCED XML OPTIONS FOR HII FILES . D.1

D.1 Basic HII Facilities D.1

D.2 Advanced Facilities D.2

D.3 Modifying HII XML Files D.2

Appendix E EURODOS..... E.1

Glossary TERMS IN COMMON USE..... GL.1

This page is intentionally left blank

Section 1

INTRODUCTION

Pc-Check is a fast, accurate and easy-to-use diagnostic tool from Eurosoft that enables you to check completely the configuration and reliable operation of IBM-AT-compatible PCs. *Pc-Check* is extremely useful to manufacturers and repairers of PCs, informing all user levels of the architecture and operational reliability of PC hardware. Stringent routines test the entire PC by exercising each hardware component and indicating those areas that fail to respond perfectly.

Note: *We recommend that you run Pc-Check regularly to ensure that the machines for which you are responsible are running reliably.*

When you run the *Pc-Check* software on a PC, its simple menu selection allows you to choose the tests and reports which you require. The program can test that all the components are functioning correctly. It provides a thorough summary of the system configuration, including all memory areas, floppy, hard and CD-ROM/DVD drives, the nature and address of I/O ports, type of display, and so on. You are then guided by a menu to select the advanced diagnostic facilities that will lead you easily and logically to the area causing problems, or to verify hardware accuracy.

As an alternative to this fully interactive method of use, *Pc-Check* can be operated in batch mode, which enables a required set of tests to be pre-defined. These can then be run repeatedly on the same machine from time to time, or on many different machines in a production environment, without further user intervention.

Although this manual assumes that the reader has a good understanding of PC architecture, it can be used equally well by those who are less confident to determine whether a fault actually exists. The user will be able to follow the steps shown on the test screens, and the following chapters in this manual are arranged in the same order as the tests. When more help is needed, this manual provides the information.

The only requirements to allow *Pc-Check* to test, verify and report in detail on your PC are: a working system core and central processor

unit; enough memory to load the program; a CD-ROM drive / USB port, or floppy disk drive.

Pc-Check is supplied with all the instructions and software you need to test your system. Loop-back and USB plugs, and a CD-ROM Test Disc facility, are also supplied, to enable you to test peripheral ports. Multi-layer DVD Test Discs, and additional test plugs and dedicated CD Test Discs, are available fom Eurosoft.

Normally, *Pc-Check* is run in self-boot mode. ***Pc-Check Self-Boot*** allows you to perform diagnostics without fear of interference by memory managers, device drivers and even DOS or Windows. You will not need to edit your normal CONFIG.SYS or AUTOEXEC.BAT files to bypass the utilities you normally need to run standard applications. These are automatically eliminated and thus ensure a 'clean' testing environment independent of the operating system.

Pc-Check Self-Boot runs independently of the machine's normal operating system so there is no need to have either a bootable DOS diskette or a hard disk to run tests.

There are just a few special circumstances in which a full DOS environment might be required for particular tests. Instructions on how to operate *Pc-Check* under a full DOS are given in Appendix A.

Note: *Pc-Check is normally shipped on removable media such as CD-ROM or USB flash device. Eurosoft can provide other methods of implementation, by separate licence, for the special requirements of some manufacturers. Please contact Eurosoft for further details of these specialist versions.*

Pc-Check normally runs directly from the supplied CD-ROM or USB flash device. Provision is made to generate a self-booting floppy diskette, if, for example, you have purchased the CD-ROM version of *Pc-Check*, but the machine under test does not have a working CD drive.

Note: *Pc-Check is one of a range of products available from Eurosoft. Other items include diagnostic software such as Eurosoft's PC Builder, a complete test management suite for system manufacturing processes and service warranty tracking.*

Contents and Index

Rather than provide an Index, this manual contains a comprehensive Contents Section, which inherently lists every sub-section topic in the same logical order as the items in the *Pc-Check* menus. Where the main reference for a given topic has additional cross-references, these will then be found within the text itself.

System Requirements

Pc-Check requires approximately 500KB of base memory and is designed to operate on machines which are 100% IBM PC-AT compatible. *Pc-Check* does not support XT machines. In some cases, testing will be limited to the hardware present, i.e. certain memory tests require a 486 or higher processor.

This page is intentionally left blank

Section 2

GETTING STARTED WITH *Pc-Check*®

2.1 Package Contents

Confirm that your *Pc-Check* package was in good physical condition when it was supplied to you.

Check the contents against the printed checklist supplied.

IMPORTANT

Promptly registering your product with us entitles you to immediate support and provides you with the opportunity to be notified of updates, enhancements and special offers on maintenance and diagnostic products from Eurosoft.

Please be certain to return your completed registration card right away. You may go to the Eurosoft web site to register online:

www.eurosoft-uk.com/register.htm

In the unlikely event that you receive corrupted media, please return it to your nearest Eurosoft address, or to an authorised representative, for replacement.

Once the software medium has been received, replacement is free of charge within the upgrade period of one year.

2.2 Important Notes on running *Pc-Check*

Do not restart a system that is currently providing network services. Do not execute *Pc-Check* in any operating system environment other than EuroDOS, MS-DOS or OpenDOS/DR-DOS. Disable any Power Management system.

The *Pc-Check* CD-ROM contains a file "readme.html", accessible by loading the medium under Windows®. It includes useful information, and has links to a pdf version of the user manual, and to a utility for generating a floppy diskette copy of *Pc-Check*. The latter can be used if no alternative working drive or port is available on the machine under test.

Pc-Check is normally shipped as a version which requires its supplied USB Preferred Port Plug to be fitted, for security control and USB port testing. This plug (sometimes called a "dongle") is also required when running *Pc-Check* from a floppy diskette copy.

WARNING

Eurosoft USB Preferred Port Plug damage!

The Eurosoft USB Preferred Port Plug can be damaged if the wiring to the USB port inside the computer system is incorrect. In the event of a USB port or socket being soldered directly to the motherboard, this is unlikely to apply. However, it is very common to encounter additional ports that are connected via a wired connection to a header on the motherboard. If the connections to these headers are not 100% correct, it will very likely damage ANY USB device that is connected to it, including the Eurosoft USB Preferred Port Plug.

Many USB devices such as cameras, PDAs, etc. are very expensive items. Checking that a USB connection is correct before installing or inserting any USB device, including an Eurosoft USB Preferred Port Plug, is a small sacrifice to make to save the destruction of USB equipment.

Please make sure a careful inspection is carried out BEFORE connecting ANY USB device to such ports.

Eurosoft and its associated companies cannot be held responsible for any damage to the Eurosoft Preferred Port Plug. Should you damage your Eurosoft USB Preferred Port Plug, you may purchase another one.

If your version of *Pc-Check* is held on a removable "program medium" (CD-ROM / USB flash device / floppy diskette), do not remove it while running the program, unless you are prompted to do so for a specific test. For instance, if you are running from CD-ROM, you will be prompted to swap discs during the Audio and DVD Laser Refocus tests. If you are running from floppy diskette, you will be prompted to replace the program diskette with a data diskette for certain floppy disk tests. In these cases, replace the program medium **immediately** after running the test.

For reasons which are discussed in Appendix C, which are caused by the fundamental nature of PC design, the drive letter which is associated with the floppy drive depends upon the program medium from which you are running. To summarise: when booting from CD-ROM, the machine's floppy drive is the B: drive; in all other cases, it is the A: drive. The manual will use a phrase such as "the appropriate drive letter" to remind you of this situation where necessary.

2.3 Program Diskette Generation

If you usually run from a removable *Pc-Check* program medium (CD-ROM or USB flash device), but, for whatever reason, a machine under test cannot utilise them, you can generate a floppy diskette copy of the program, and run from that. To do so, you need access to a fully working PC which runs Windows®, and has a CD drive and a floppy disk drive.

Run Windows®. Insert a blank, formatted, write-enabled 1.44MB diskette. Insert the *Pc-Check* CD-ROM. Locate and open file "readme.html" (your system might open it via autorun, if enabled). This contains a link to a utility for generating a floppy diskette copy of *Pc-Check*.

Clicking on the utility's link will display a setup panel, which will guide you through the process of creating a floppy diskette copy of *Pc-Check*.

The floppy diskette copy of *Pc-Check* inherits the same security protection as the original CD-ROM or USB flash device version.

2.4 Loading *Pc-Check*® Self-Boot

2.4.1 Configuring the Boot Sequence

Commonly, PCs are configured to boot from removable media such as CDROM and/or floppy disk when you switch on or reset. So, in many cases, it should not be necessary to make any changes to system settings in order to start *Pc-Check*.

However, if *Pc-Check* fails to load automatically, you will need to select the boot device. If you are not familiar with how to use the BIOS Setup to alter the boot sequence, study the information below.

Many BIOS provide a 'boot menu' option, commonly accessed by pressing the F10 or F12 key. Watch carefully for a prompt soon after the PC is started, to find out what key to press. If there is a boot menu option which permits the selection of Floppy Disk, CDROM or USB Drive for just one boot, there is then no need to enter the full BIOS Setup and make changes to the configuration. Merely select the appropriate device from which to boot *Pc-Check.*

If BIOS Setup changes must be made in order to boot *Pc-Check*, look for 'boot order' or 'boot priority' options, in either a separate 'Boot' or an 'Advanced BIOS' page. BIOS Setup design varies between vendors: please consult your system documentation for further information on how to do this.

When selecting a USB device for boot, a choice of device type might be given: typically this should be selected as USB HDD for Flash Memory devices.

Note: *If configuration changes were necessary using BIOS Setup, remember to reverse your changes when you have finished using Pc-Check.*

2.4.2 Loading *Pc-Check*®

1. Insert the medium containing *Pc-Check* in the appropriate drive or socket, and switch on or reset the computer.

2. *Pc-Check* self-boot includes its own version of DOS, called EuroDOS. A summary of its facilities and restrictions is given in Appendix E.

3. Unless you require the Advanced Start-up Options (described later), allow *Pc-Check* to boot normally. After a short while, you will see the *Pc-Check* Main Menu.

4. Proceed with your testing, as described in the following Sections, but take note of the Limitations described below.

   A message is given if you attempt to select a menu option that is not available.

5. When you exit *Pc-Check* your computer will attempt to re-boot, so you must remove the *Pc-Check* program medium.

2.5 Limitations of Self-Boot Mode

When running *Pc-Check* Self Boot, the following options are unavailable owing to the appropriate device drivers not being loaded:

CD-ROM/DVD Tests (non ATA); SCSI Utilities; and the PCMCIA Information. SCSI hard drives **can** be tested by an alternative method.

Appendix A describes how to operate *Pc-Check* under a full DOS environment, in order to access these drivers, should they be required.

2.6 Overview of Running Mode Options

Pc-Check can be run in either of two modes:

Interactive Mode runs diagnostic tests under user keyboard control, via a series of on-screen menus;

Command Line Mode runs tests in non-interactive mode, requiring little or no user attention.

2.6.1 Interactive Mode

When *Pc-Check* is booted normally, the user is presented with a menu-driven interactive user-image. This allows access to all the available diagnostic information and tests, which can be run directly and selectively. Interactive mode is particularly useful for running specific tests quickly and easily, and for gaining experience of how the various diagnostic tests behave.

2.6.2 Command Line Mode

This mode allows the user fully to define a set of tests which can be run on repeated occasions, or run on more than one machine, or run with little or no user intervention. It is particularly useful for continuous burn-in testing.

For burn-in testing, two data files are generated. One (generically called the Burnfile) contains a specification of the diagnostic tests which are to be performed. The other (the Command-Line file) specifies additional parameters which control the overall running of the tests, the output

reports required, etc. Various interactive facilities can be used to help the user to construct these control files in advance.

Another interactive option allows a set of tests to be specified for just a single immediate non-interactive execution.

2.7 Menu Controls

After the introductory screens, the Main Menu is displayed. You will return to the Main Menu on completion of each option you select.

You should use the arrow keys on your keyboard to highlight your choice and press <ENTER> to start the procedure. Instructions are given on-screen about which keys to press. Generally: the arrow keys enable you to highlight your choice; the <ENTER> key starts the operation; and the <ESC> key returns you to the previous menu level.

The Main Menu contains an option "About PC-CHECK": in addition to version and copyright information, this panel lists those *Pc-Check* components which are and are not active.

The final option is "Exit", which prompts the user to confirm the actions if the results have not yet been reviewed on-screen or written as a report, before exiting *Pc-Check*.

Note: *When you exit Pc-Check, remove any program media, and reset your computer.*

2.8 Advanced Start-Up Options

As *Pc-Check* starts to load, it displays an option to access Advanced Start-Up Options, by pressing the F8 key once. This facility provides a convenient on-screen method of specifying the Command Line parameters used to control non-interactive and semi-interactive operation of *Pc-Check*, which was briefly mentioned earlier.

This option is discussed in detail within the section of the manual describing Command Line Operation.

You are now ready to start testing. Look at the following sections to find the appropriate explanations for the tests you wish to run.

Section 3

COMMAND LINE OPERATION

3.1 Overview

Pc-Check can be run either interactively under user keyboard control, as described in later sections of the manual, or via command line operation, which requires either no attention, or only minimal attention (when user acknowledgement of visual information is required).

You can run *Pc-Check* from the command line by providing control information on two levels: a set of command line "switch" parameters; and a burnfile. The command line switches control the overall running of the tests, such as the duration of some specific tests, and the generation and location of various output reports. The burnfile defines which diagnostic tests are to be performed.

Typically, Command Line Operation is used to operate *Pc-Check* in Continuous Burn-in mode, where the command line switches are saved to a text file, which itself references a burn-in file.

Pc-Check assists in the construction of both these files by enabling the required options to be defined interactively.

It is also possible to set up the command line switches for a single "special needs" boot session, without the need to save them to a file.

Pc-Check can be run in a full DOS environment, rather than in self-boot mode. Information is provided in Appendix A on how this method differs from the self-boot mode of operation, together with a discussion of the special circumstances in which you might wish to use it.

3.2 The Command Line File

As there is no command prompt available with *Pc-Check* Self-Boot, the Command Line options normally have be written to a file called CMDLINE.TXT. The system is then re-booted to enable *Pc-Check* to read and use the commands.

The CMDLINE.TXT file can be constructed and saved via on-screen help, using any of the following methods:

(i) Interactively, via the "Advanced Start-Up Options" facility, described later in this Section. This is the most flexible method.

(ii) Interactively, via the "Start-Up Options" facility located in the System Information Menu.

(iii) *Pc-Check*'s own Text File Editor (accessed via the System Information Menu) to define the switches manually.

(iv) The file may be also be prepared using another text editor, such as Windows® NOTEPAD, or a DOS editor.

3.3 Command Line Switches

The command line switch parameters follow the normal DOS convention and are defined below.

All arguments (including the name of the Burnfile) are non-positional and case-insensitive. The argument template is as follows:

[/BB] [/BC] [/BD] [/BE Num] [/BM Num] [/BP] [/BS] [/CR Name] [/CS Name] [/CT] [/ET Num] [/HA] [/HB] [/HC] [/HDD Num] [/HDL Num] [/HF] [/HI] [/HMC Num] [/HMD Num [/HS] [/HT Num] [/IC Name] [/ID Name] [/IE] [/IF] [/IO Name] [/IS] [/IT] [/JA] [/JF Name] [/JS] [/JT] [/JX] [/KS] [/LD] [/MH Num] [/MI] [/MM Num] [/MP Num] [/ND] [/PD] [/PS] [/QM] [/RA] [/RC] [/RD] [/RF Name] [/RJ] [/RL Num] [/RM Name] [/RP] [/RS Num] [/RT Name] [/SD Num] [/TF] [/TP] [/UK] [/UM] [/UP Num] [/YM Num] [/YN Num] [Burnfile Name]

Square brackets [ ] indicate optional items.

'Name**'** and **'**Num**'** indicate the need to supply appropriate text and numerical information, respectively.

Note: *If no burn-in file is included with the set of command line parameters in a CMDLINE.TXT file, then, when you reboot, Pc-Check obviously has no information to tell it which tests you wish to perform. Therefore it will bring up the main menu. It will also "register" the command line options, which it has found in the CMDLINE.TXT file, for the duration of the current*

session. You can then use interactive facilities to complete your particular requirements.

This hybrid "semi-interactive" technique can be used for a number of purposes. For example, you can generate a fixed set of command line switches, but with the flexibility to use them with a variety of interactively defined tests. These tests can themselves be run interactively or via continuous burn-in.

Alternatively, you can easily add the burnfile name to the CMDLINE.TXT file, if it had been omitted by mistake.

These facilities are described later in the appropriate sections of the manual.

/BB repeatedly outputs a sequence of beep codes when items under test fail. (See "POST Codes and Beep Codes" in the "Continuous Burn-In" Section of the manual for a definition of each beep code.)

/BC sounds a repeated two-tone beep to indicate completion of burn-in. This is NOT a Beep code.

/BD specifies that the system returns to the DOS prompt on test completion. This is particularly useful when you run the tests from a batch file. *Pc-Check* exits with an error level set in the range 0 to 3 as defined below. A batch file can detect this and initiate different appropriate action. Required if any reports are to be generated, or if POST or SIB output is requested.

The error levels provided by /BD are:

0 everything ran, with no errors
1 everything ran but there were failures
2 burn-in was interrupted by the user
3 bad option on the command line.

/BE causes *Pc-Check* to abort the Burn-In testing if the number of device failures reaches the specified value.

/BM allows an upper limit to be set for the modem baud rate for burn-in testing. It is advised that an interactive test be used to establish a sensible maximum value in advance. If this parameter is omitted, a default strategy is used, described

under "Modem Diagnostics" in the Advanced Diagnostics Section of this manual.

/BP causes *Pc-Check* to output diagnostic codes to a POST (Power On Self Test) Card during Burn-In testing. (See "POST Codes and Beep Codes" in the "Continuous Burn-In" Section of this manual for a list of POST Codes). You may wish to use /BD in conjunction with /BP.

/BS causes *Pc-Check* to display diagnostic status on a SIB (Status Indicator Box) during and after Burn-In testing. (See "SIB (Status Indicator Box)" in the "Continuous Burn-In" Section of this manual for more information on the use of SIBs). You may wish to use /BD in conjunction with /BS.

/CR specifies a filename from which to restore the contents of CMOS memory on startup. Use with caution, especially if restoring CMOS memory from a different machine, since the current machine might then be unable to boot.

/CS causes *Pc-Check* to save the contents of CMOS memory to the specified file on start-up.

/CT reboots the machine after performing CMOS save or restore operations.

/ET in the System Stress Test, sets the threshold at which ECC events cause failure of the memory test. Default is 10.

/HA causes *Pc-Check* to use only direct ATA commands for the detection and control of hard disks. The BIOS is not used, and some hard disks may not be listed, including non-ATA devices. Used for special investigation of a specific issue, under instruction. Option /HB overrides this option.

/HB causes *Pc-Check* to use only the BIOS interface for the detection and control of hard disks. No direct ATA commands are issued to devices. Information on, and test options for hard disks may be reduced. Use if hard disk identification information appears incorrect, especially when using RAID.

/HC causes *Pc-Check* **not** to use EDD BIOS call 'Set Hardware Configuration' to configure hard disks for maximum DMA throughput. Use when experiencing problems with hard

drive detection or operation, especially with non-DMA ATA devices, such as an ATA flash adaptor.

/HDD Hard Disk Device test Duration: sets the duration limit for hard disk device tests (adaptive level). Format: [##h] [##m] [##s]. Ignored if the time actually required for the disk tests is less than this value.

/HDL Hard Disk Device testing Level: sets the test level for hard disk device tests (fixed level). Entered as a number between 1 and 100, indicating the percentage coverage required. For example, if set to 50, then only half the amount of tests will be performed.

/HF checks the hard disk SMART log for errors before testing. The default is that SMART logs are not checked prior to commencing other hard drive tests during burn-in. When this switch is present, the SMART summary error log is checked, such that, if the log has recorded a previous failure of the commands used by a test which is starting, the test will immediately fail.

/HI ignores a hard disk on BIOS LUN 80h. When booting the system from a USB flash device (or similar), the BIOS will create an emulation of a hard disk to support the boot. This device will then ordinarily appear in reports and diagnostics as if a real device, commonly failing in items such as the Stress test. This switch suppresses the emulated drive.

/HMC Hard Disk Media Coverage: sets the level of coverage for hard disk media tests (fixed coverage). Entered as a number between 1 and 100, indicating the percentage coverage required.

/HMD Hard Disk Media Duration: sets the duration limit for hard disk media tests (adaptive coverage). Format: [##h] [##m] [##s]. Ignored if the time actually required for the disk tests is less than this value.

/HS allows access to PCI sub-class 6 (custom SATA). Model, serial number and firmware information can be obtained, and SMART testing performed.

/HT Hard Disk Timeout Value. *Pc-Check's* timeout default for hard disk operations is 2 seconds. Use to override the default if detection problems are suspected, or operations are timing out unexpectedly.

/IC specifies the filename of a reference image used as a comparison with current burn-in HII. Files must be in .XML format.

/ID specifies a filename to which to write a hardware ID image (HII) or machine ID descriptor. Default format is .XML.

/IE Ignore ECC errors if correction of memory data is successful. During a memory test, if the ECC has successfully corrected an error, the memory test would normally still fail the component: this switch allows suppression of these failures.

/IF causes the file requested by /ID to be output as text (.TXT).

/IO specifies an output filename which lists any differences between the burn-in HII and the reference image.

/IS causes *Pc-Check* to ignore serial port hardware. Use if you are using serial port hardware for console redirection or Serial Over LAN, and *Pc-Check* interrupts the output.

/IT exits program after writing hardware ID image (HII).

/JA writes a journal log line for each selected component which is found to be or appears to be absent (for example if no CD-ROM drive is present).

/JF should be followed by the filename (and path) of a file into which error-logging information is written during Burn-In testing. This journal will contain a list of the tests that failed during Burn-In, stating the device reference, if applicable, and the pass number in which the device failed. The filename supplied may also refer to DOS devices such as PRN for the printer and COM1 for the first serial port. The journal can be viewed with any text editor.

Note: *A new journal file is created for each Pc-Check "session". If Pc-Check is used "semi-interactively" to run more than one script in the same session, the output from all scripts run during that session are appended successively.*

/JS writes a summary of the tests to the journal at the end of testing.

/JT logs the start and end of each test in the journal: if not included, then only failed tests are logged.

/JX causes the journal to be written as XML format. If omitted, journals are written as plain text.

/KS disables keyboard self-test: use if you experience problems running the Keyboard Controller Test.

/LD disables legacy DMA testing for channels 0 and 1, to accommodate new chipset designs which will otherwise fail.

/MH Set hundredths of a second per MB for uTL Memory Test. Default 150 (1.5 sec/MB). See the topic "Set uTL Test Time" in the "Advanced Diagnostic Tests" Section for further explanation.

/MI Enables "Memory Intelligent Preservation" for all tests that access extended memory (above 1MB). Use when extended memory holds data which must not be destroyed by testing, e.g. for PXE boot.

/MM causes *Pc-Check* to assume the presence of a Microsoft compatible mouse on the specified COM port.

/MP causes *Pc-Check* to assume the presence of a PC-compatible mouse on the specified COM port.

/ND never disable video DMA. Use if the screen blanks during start-up, and is not restored.

/PD causes *Pc-Check* to power down the PC after burn-in.

/PS assists the testing of PC-based ePoS terminals, by scanning for additional ISA serial ports. Full documentation on this specialist option is available on request.

/QM suppresses module mapping assumptions in the Memory Test. Normally, *Pc-Check* uses information obtained from the system, to deduce which physical addresses map onto which memory modules, in order to pin-point which module is faulty. Sometimes the system information is incomplete or very obviously inaccurate: in these cases *Pc-Check* will attempt to

deduce the mapping if it is safe to do so. However, if the /QM switch is set, then, if *Pc-Check* detects the slightest problem with the system data, it will instead resolve all memory to one device entitled "nnnMB accessible system memory".

/RA modifies the operation of the **/RF** report generation. The normal default is to list only the tests actually run during Burn-In, but adding the /RA switch causes the report to list all tests whether they are run or not.

/RC writes a report after the testing of each component in the burn-in has completed.

Note: This option causes a significant delay between the testing of components.

/RD omits the starting, ending and duration of burn-in on the last page of reports.

/RF causes a summary of the system configuration and the results of all tests to be written to the burn-in report. It should be followed by the filename (and path) of the Burn-In tests report file. This is the same output as you get from the '**Write Results Report**' when you select that option from the Main Menu, except that the variable fields for the machine name, tester's name etc. are left blank (unless modified by /RM and /RT). The filename supplied may also refer to DOS devices such as PRN for the printer and COM1 for the first serial port. Normally used in conjunction with /BD, to return control to the DOS prompt. The report can be viewed with any text editor.

Note*: If the filename you nominate does not already exist, Pc-Check creates it for you. If the file does exist, then the new data overwrites any existing data, unless /RJ is specified, in which case data is appended to the existing file.*

/RL allows the page length for the report to be specified.

/RM allows a machine name to be entered, which will be displayed in reports and logs. Maximum of 20 characters. See Note below for options.

/RJ causes *Pc-Check* to join (append) report output to existing reports in a single file. If this switch is not specified, the

default behaviour is to overwrite existing reports: where possible, one back-up copy of the last file to be overwritten is saved (LASTRPT.BAK). Recommended for use with /RA.

/RP writes a report after each pass during burn-in. Causes a slight delay between passes.

/RS specifies a machine serial number which appears on reports requested from the command line, and also as the default serial number when a report is requested interactively. Maximum of 20 characters. See Note below for options.

/RT specifies a user/tester name which appears on reports requested from the command line, and also as the default tester name when a report is requested interactively. Maximum of 30 characters. See Note below.

Note: *If the name/number following **/RM**, **/RS** and **/RT** contains spaces, the text string must be included in double quotes, eg "John Smith".*

*If the first character of the name/number following **/RM, /RS, /RT** is ? (for example /RT ?Smith), then an interactive window appears which allows changes to be made to, say, what had been specified in a default batchfile. For example, if the default batch file includes:*

/RM *machine name* /RS ? /RT "John Smith"

then the interactive window appears with the machine name and tester filled in, and the serial number blank. All three fields can then be changed.

/SD Set duration of System Stress test. Format: [##h] [##m] [##s].

/TF writes a debug trace log to a file

/TP prints a debug trace log to LPT1.

/UK causes *Pc-Check* to retain control of the USB system rather than hand it back to the BIOS. Overcomes problems with legacy devices on some system BIOSes. However, BIOS-controlled legacy USB devices such as keyboards or floppy drives will cease to operate.

/UM causes *Pc-Check* to disregard memory module mapping by resolving all memory into a single logical memory module.

/UP sets the number of USB ports that require test plugs: 0 = all, default = 1. The USB Functional Tests will pass only if there are test plugs in the specified number of USB ports. Specifying "0" requires all ports to be occupied. If this option is omitted, a single port must be occupied by a test plug in order for the USB Functional Tests to pass: however, all occupied ports will be tested.

Note: *Some system configurations may not physically expose all ports.*

/YM causes *Pc-Check* to assume that the level 2 cache size is as specified here, in KB.

/YN causes *Pc-Check* to assume that the level 3 cache size is as specified here, in KB.

[Burnfile Name]
represents the name of the script file containing the list of Burn-In tests. This file can be generated, edited and saved interactively, as described in the Section "Continuous Burn-In" in this manual.

As described later, a full list of command line switches can be viewed via the "Start-Up Options" subpanel of the System Information Menu, or, on boot-up, via the Advanced Start-Up Options. Both facilities can be used to generate the CMDLINE.TXT file.

Note: *When Pc-Check is started with a Burn-In file, all devices requested at the time the burn-in file was created will be tested if they are available.*

Note: *The instructions for Command Line options when running under a full DOS environment are the same as for Pc-Check Self-Boot, except that an initial keyword PCCHECK is included. See Appendix A for full details.*

If you attempt to run *Pc-Check* Self-Boot with an invalid CMDLINE.TXT file (for instance, it contains an invalid switch), you are presented with the full list of command line switches, followed by the contents of

CMDLINE.TXT. You will then be prompted to re-boot the system. You should use a text editor to correct CMDLINE.TXT and then try again.

3.4 Command Line Example

Suppose that you wish to generate a report containing a summary of the system configuration and the final burn-in results, and a journal which logs any errors. You also wish to display the final outcome on a *Pc-Check* SIB (Status Indicator Box) if fitted, and exit when finished. The main report is to be written to a file which we shall name BURN03.RPT, and the error-logging journal is to be called ERRORS.FIL. The burn-in file is called BURNFILE.DAT.

This is achieved by constructing the following command:

```
/JF ERRORS.FIL  /RF BURN03.RPT  /RA  /BD
/BS    BURNFILE.DAT
```

You can use file names and extensions of your choice.

Note: *If these files are to be stored in a different directory from the one in which the Pc-Check software resides, you must give the full path ahead of the file name.*

3.5 Creating Command Line Files

3.5.1 Options

There are various ways of producing a set of command line instructions, and generating a CMDLINE.TXT file. They can be typed directly into any suitable text editor (including *Pc-Check's* own text editor, located via the System Information Menu) and then saved. However, *Pc-Check* has interactive facilities which largely automate the process. These are the "Advanced Start-Up Options" which can be invoked at the start of the *Pc-Check* boot process, and the "Start-Up Options" subpanel of the System Information Menu. The user-images of these two facilities are essentially the same, although the Start-Up Options facility is more restricted in its function.

3.5.2 Advanced Start-Up Options

As soon as the initial startup panel of *Pc-Check* appears, it displays an option to access "Advanced Start-Up Options" by pressing the F8 key once. This will immediately lead to a Start-Up Menu which provides the ability to set command line switches, with interactive support. There is the following choice:

Current Session

The values which are set apply only to the current *Pc-Check* session, and are not saved to a file. They apply to the current interactive session, including the Immediate Burn-In option. This feature can be used to set up "special needs" switches for a single session.

All Sessions

The values chosen are saved to a CMDLINE.TXT file. The file is constructed with interactive support, rather than having to be typed manually.

Note: *The location of the CMDLINE.TXT file will depend upon the program medium being used. For USB flash device or floppy diskette, the file will be written to that medium by default.*

For the CD-ROM version of Pc-Check, a writable floppy diskette will have to be inserted first: a message will appear on the screen, with reminders that a floppy diskette must be present, and that the CD-ROM must have priority over the floppy disk drive on reboot.

Note: *For CD-ROM use, since the burnfile will also be written to floppy diskette, you must include the full pathname of the burnfile in the CMDLINE.TXT file. This will be drive B: for a floppy drive running with the CD-ROM version of Pc-Check. See Appendix C for further details.*

Choosing either option will lead to the Start-Up Options Editor. All the command line parameters are listed in alphabetical order, with a one-line summary of their function. Navigate through the list with the Up/Down arrow keys and Page-Up/Page-Down keys.

Highlight a required switch and press <ENTER>. A more detailed description appears, together with the following options:

Yes	Include this option in the command line.
No	Omit this option from the command line. Used to remove a switch from the current command line data.
Cancel	Do not change the current status of this switch.

If "Yes" is selected, and there is an additional value required (name or number), a panel appears which enables this argument to be inserted. Do not include double quotes around text strings.

Each time that you press <ENTER> after setting an individual parameter, the main parameter list reappears, with the full revised command line contents displayed at the bottom. Double quotes are automatically inserted for text strings containing blanks.

When you have completed all your settings, press <Esc>. The "All Sessions" option will give you the chance to choose whether you do wish to save the instructions, and then *Pc-Check* will load the main interactive menu.

3.5.3 Start-Up Options (System Information Menu)

The System Information Menu is described in detail in the next Section of the manual. One of its sub-panels is "Start-Up Options", which brings up the same panel as has just been described under "Advanced Start-Up Options", which can be used as an alternative method of setting command line switches.

Note: *Unlike the Advanced Start-Up Options, the Start-Up Options facility cannot be used to define or modify data for the* ***current*** *interactive session: it can only be used to generate a CMDLINE.TXT file for use in a subsequent Pc-Check session.*

3.6 Creating Self-Boot Batch Jobs

To create a self-boot *PC-Check* batch job requires a CMDLINE.TXT file, constructed as above, which includes the filename of the required burn-in file. A full description of how to construct burn-in files is given in the Section on "Continuous Burn-In", but the process is summarised here.

In interactive mode, select “Immediate Burn-In Testing” or “Deferred Burn-In Testing” from the Main Menu, and select the tests which you require. When your selections are complete, choose the option “Save Burn-In Script” and supply a filename, say “BURNFILE.DAT”, so that your selections are saved. This must be the filename referenced in the CMDLINE.TXT file. If necessary, include the full pathname of the burn-in file.

Leaving the *Pc-Check* writable media in place, reboot the computer. *Pc-Check* will start up and immediately execute your required tests.

Note: *Upon completion, remember either to delete or to rename the CMDLINE.TXT file, otherwise the tests will be repeated the next time you run Self-Boot Pc-Check!*

Note: *The procedure for running batch jobs in a full DOS environment, i.e. not via self-boot, is based on the same combination of CMDLINE.TXT file and burnfile, with one change in syntax. Appendix A describes the steps required to operate Pc-Check under DOS.*

Section 4

SYSTEM INFORMATION MENU

This is the first option from the Main Menu. If you press the <ENTER> key while the SYSTEM INFORMATION MENU is highlighted, you will be presented with the corresponding menu screen. The subsections on the following pages explain each option in turn.

4.1 System Overview

Pc-Check examines your machine's configuration and produces a summary of what it finds. Check that the reported configuration is what you would expect, and investigate any irregularities before you go any further.

Note: *On legacy configurations, incorrect values for the total amount of memory may be given when 286 & 386 Memory Managers such as QEMM, Bluemax, 386MAX & LIMSIM are operating.*

Note: *Pc-Check lists physical hard drives, not logical volumes, so a hard drive that has been partitioned into* **two** *volumes (C: and D:, for example) is treated as* **one** *drive.*

4.2 Hardware ID Image Menu

A Hardware Identification Image (HII) is a file, stored in a format that is convenient for further processing, which contains a detailed configuration snapshot of the host PC. Files can be used for inventory records, or, if compared against previously saved images, can be used to pinpoint configuration changes.

Selecting Hardware ID Image Menu leads to a screen which is split into left and right panels.

Note: *If you are running under full DOS instead of in self-boot mode, the HII Menu is inaccessible if memory managers are loaded. See Appendix A for information on how to exclude memory managers under DOS.*

The left panel gives the following general information:

HII can create an XML document describing your system. This file can be viewed and printed by using it in conjunction with the .XSL file provided with Pc-Check (HII.XSL) and internet browsing software that imports XML.

XML Documents can be used in production to ensure identical builds. Such a comparison can be included in a burn-in. In maintenance they can be used to identify components that have since been added or removed.

Note: *Advanced XML Options are discussed in Appendix D.*

The right hand panel is the HII Management Menu.

Note: *Remember to use the full path name, including the appropriate drive letter, if you are running from a read-only Pc-Check program medium such as CD-ROM, and therefore using a different drive to write or read your data. See Appendix C for more information, which includes advice on possible problems caused by certain legacy BIOSes.*

4.2.1 Write System HII as XML File

Selecting this first option shows the selected file type of XML, and prompts for input of a filename. Pressing escape at this time aborts back to the menu. If the entered filename has no extension, .XML will automatically be appended. Having entered a filename, press <ENTER>. A central window pops up with a 0% - 100% progress bar, first showing the progress of Hardware Identification Image capture (i.e. to memory). The bar then resets to 0% and shows progress of file write operation. The text changes to reflect which pass the program is on.

Note: *XML HII files from versions of Pc-Check before V5.60 are not compatible.*

4.2.2 Compare System HII with XML File

You are first prompted to identify the existing XML file which contains the original system specification, against which you wish to compare the current machine specification. Pc-Check then obtains the current specification, and undertakes a comparison of the two specifications. The result, either a message confirming that they match, or a list of

differences, is then displayed. You may press <X> or <T> to save any difference information as either an XML or TXT file respectively.

Note: *When operating interactively, if there are very large numbers of differences between the original and current system specifications, the* ***on screen*** *output might be truncated, but the XML file will always contain the complete difference set, with no omissions.*

4.2.3 Write System HII as TXT File

This option shows the selected file type of TXT and prompts for input of a filename. Pressing escape at this time aborts back to the menu. If the entered filename has no extension, .TXT will automatically be appended. Having entered a filename, press <ENTER>. A central window pops up with a 0% - 100% progress bar. In this instance capture and write are performed together, such that the bar moves across once only.

Note: *The format of the text HII is identical to that of previous Pc-Check versions.*

Upon completion of either write operation you are returned to the HII Management menu.

Exit takes you back to the System Information Menu, as does <ESC>.

Note: *File compare utilities such as 'fc' can be used to compare HII files taken on different occasions: this will highlight configuration changes to the PC.*

Note: *The TXT format is a convenient general format for users who wish to store HII files in their own databases. Some databases may support XML files.*

4.3 System Management Information

Displays information obtained from the system BIOS for a variety of aspects of the system. To view the information, first press <ENTER> to clear the warning text, and then select an option from the list and press <ENTER>.

IMPORTANT

This information is read from text and numerical information held in the BIOS. Unfortunately, not all system BIOS have been updated in line with changes to actual hardware. Experience shows that the more modern the BIOS, the more reliable the information tends to be. Discretion is therefore required when interpreting these displays, but the facility is included because some of this information is difficult to obtain elsewhere. In some cases, there is no BIOS information at all, in which case the following message is displayed:

"System Management BIOS extensions not found"

4.4 PCI Bus Information

The PCI Bus is scanned, and information presented about the devices found, including: memory, I/O port usage, and any interrupt requirements. Information about the manufacturer and type of device is also displayed.

4.5 IDE Bus Information

This option provides parameter information for IDE devices. A sub-menu is displayed, which lists all detected devices. Use the cursor keys to select a device from the list. Press <ENTER> to view the information. Press <ENTER> or <ESC> to return to the sub-menu. Then press <ESC> when you are ready to return to the Main Menu.

IMPORTANT: Not all IDE type devices support this function.

4.6 PCMCIA/CardBus Information

To obtain any information about your PCMCIA installation at all, you will require the software drivers for the installed or built-in (laptops) host adapter. These are known as the Socket Services. The *PCMCIA Host Adapter Information* can be displayed with only the Socket Services loaded. Further information would also require the presence of Card Services, software drivers that mediate between the card specific drivers or software and the Socket Services. It is possible to have more than

one host adapter: therefore it is possible to have more than one set of Socket Services. However there is only ever one set of Card Services. The need for drivers may preclude the ability to obtain PCMCIA information when running Self-Boot, unless the BIOS has integrated support for PCMCIA.

A typical PCMCIA system will feature one host adapter with two sockets, and both Socket and Card Services.

All PCMCIA screens are aware of any 'hot-plug' changes made to the configuration (primarily card insertion and removal), even being able to indicate a change of card battery state.

4.6.1 PCMCIA Host Adapter Information

The PCMCIA Host Adapter Information Screen is split into two sections. Information about the host adapter hardware fills the top, while information about the Socket Services that drive the adapter fills the lower portion. It is possible that one set of Socket Services may drive more than one adapter and so may feature more than once at the same level.

The menu on this screen has options for moving to the Socket information for the currently selected adapter, and selecting the next or previous adapter in a multi-adapter system.

Host Adapter Number

A logical number used uniquely to identify this host adapter. The order of host adapter numbering is usually dictated by the order of installation of the associated Socket Services.

Sockets

The logical numbering of the sockets provided by this adapter and also in parenthesis the total number of sockets, e.g.: 1-2 (2).

Memory or I/O Windows

The maximum number of windows that are available to map into system memory or I/O space that the host adapter can create and assign to its

sockets. For example a card featuring a serial port may have a standard I/O range such as 2F8H-2FFH assigned to it, which would constitute one memory or I/O window.

EDC Generators

EDC - Error Detection and Correction. Some host adapters may feature facilities to generate this kind of logic.

Sockets Share Power Levels

Either yes or no. If the sockets share power levels, then each socket cannot be programmed independently of the other. If the card in one socket has specific requirements that are not matched by a card in another, they cannot be made to operate simultaneously. Typically this reads 'no'.

Sockets Share Data Bus Width

This is also yes or no. Shows whether the data bus width is independently programmable for each socket. Typically 'no'.

Status Change IRQ

Each host adapter requires an IRQ of its own. It uses this to notify the Card Services of events such as, primarily, a card being inserted into or removed from a socket. The currently selected IRQ and its state (Active or Inactive) are reported. When Inactive, the IRQ may not have been configured and so carry a value that appears to conflict with other hardware: this is not of concern owing to the inactive state.

Supported IRQ Options

A list of all the IRQs which the host adapter can be programmed to use for the Status Change IRQ above.

Vendor Identification String

The string inserted by the vendor of the Socket Services which will usually give (in the form of a copyright message) the name of the Socket Services vendor and may also give the host adapter chipset type for which it is designed.

Vendor Revision

The vendor's own maintained release number, to ensure that you have the most up-to-date Socket Services version, for example.

PCMCIA Compliance

The level of the PCMCIA specification to which the Socket Services comply. This may affect your ability to use certain cards or Card Services.

Socket Services Entry Point

The entry point (obtained from Card Services) to which software must go to talk directly to the Socket Services rather than to the Card Services. When the Card Services are not loaded the INT 1AH interface is active.

4.6.2 PCMCIA Socket Information

Only available when the Card Services are installed. The information relates to the current configuration of the socket and so contains little information when there is no card installed in that socket. When a card is installed in the socket which has been either part configured by the Card Services or completely configured by its driver, this screen gives its configuration.

The menu on this screen has options to obtain the card information for a card inserted into the socket, and for moving to the next or previous socket. Note that you are not prevented from selecting this option if there is no card: Card Services information can always be viewed.

Socket Number

The logical number of the socket. All software referring to sockets will use their logical numbers (i.e. The card in socket 1 is ...). The order of installation of Socket Services drivers usually dictates the order of numbering of the sockets.

Card Inserted

Whether a card has been detected as inserted in the socket. This could indicate for instance that the card insertion is not being detected.

Assigned IRQ

If the socket has been successfully configured for an inserted card, and the card requested the use of an IRQ, the selected IRQ that has been channelled to the socket is given. The IRQ will also be indicated to be Exclusive, Shared or Time Multiplexed.

I/O Lines Enabled

The number of I/O address lines that are enabled at the socket. The remaining address lines at the socket are unused, but the bus address lines stop at and are decoded by host adapter logic instead. A card requiring 8 I/O locations could take only 3 address lines and require that the adapter perform the remaining decode by use of a memory or I/O window.

Power

Figures are given for Vcc, Vpp1 and Vpp2. Not all cards use both the common and programming voltages. Note that Vpp1 and Vpp2 display the current state, which may be under the control of client drivers, and therefore might indicate other than the expected value.

Memory and I/O Windows

This list of memory and I/O windows shows what memory type (i.e. main memory or I/O) and the data size that is transferred (either 8 or 16 bit). The address and size of the window are also given.

4.6.3 PCMCIA Card Information

The menu on this screen has options to move to the next or previous socket to view cards in other sockets. On some systems, some minor confusion can occur since some ISA-PCMCIA adapters place socket 1 at the rear of the computer and socket 2 at the front. Socket 1 is the default socket when the PCMCIA information is first invoked within

Pc-Check and so the socket number must be changed before cards inserted at the front of the machine are visible.

Socket Number

You are currently viewing information for socket number n (see PCMCIA Socket Information).

Card Type

A broad indication as to the general classification of the currently inserted card. Examples are 'Fixed Disk', 'Memory' or 'Serial Device'.

Common Memory / Attribute Memory

Every card contains at least a small amount of memory. Depending on the card type and design, one or both of two distinct memory areas will exist: common memory and attribute memory. These often have different physical memory types. The attribute memory stores the Card Information Structure (CIS). The CIS contains useful information about the card, including the physical characteristics of the common and attribute memory. Some designs place the CIS in common memory, or omit information from the CIS such that no attribute memory type can be shown. An example of a memory configuration might be a 4MB flash card, with 150ns access time and the CIS placed in common memory. The common memory would be shown as 2x2MB (4MB), Flash (150ns).

Power Required

The power configuration that the card requests in its CIS. If any of the power options are not specified within the CIS, they are shown as 'default'. The PCMCIA Socket Information gives the levels that are actually being used, which should tally with the appropriate PCMCIA PC-card specification.

Backup Battery

Some memory cards require a battery for data retention. The state of this battery is shown to be either good, low or bad. If the battery is low, it should be replaced to ensure data will not be lost - if it is bad then data

loss will have occurred. If no battery is fitted to the card or the state of the battery is not readable, then the entry will read 'none'.

CIS Level 1 Version

The version information from the Level 1 Version / Product Information Tuple in the CIS. With appropriate knowledge, this value can be used to determine if a card is suitable to use with the installed versions of the PCMCIA software.

Vendor Identification String

The vendor identification string from the CIS gives the card's manufacturer, a description of the card itself, and may also give some kind of product identification.

Items beyond this point refer to Card Services Information.

Vendor Identification String

The identification string returned from Card Services, which gives the vendor of the Card Services in use on the system.

PCMCIA Compliance

The level of PCMCIA PC-Card Specification to which the Card Services software is compatible. Certain PCMCIA cards may specify a minimum level of compliance.

Vendor Revision

The vendor's own revision number for the Card Services software. You can use this to ensure that your Card Services are up-to-date.

4.7 Interrupt Vectors

The Interrupt Vector Information screen lists the software interrupt vectors with the interrupt number in hex and decimal, the vector that the interrupt is pointing to in "segment: offset" notation, plus a description of what the vector is normally used for (e.g., divide-by-zero interrupt).

There is more data than the screen can display all at once so you may use the cursor or the PgUp/PgDn keys to scroll beyond the normal display limits. These instructions are given on the bottom line of the display when they apply. Press <ESC> to exit back to the System Information Menu.

4.8 IRQ Routing Information

Displays the devices which are attached to the 16 system IRQs and which loaded program or device driver is in control of them.

IRQs which are enabled are marked “Active: YES”, otherwise “NO”. Vector shows the memory location where the interrupt is serviced, and (for the DOS version of *Pc-Check* only) Owner contains the name of the controlling program or device driver. This information is followed by a list of devices. The devices whose IRQs are detected include:

Serial Port, Parallel Port, Hard Drive, Floppy Drive, CD-ROM/ DVD Drive, Mouse, Soundcard, Network card, ATAPI, and any devices on the PCI bus.

All of the standard AT devices are also confirmed on the display and their active status noted. These are:

System Timer, Keyboard, Cascade, Real-Time Clock, Co-Processor.

To detect to which IRQ each parallel port is attached requires that a *Pc-Check* loopback plug is inserted in each parallel port.

In order to detect the used IRQ of some devices, e.g. a network card, the relevant driver may need to be loaded. Therefore the usage data may be incomplete if the appropriate programs are not present.

4.9 Device Drivers

The information displayed differs between *Pc-Check* running in self-boot mode, and *Pc-Check* running under full DOS.

4.9.1 Pc-Check Self-Boot

The “About PC-CHECK” panel is displayed, listing *Pc-Check*’s own device drivers, indicating which are and are not loaded.

4.9.2 Pc-Check under full DOS

The Device Driver Information option lists the currently installed device drivers with the memory location of the driver, technical characteristics, the standard DOS name and a short description, e.g. “First Serial Port”.

Devices that are recognised by *Pc-Check* are described briefly in the comment column.

Your system may have more device drivers than can be listed on one screen. In this case you may use the <ENTER> or PgUp/PgDn keys to swap between the two pages.

4.10 APM Information

Displays a variety of Advanced Power Management information, the screen being divided into two parts. The left-hand side provides a general information panel, and the right-hand side initially displays a menu with the following facilities: Select Device; Change Power State; View Power Status; Indicate CPU Usage; Get PM Event; Change Interface Mode.

WARNING

The behaviour of Advanced Power Management facilities is heavily dependent upon BIOS design, and what works in a particular way for one manufacturer may not do so for another. Also, a number of functions are interconnected. Highly experienced users will be aware of these difficulties, but others are advised to exercise caution. Particular care should be taken with the “Change Power State” option, because it is possible to power down the entire system, perhaps losing previous test results in the current *Pc-Check* session. Therefore, unless the exact behaviour of a machine is known, it might be advisable to carry out “Change Power State” tests in a different session.

4.10.1 Select Device

Leads to a sub-menu allowing power management for all devices or individual devices to be examined. The menu items are: All devices; Display; Secondary Storage; Parallel Ports; Serial Ports; Network Adapters; PCMCIA Sockets. Should the user wish to select an individual

device rather than the default option of "All devices", the user is prompted to supply the device unit number: failure to do so correctly will produce an error message.

4.10.2 Change Power State

IMPORTANT

Read the warning notice at the head of this APM section of the manual carefully before using this option.

A menu allows setting of the following power states to be tested: APM Enabled; Standby; Suspend; Off.

Selecting APM Enabled when it is already in use produces an appropriate error message. If Standby, Suspend or Off are invoked, a warning message such as the following is displayed:

!! CAUTION !!

Switching to Off may interrupt the operation of *Pc-Check*

indicating that switching to that mode may terminate the *Pc-Check* session. In particular, the combination of "All devices" and a Change Power State of "Off" will switch the machine off, requiring restarting via the power switch, and the loss of any test results from the *Pc-Check* run. However, some machines will also power down with other combinations of "Select Device" and "Change Power State": hence the above recommendation that the user should experiment with Change Power State options first in a different session.

4.10.3 View Power Status

Provides information about AC line status, Battery status, Battery flag, and details of battery life, for each battery in succession. Press <ENTER> to display details of the next battery.

4.10.4 Indicate CPU Usage

A menu of two CPU Usage options is displayed: Call CPU Idle; Call CPU Busy.

Call CPU Idle

Notifies the APM BIOS that the system is idle, causing it to take some power-saving action. If successful, a message is displayed detailing the action taken (the CPU clock is either slowed, or stopped for 1 clock tick). Otherwise an error message is displayed.

If the CPU clock speed was slowed as a result of selecting "Call CPU Idle", re-selection of this option prior to restoring the clock speed via "Call CPU Busy" produces the following error message:

CPU clock speed already slowed

If instead the CPU clock was stopped for 1 clock tick as a result of selecting "Call CPU Idle", re-selection of this option prior to selecting "Call CPU Busy" causes the clock again to be stopped for 1 clock tick.

When the interface is disconnected (see below), selecting "Call CPU Idle" from the "Indicate CPU Usage" menu produces an "Interface not connected" error message; pressing <ENTER> returns to the "Indicate CPU Usage" menu.

Call CPU Busy

Produces the following message when the clock is already operating at full speed, for instance after a "Call CPU Idle" selection which stopped the clock for 1 clock tick:

CPU clock already operating at full speed

If instead you select "Call CPU Busy" after slowing the clock via "Call CPU Idle", then if successful a message is displayed stating that the clock has been restored to full speed. An unsuccessful call produces an error message.

4.10.5 Get PM Event

Provides confirmation that the Operating System has been notified of an APM-related event, unless the Interface has already been disconnected.

If there is a pending event, its name is displayed in a "Pending PM Events" display box. Pressing <ENTER> displays the name of the next event in the queue, or else displays the message:

No more power management events pending

If instead no PM events at all were pending, the following message is displayed:

No power management events pending

For completeness, a list of Power Management event notifications is given in Appendix B, although not all of them are likely to be invoked via *Pc-Check*. From this list it should be possible to deduce the set of messages which should be expected for the particular combination of options which *Pc-Check* is asked to perform.

4.10.6 Change Interface Mode

A menu of two items is displayed: Real Mode Connect, and Interface Disconnect. When either option is selected, either a message is produced indicating a successful interface connection/disconnection, or an error message is produced indicating that the appropriate status was already in operation.

Note: *If the Interface is disconnected, several other APM options cannot function, namely "Change Power State", "Indicate CPU Usage" and "Get PM Event". An attempt to use them gives the error message:*

Interface not connected

4.11 I/O Port Browser

Displays the status of the I/O ports, locates the available ports and detects which ports are connected.

A cautionary message is displayed, as follows:

CAUTION - PLEASE READ THIS MESSAGE - CAUTION

Reading I/O register values may disrupt the operation of some devices. Occasionally a PC may need to be restarted. If this occurs, turn off the 'Show Active Ports Only' option.

The Portmap Settings menu appears below the message.

4.11.1 Output Device

Allows the user to change the device to which the I/O port information is output. To toggle the output device between screen and printer, use the cursor keys to highlight the 'Output Device' option in the menu and press <ENTER>.

4.11.2 I/O Search Start

Allows the user to enter an address at which the I/O search will begin. To change the I/O search start address, use the cursor keys to highlight the 'I/O Search Start' option in the menu and press <ENTER> to select: a flashing cursor appears awaiting your input. You may press <ESC> to abort, or type in a hexadecimal start address that must be between 0 and hexadecimal F9D0h to be valid. Press <ENTER> to accept the value. Note that if you enter an address above F9D0h, it will be curtailed to this value. After <ENTER> is pressed, the portmap menu will update to show the new address.

Note: *The address entered will be rounded down to a multiple of 8.*

4.11.3 Show Active Ports Only

With this option the user may choose to view all the I/O addresses within the selected range or only the active I/O addresses. To toggle between settings, use the cursor keys to highlight the 'Show Active Ports Only' option in the menu and press <ENTER>.

4.11.4 Accept Settings as Shown Above

Allows the user to continue and display the I/O port information using the displayed settings.

To continue, and display the I/O port information, use the cursor keys to highlight the 'Accept Settings as Shown Above' option and press <ENTER> to select. The I/O port information will then be displayed to the selected output device.

4.11.5 I/O Port Browser

When the I/O port information is displayed on the screen, all active ports will be shown in YELLOW, or HIGHLIGHTED on monochrome systems.

Contents	Description
Description	A short description of the I/O port
In-Use	Determines if the port is active or not by displaying 'Y' or 'N'
Address	The hexadecimal location of the row's first I/O port
Contents	The values contained at the I/O port locations.

The following keys are valid when viewing the I/O port information:-

↑↓	**Move the current viewing area up or down 1 line respectively**
PgUp	**Moves the current viewing area 1 page up**
PgDn	**Moves the current viewing area 1 page down**
Home	**Moves to the top of the viewing area**
End	**Moves to the end of the viewing area**
Enter/Esc	**Exits the I/O port browser**

4.12 Memory Browser

Displays the contents of memory in 512-byte blocks, either low memory only (the first 1MB) or else all memory.

An introductory panel allows selection of address format, either segment:offset for low memory display or else linear for all memory.

Note: *All linear addresses are rounded down to the nearest paragraph (16 byte) boundary, i.e. the last digit is rounded down to zero.*

The top of the display gives the memory area currently being shown. Pressing the key "I" brings up a Help Panel, giving navigational shortcut keys appropriate to the selected address format. The keys common to both Help Panels are as follows:

↑↓	**Moves up/down 1 line**
PgUp/PgDn	**Moves up/down 1 page**
Home	**Moves to the start of the block**
End	**Moves to the end of the block**
+	**Moves to the next 512 byte block**
-	**Moves to the previous 512 byte block**
Esc	**Allows a new address format to be selected**

The address format-specific keys are the following:

Segment:offset address format:

O	**Allows a new OFFSET to be set**
S	**Allows a new SEGMENT to be set**

Linear address format:

L	**Allows a new LINEAR ADDRESS to be set**

Press any key to clear the Help Panel before pressing your chosen key. Segments and offsets may be up to 4 digits long, linear addresses up to 8 digits.

Press <ESC> to return to the introductory panel allowing selection of an address format. Press <ESC> again to exit the Memory Browser.

4.13 Sector Browser

For floppy and hard drives, displays contents per sector in hexadecimal and ASCII, with offset. Sector locations are either given in cylinder, head and sector (CHS) format or else as linear block addresses (LBAs). An introductory panel allows selection of a drive.

If you select the floppy drive you will be prompted to swap the PC-Check boot disk if you wish. If you select a hard drive which supports disk extensions, as the majority of hard disks now do, a menu appears allowing choice of address format (CHS or LBA). The address format determines how much disk space can be displayed; CHS limits the display to 8.4GB, whereas LBA removes this limit. (In the rare event of your hard disk not supporting disk extensions, the display will default to CHS limited to 8.4GB).

The top of the display gives the current sector location in the relevant address format – CHS for floppy disks and either CHS or LBA for hard disks.

Pressing the key "I" brings up a Help Panel, giving navigational shortcut keys appropriate to the address format. The keys common to both Help Panels are as follows:

↑↓	**Moves up/down 1 line**
PgUp/PgDn	**Moves up/down 1 page**
Home	**Moves to the start of the sector**
End	**Moves to the end of the sector**
+	**Moves to the next sector**
-	**Moves to the previous sector**
Esc	**Exits to previous menu**

The keys that vary are as follows:

Floppy drive or Hard drive, CHS:

C	**Allows a new CYLINDER to be set**
H	**Allows a new HEAD to be set**
S	**Allows a new SECTOR to be set**

Hard drive, LBA:

L	**Allows a new LBA to be set**

Press any key to clear the Help Panel before pressing your chosen key. When you press <ESC> to exit the floppy drive display you will be prompted to reinsert the PC-Check boot disk.

To exit the Sector Browser, press <ESC> when the introductory panel is showing.

4.14 CPU Frequency Monitor

Displays the measured processor speed over time, using a choice of three timebases. A histogram of time (vertical y-axis) against measured processor speed (horizontal x-axis) is plotted. The time interval for measurements is selected from a panel via the up/down arrow keys (Note: <ENTER> is not required), and can be 2 seconds, 1 minute or 1 hour. This feature can be useful for checking processors having a

Speedstep facility, or where there is a suspicion of thermal instability. With a stable, single-speed system, the graphic will resemble a rectangle.

4.15 CMOS RAM Utilities

This option leads to the CMOS RAM Utilities display. An introductory panel contains information about the utilities, leading to a menu with the following options.

4.15.1 Save CMOS to File

A copy of the machine's non-volatile CMOS memory can be saved to a writable medium. Select the option and enter the filename (see Appendix C for the pathname drive letter, if necessary). The action takes place immediately the option is chosen.

IMPORTANT

If you are running *Pc-Check* from a floppy diskette, and writing the CMOS file to another floppy diskette, remember to replace the program disk AS SOON AS the Save operation with the backup diskette is completed.

Always be sure to restore saved data only to the PC from which it was saved.

4.15.2 Restore CMOS from File

A copy of the machine's CMOS memory can be restored. The action takes place immediately the option is chosen.

IMPORTANT

If you are running *Pc-Check* from a floppy diskette, and reading the CMOS file from another floppy diskette, remember to replace the program disk AS SOON AS the Restore operation with the backup diskette is completed.

Always be sure to restore saved data only to the PC from which it was saved.

4.16 SCSI Utilities

4.16.1 Important Information Before You Begin

The SCSI Utilities currently require an ASPI compatible device driver in order to operate: hence these tests do not work with Self-Boot *Pc-Check*, as the ASPI driver is not loaded. ASPI device drivers are invariably designed to work with a specific controller and are sold with the controller card. This means that an ASPI driver that was not supplied with the controller card being used will almost certainly not work correctly. See Appendix A for a description of how to access the SCSI Utilities by operating *Pc-Check* under a full DOS environment.

Note: *SCSI hard drives can be tested using the Hard Disk Diagnostics option under the Advanced Diagnostics menu, even in self-boot mode, provided that the SCSI Adapter BIOS has "int 13h extensions" enabled.*

Note: *The SCSI Utilities work on **targets** (physical devices), and do **not** recognise subdivisions into Logical Unit Numbers (LUN's). Therefore **all** logical devices associated with a physical device will be involved when the utilities are used.*

A SCSI Menu is displayed with the following options:

4.16.2 Identify SCSI Devices

Displays relevant information about the SCSI host adapter (controller card) and the first SCSI target connected — the SCSI target device with the lowest SCSI ID. If multiple targets are attached, a menu will appear on the right hand side of the screen allowing additional targets to be interrogated. Pressing the <ESC> key will exit the menu.

Note: *The above option applies to all SCSI devices attached to the SCSI bus and is not restricted to hard disk drives only.*

4.16.3 SCSI Low Level Format

Only to be used to low-level format SCSI hard disk drives and when selected will provide a menu of SCSI hard disk drive targets to choose from. If only one SCSI hard disk drive is connected, this is the drive

that will be formatted, and the interleave entry screen will be entered immediately. You can press <ESC> here to exit without formatting and will have a further opportunity to abort the format before it is started.

Interleave Entry

You must enter an interleave to use for formatting the selected hard drive. Values of between 1 and 99 are valid and other values will result in an error. If you are unsure about which interleave to use, a value of 1 or 2 is recommended or the performance of your SCSI hard disk drive will be significantly reduced. Pressing <ESC> here will return to the SCSI Menu without taking any action.

Note: *Selecting an unsuitable interleave may cause the format to fail.*

Format Key

The format key is a randomly generated case sensitive password that has to be entered exactly as shown in order to initiate the format. Pressing <ESC> here will return to the SCSI Menu without taking any action.

IMPORTANT

This is your final opportunity to abort the format: any data on the disk will be irretrievably destroyed if you continue!

Format In Progress

After the format has been initiated, some relevant information about the drive being formatted is displayed for your review.

Note: *The low-level formatting of large hard drives can take a considerable time!*

4.16.4 Assign SCSI Bad Blocks

Only to be used to assign bad blocks on SCSI hard disk drives and when selected will provide a menu of SCSI hard disk drive targets to choose from. If only one SCSI hard disk drive is connected, this is the drive that will apply when re-assigning bad blocks, and the Re-assign Menu will be entered immediately. This menu has the following options:

Add Bad Block

Selecting this option will pop up a data entry window requesting the bad block to be re-assigned. The bad block number can then be entered using hexadecimal notation. The range of legal blocks that can be re-assigned is from 1 to the maximum block on the selected hard disk drive. Note that block 0, the boot sector, cannot be re-assigned. If a block number greater than the maximum block available on the selected target is entered, a 'Value out of range' error will be generated. Enter the correct value after the message disappears. When successful, the bad block entered is added to the list shown on the display.

Error Messages and Comments

'Out of Range Error, Please Retry'
'Block Already Listed, Please Retry'
'The Boot Sector cannot be re-assigned'

Delete Bad Block

At least 1 bad block must have been entered in order for this function to operate, otherwise an error message will appear. After the data entry window pops up, enter the bad block number for deletion and press <ENTER>. That entry will then be deleted from the current list, assuming that it is present. The bad block entered must be in the current list or a 'Value out of range' error will occur.

Error Messages and Comments

'Block Not Listed, Please Retry'

Clear List

At least 1 bad block must have been entered in order for this function to operate, otherwise an error message will appear. After selecting this option a message window will appear saying that all the bad blocks will be deleted. You may press <ESC> to abort or <ENTER> to continue. After <ENTER> is pressed a blank list is shown.

Sort List

At least 1 bad block must have been entered in order for this function to operate, otherwise an error message will appear. This function has no dialogue window at all: it merely sorts the current list into ascending order as soon as it is selected.

Write Bad Blocks

At least 1 bad block must have been entered in order for this function to operate, otherwise an error message will appear. When selected, this function attempts to re-assign the bad blocks entered to spare blocks on the selected hard disk drive, and may take a while to complete its task. A dialogue window will appear indicating the success or failure of the function on completion. If this function fails, it is probable that there are insufficient spare blocks available to re-assign all the bad blocks entered. If you low level format the selected hard disk drive it will release all previously marked bad blocks that were not specified by the manufacturer.

Note: *If more than 44 bad blocks are to be re-assigned, this must be done in several passes, i.e. write 44 bad blocks at a time.*

If any unwritten bad blocks remain, pressing <ESC> leads to a 'List not written !!' menu; otherwise, <ESC> returns to the SCSI Menu.

The 'List not written' menu gives the following choices:-

Note: *This is a forced entry menu where you must make a choice. You cannot Escape from this menu.*

(i) **Continue Editing**

This choice simply returns you to the main Re-assign Menu where you can continue editing your bad blocks list.

(ii) **Write List And Exit**

This choice attempts to write the bad blocks entered and then exits directly to the SCSI Menu. See Section 6.3.5 'Write Bad Blocks' for further information.

(iii) **Abort List And Exit**

This choice simply dumps any bad blocks entered and returns control directly to the SCSI Menu.

4.17 Text File Editor

The text file editor can be used as an editor / browser for any file. Backup files (with a .BAK extension) are created whenever a file is saved in the editor: hence it is always possible to revert to the previous version of a file.

If *Pc-Check* is run under DOS, rather than in self-boot mode, it searches for the presence and location of the following files on the hard disk: AUTOEXEC.BAT, CONFIG.SYS, WIN.INI, and SYSTEM.INI. It then presents those which have been found with their full pathname, together with another option "Other File", which presents a "file open" dialogue to allow you to choose a file from another location.

Note: *Please ensure that the medium containing the file being edited is not write protected.*

The editor uses the following keys:

←↑↓→	**Move in the chosen direction**
Ctrl- ←	**Back one word**
Ctrl- →	**Forward one word**
Page Up	**Back one page**
Page Down	**Forward one page**
Home	**Beginning of current line**
End	**End of current line**
Ins	**Toggle Insert / Overwrite mode**
Del	**Delete current character: if pressed at the end of the line then the line below is joined to the current line**
BkSp	**Backspace and delete previous character**
Enter	**Open a new line: splits current line if pressed in the middle**
Alt-X	**Finish editing and ask whether to save the file: can be escaped to return to editing.**

The screen will scroll left and right as necessary, to show the end of lines which are longer than the screen width.

4.18 Start-Up Options

This option is very similar in function and user-image to the "Advanced Start-Up Options" invoked via the F8 key when *Pc-Check* boots. The most important difference is that it **cannot** be used to define or modify data for the **current** interactive session. Its job is to generate a CMDLINE.TXT file for a subsequent *Pc-Check* session. Hence the following panel appears on the screen when the option is entered:

IMPORTANT

This option edits the content of the CMDLINE.TXT file only. Changes made to the command line at this time will not take effect until the next and subsequent sessions.

Pressing <ENTER> will lead to the Start-Up Options Editor. All the command line parameters are listed in alphabetical order, with a one-line summary of their function. Navigate through the list with the Up/Down arrow keys and Page-Up/Page-Down keys.

Highlight a required switch and press <ENTER>. A more detailed description appears, together with the following options:

Yes Include this option in the command line.

No Omit this option from the command line. Used to remove a switch from the current command line data.

Cancel Do not change the current status of this switch.

If "Yes" is selected, and there is an additional value required (name or number), a panel appears which enables this argument to be inserted. Do not include double quotes around text strings.

Each time that you press <ENTER> after setting an individual parameter, the main parameter list reappears, with the full revised command line contents displayed at the bottom. Double quotes are automatically inserted for text strings containing blanks.

When you have completed all your settings, press <ESC>. A panel allows you to choose whether you wish to resume editing, save your instructions, or discard them. *Pc-Check* will return to the System Information Menu, after writing the CMDLINE.TXT file if you requested it.

Note: *The location of the CMDLINE.TXT file will depend upon the program medium being used. For USB flash device or floppy diskette, the file will be written to that medium by default.*

For the CD-ROM version of Pc-Check, a writable floppy diskette will have to be inserted first: a message will appear on the screen, with reminders that a floppy diskette must be present, and that the CD-ROM must have priority over the floppy disk drive on reboot.

Note: *For CD-ROM use, since the burnfile will also be written to floppy diskette, you must include the full pathname of the burnfile in the CMDLINE.TXT file. This will be drive B: for a floppy drive running with the CD-ROM version of Pc-Check. See Appendix C for further details.*

This page is intentionally left blank

Section 5

ADVANCED DIAGNOSTIC TESTS

The Advanced Diagnostic Tests are selected from the Main Menu. You will find that the screen display normally gives all the information required to determine the nature of any fault detected, but these notes give further explanation where necessary.

Test results can be viewed in the Results Summary or printed in the Results Report, both accessed from *Pc-Check*'s Main Menu. A few options provide a results viewing facility within the option itself, for instance Floppy Disks and Hard Disks: in these cases, you may choose between viewing the results on screen, sending them to a printer or saving them to disk.

In the following sub-sections, error messages and comments appear as overlay boxes on the screen. They are usually self explanatory. In some cases, the overlay boxes require a decision by the user, either by a sub-menu selection or by a key press.

Looking at the screen menu, the order of description of the Advanced Diagnostic Tests in the manual is: top to bottom in column 1, followed by the second column, etc.

5.1 Processor Diagnostics

When the Processor Diagnostics are selected, the left-hand side of the screen provides processor details and the status of the tests, while the right-hand side contains a menu of these tests.

Processor details include type, speed and CPU signature. Processor tests cover the Core Processor, AMD 64/EM64T Core, Maths Co-Processor, MMX Extensions, 3DNow! Extensions, SSE/SSE2 Instruction Sets, and MP Symmetry.

If you're using a multiprocessor system, 'Select Processor' allows selection of a particular processor for testing. *Pc-Check's* Processor Diagnostics support systems with up to 16 processors.

"CPU Information" produces a scrolling window which indicates whether the CPU supports individual features and extensions. No tests are invoked.

For the Core Processor test, *Pc-Check* will ensure that the processor is performing satisfactorily by running a series of functions. Once tested, the result is given as PASSED or FAILED.

If a Maths Co-processor is detected, *Pc-Check* verifies the correct operation of the co-processor with a series of comparison and arithmetic functions. After testing, the result is given as PASSED or FAILED.

On Pentiums and above, the Pentium division (FDIV) bug is tested for: this should only fail on Pentium 60MHz and early 90MHz processors. The FIST bug is also tested for: this should only fail on some Pentium Pro and Pentium II processors.

If MMX Extensions are detected, *Pc-Check* verifies correct operation of the MMX unit. After testing, the result is given as PASSED or FAILED.

If 3DNow! Extensions are detected, *Pc-Check* performs various checks on arithmetic operations.

Where detected, SSE and SSE2 Instructions are tested. Processor types such as AMD XP and Pentium III have SSE instructions, and later processors may also have SSE2. Earlier processors have neither. Appropriate messages are displayed accordingly.

For multiprocessor (MP) systems, *Pc-Check* performs various symmetry comparisons between the bootstrap processor and other processors. There may be a short pause at the beginning while checks are made on the additional processors under test. The symmetry test will fail if the additional processors are not identical to the bootstrap processor.

Error Messages and Comments

'No Co-Processor is Installed'
'MMX Extensions Not Detected'
'3DNow! Extensions Not Detected'
'SSE Instruction Set not supported by this processor'
'SSE2 Instruction Set not supported by this processor'
'Symmetry tests have no direct relevance for the bootstrap device or to single processor configurations'

5.2 Memory Diagnostics

Note: *With large modern memory modules, testing can be time-consuming. On older systems, or systems with large amounts of memory, full testing can take an extended period. Accordingly, the Memory Diagnostics include options for restricting which memory modules are tested, and over what range. If desired, the types of test can also be restricted.*

The upper half of the screen initially contains a Memory Tests Menu, and the lower half, which remains in view throughout most tests, lists the memory installed, with its current test status.

The Memory Tests Menu is divided into three parts, as follows:

Test System Memory	Test Cache Memory	Test Video Memory
Test Module	Benchmark Memory	Set Test Set
Test Range	Cache Profiler	Set Test Reps
User Pattern Test	Part Details	Set uTL Test Time

The left portion of the menu allows the user to choose between testing all or part of the memory, and to choose the test pattern to be used.

The centre portion of the menu initiates direct testing of Cache Memory, Benchmark Memory and Cache Profiler. Information about memory can be viewed via Part Details.

The rightmost portion of the menu accesses the Video Memory Tests, and also provides options for which tests to run, and how many times they are to be repeated.

Note: *It is necessary to complete your choices, if any, for test set and number of repeats* ***before*** *initiating testing. Except for the User Pattern Test, Benchmark Memory and Cache Profiler, all tests utilise these settings, defaulting to all tests being performed once.*

Memory errors are displayed in white on a red background. For the last failure detected, the memory address, the expected value and the actual value are reported. The lower half of the screen indicates which module failed. Testing then continues, unless <Esc> is pressed, which halts testing at the next appropriate point.

Very rarely, a memory module may appear listed in grey, if the system information about the module indicates that there are no accessible memory locations that map to that module, making it effectively untestable. The module is given the result N/A. An attempt to test such a module using the 'Test Module' menu option gives the following message:

"The selection cannot be tested because the physical address range does not include any regions that are accessible to the CPU. Memory may be masked in this way if it occupies the same space set aside for memory mapped PCI devices and there is no provision in the memory controller to remap it at a higher address. This may in turn be because the module is paired with other modules for performance."

5.2.1 Test System Memory

Initiates testing of all installed memory modules. Information is displayed for: Current Test; Status (e.g. Testing, Passed); Current Step; Last Failure.

5.2.2 Test Module

Allows the memory in each socket bank to be tested individually. Press <ENTER> and then use the Up/Down cursor keys to select the required memory module from the list in the lower half of the screen. Pressing <ENTER> for a second time starts the testing. This option can save time if, for example, an additional memory module has been added, and the original modules do not require re-testing.

Note: *Some systems do not supply sufficient information to detect individual memory devices, in which case an explanatory message is displayed, and the "Test All Memory" option should be used.*

5.2.3 Test Range

Allows the user to define the start and end memory addresses to be tested. Once the range has been input, pressing <F10> immediately initiates testing.

5.2.4 User Pattern Test

Allows users to define an additional memory test using their own bit pattern. It is available only as an interactive option.

5.2.5 Test Cache Memory

Tests all levels of cache using memory test algorithms. The result for each cache level is reported separately.

5.2.6 Benchmark Memory

Invoked directly from the Memory Tests Menu by highlighting via the cursor keys, and pressing <ENTER>. Performs linear 32-bit writes to memory with the cache system both enabled and disabled. The throughput is displayed as a two-bar chart.

5.2.7 Cache Profiler

Invoked directly from the Memory Tests Menu by highlighting via the cursor keys, and pressing <ENTER>. Plots in real time on logarithmic scales the access time for random scattered memory access over an increasing range of memory. Indicates the increase in access time as greater amounts of level 1, level 2, level 3 cache and then main memory are used. The shape of the plot can be influenced by the characteristics of the cache and the speed of main memory.

5.2.8 Part Details

Gives information about the memory module, if available; otherwise it reports N/A (not available). A particular memory module is first selected via the Up/Down cursor keys. Pressing <ENTER> returns directly to the main memory test screen.

5.2.9 Test Video Memory

The first time the test is selected a cautionary message will appear:

Note: On some systems the entire screen may become black or white for prolonged intervals: this is normal during the operation of this test.

The selected tests are run in turn, and typically take several minutes. The Memory Tests Menu re-appears when the tests are complete.

5.2.10 Set Test Set

Allows the following tests to be included or excluded:

Module Seating Test
Inversion Tree Test
Progressive Inversion Test
Chaotic Addressing Test
Block Rotation Test
Microtopology Test

Note: *The Module Seating Test performs a connection test to ensure that a memory module has simply 'made good' in its socket. Intended for use as a quick test for previously tested memory that has been temporarily removed from the system.*

By default, all tests are selected. Pressing <ENTER> or <SPACE> toggles an option off or on (the latter is designated by a • symbol), and then moves to the next item. The Up/Down cursor keys move between items without changing their status. Pressing <F10> accepts the choices and returns to the previous panel. The most recent selection will be retained until the end of the Pc-Check session, i.e. if the user returns to the Memory Test option, the choices will not have reverted automatically to the default.

5.2.11 Set Test Reps

Controls how many times the selected tests are to be run in succession (the default is once only).

5.2.12 Set uTL Test Time

Microtopology (uTL) provides an exceptionally rigorous method of testing PC memory, and produces a highly reliable diagnostic report. It is a time-based test using a special "Microtopological Locality" algorithm, and is exceptionally sensitive to issues of noise and timing in the memory system as a whole.

The menu can be used to adjust the test time, which is expressed as hundredths of a second per megabyte. For example, if 100 (i.e. 1 second) were entered on a system with 512MB, the test would last for 512 seconds (eight and a half minutes). The default value is 150, which is usually sufficient to expose all but the most obscure faults.

Note: *A succinct definition of the Microtopological Locality algorithm used here is: "a mathematical addressing method designed to stimulate physically adjacent bit cells, effective even where the precise ordering is unknown".*

5.3 Motherboard Diagnostics

The motherboard tests are extensive, consisting of various low-level tests as detailed in the sections below. The left-hand side of the screen provides motherboard details and the status of the tests, while the right-hand side contains a menu of these tests. Operator action is only required if the CMOS RAM clock and system clock differ by more than a few seconds. If you only want to perform selected tests you can do this from the Burn-In menu option (see the Burn-In Section of the manual).

Note: *Some chipsets may not implement all the features of the original Intel design. In some cases, this can result in some tests failing. If this happens, you should consult the chipset manufacturer's literature or consult with the motherboard manufacturer.*

DMA Controller Tests

This test exercises the DMA controller's 3 types of registers (page, address and count), displaying PASSED or FAILED against each one.

These results are mainly informative to engineers. Some chipsets may not support the standard full set of page registers, as not all of them are used on the PC. The set of registers tested has been restricted to the common minimum.

System Timer Tests

These test the system timer chip (i.e. NOT the Real-Time-Clock). Clock ticking checks that the chip is generating interrupts. A clock tick check is followed by the frequencies of the three channel timers. The reload

interval values are shown for information only: they may be of benefit to an experienced engineer.

Channel 0 tests the counter associated with timer 0 to make sure it conforms with the operational characteristics of the standard Intel 8254 counter/timer chips or chipsets incorporating these functions.

Channels 1 and 2 run similar tests. Channel 1 is normally associated with memory refresh, and Channel 2 is normally connected to the speaker. (The speaker is disabled during testing: upon completion of the test, a beep will be heard of the currently programmed frequency).

Interrupt Controller Tests

Pc-Check tests some basic CPU interrupts, namely divide-by-zero, single-step (trace), breakpoint, overflow, invalid opcode, master controller and slave controller. The main program sets up an interrupt handler for each of these, generating the appropriate problem, and then checking that the interrupt occurred.

The interrupt controller test checks out the 8259 chip, or its chipset equivalent. Specifically, it checks the "Mask" register which allows selective disabling of a given type of interrupt. This is the only register that can be tested because it can be read and written to. All others are read or write only. This test is unavailable if memory managers are loaded (see Appendix A).

Keyboard Controller Tests

Pc-Check performs a series of six keyboard controller tests, returning either a pass or a fail for each. In the event of a failure, one of the following messages may appear which better describes the fault.

Error Messages and Comments

"FAILED: No reply"
"Clock Low"
"Clock High"
"Data Low"
"Data High"

Check the motherboard for physical faults and/or contact a qualified technician.

PCI Bus Tests

Scans the PCI Bus, accesses the devices found, checks the configuration and exercises the PCI BIOS functions. The process completes rapidly. This test is unavailable if memory managers are loaded (see Appendix A).

Non-Volatile CMOS RAM Tests

Checks the power-sense pin of the RTC (Real-Time Clock) which will fail if the battery is flat. The test then exercises the standard CMOS RAM locations with a walking bit test. The CMOS checksum is then calculated and compared with the stored value.

Note: *If you are running Pc-Check on a PS/2 system, a password is stored in CMOS but is locked out of read and write operations by hardware. This will cause the CMOS RAM tests to be skipped.*

The test also confirms that the Real-Time Clock is running. The RTC's status or mode registers are then checked to ensure that they contain standard IBM PC values. If not, "Non-Standard Mode" is displayed, but this is not considered to be a failure of the RTC.

The RTC's alarm operation is checked by setting an alarm time 2 seconds ahead and waiting for it with a timeout delay. This also tests the RTC's alarm IRQ generation.

The clock synchronicity test checks that the CMOS RAM clock and the system clock are running at the same rate and that their times are not more than 3 seconds apart. Should the times differ by more than 3 seconds, a prompt will appear, giving you the option to resync the system clock with the CMOS RAM clock.

Finally, the system (DOS) and CMOS (RTC) date & time are displayed (and continuously updated). Press the <ENTER> key to exit the test.

If you were asked to set the date and time when you booted the system, you can check that they are correct.

5.4 Floppy Disk Diagnostics

Checks the floppy diskette drives and the drive controller. The left-hand side of the screen provides details of the selected floppy drive

and the status of the tests, while the right-hand side contains a menu from which you can select a different floppy disk (if applicable) and the tests you wish to run.

To run a test, select the test option from the menu and press <ENTER>.

IMPORTANT

Two of these tests involve non-destructive writing to the diskette. There is always a slight risk of data loss in such a procedure (for example a power failure during the test), so do not risk using a diskette containing information which is not backed up. Should you be running *Pc-Check* from diskette, any data loss would of course require you to regenerate a *Pc-Check* program diskette.

5.4.1 The Select Drive Menu

This option allows the user to select the floppy disk drive to test, from a menu of the available drives. Information about the floppy disk is displayed on the left-hand side of the screen.

5.4.2 The Test Settings Menu

The Test Settings Menu allows you to configure the testing parameters used by the tests presented in the Floppy Disk Tests Menu.

Number of Retries

This option allows you to select the number of retries per test performed after a test operation fails (e.g. a read, write, seek etc.). Any failure, regardless of the number of retries set, will be logged in the error log, but it will not be counted as an error until the specified number of retries has been exhausted. For example, if this value is set to two, the test will try an operation three times (logging each failed attempt in the error log) before counting this operation as an error (and failing the device). See Test Settings >> Maximum Errors for a description on how to stop testing when a number of errors have occurred.

Note: *The default value for this setting is three, i.e. failed operations will be retried three times only.*

Maximum Errors

This option allows you to select the maximum number of errors per test that may occur before a test terminates. If this value is set to fifty, the fiftieth error will cause this test to terminate (give up). The first error will cause a failure to be recorded. See Test Settings >> Number of Retries for a description of what is considered an error.

Note: *The default value for this setting is 50. This means that testing will continue until 50 errors have been logged.*

Select Test Duration

Because of the short test time of floppy disks, the default value can usually be accepted. See the corresponding section under Hard Disk Diagnostics if you require a full description.

Select Test Coverage

Because of the short test time of floppy disks, the default value can usually be accepted. See the corresponding section under Hard Disk Diagnostics if you require a full description.

5.4.3 Read Test

This is a media class test. The Read Test reads sectors from the currently selected floppy disk (within the selected test range). This test diagnoses the device's mechanical functionality, media integrity and ability to transfer data to the host controller. The test screen (as with all media tests) shows the name of the test (Floppy Disk Diagnostics – Read Test) for the title, followed by a section containing the drive letter and capacity of the disk under test.

The next screen section contains a table giving details of the current status of the test, although this is not usually of great interest, because of the small capacity and short test time of floppy disks. See the similar "Read Test" section of the Hard Disk Diagnostics if you require further information about the parameters displayed.

The final section of the screen is filled with the bottom of the error log (most recently logged information).

5.4.4 Read Verify Test

The Read Verify Test checks the media of the currently selected floppy disk drive for bad sectors etc. This test causes the device physically to read the media but NOT transfer the data to the host controller. However, unlike the Read Test, this test does not test the device's ability to transfer data to the host computer.

See "Read Test" for a description of the screen layout.

5.4.5 Non-destructive Write Test

A warning panel appears with the following message:

> **Please ensure you have a valid up-to-date backup of your data before running this test. If this test is interrupted by power loss or user reboot, data corruption will occur.**
>
> **In the interests of your data security, you are required to repeat the following case-sensitive key in order to continue.**

The user is requested to repeat the challenge key 'YES' (case insensitive) before the test executes. This challenge is presented on entry to the test (in interactive mode) and at the start of burn-in (in burn-in mode). Although this test is theoretically safe, it does involve temporary changes to the disk, and is therefore vulnerable to the effects of power loss, etc.

This test writes contiguously to the whole of the diskette, and logs any errors. Various parameters are displayed, indicating the progress of the test.

5.4.6 Mechanics Stress Test

This test exaggerates the mechanical stresses caused by fragmented file systems in the day-to-day use of a drive. It can show up faulty seek logic, overshoot and undershoot problems, etc. Details of duration, coverage, head position and progress are given.

5.4.7 View Error Log

A menu allows the results of the above tests to be viewed on-screen, printed or saved to a file.

5.5 Hard Disk Diagnostics

WARNING

The Non-Destructive Write Test and Internal Cache Test described below can, under certain circumstances such as power failure, result in corruption of data. The Destructive Write Test erases all data on the currently selected drive. Please ensure you have read the advice given in the appropriate sections before selecting these options.

5.5.1 Menu Layout

The *Pc-Check* Hard Disk Diagnostics screen is split into two panels. The left panel shows information pertaining to the menu options displayed in the right panel.

5.5.2 The Hard Disk Tests Menu

The information panel contains the overall status of the current drive and the results of any previously run tests. Drive status will be shown as N/A if no tests have been run, PASSED if all previously run tests have passed, or FAILED if any previously run tests have failed. In interactive mode, re-running a test will overwrite the previous result.

5.5.3 The Select Drive Menu

In this menu, the information panel on the left provides an overview of the currently highlighted drive. This description includes the model number, firmware revision, serial number and capacity of the drive (including the Host Protected Area if one has been set). The information panel may show the drive as 'Unidentified' for non-IDE (i.e. non-ATA / non-SATA) drives and drives connected via custom controllers.

Selecting a drive will reset the test range to cover the entirety of the disk's surface (this applies to media tests only) and clear the error log.

If the error log is not empty, you will be prompted that errors exist, before it is cleared and the current drive is changed.

Selecting 'Exit' or pressing <Esc> in this menu will return you to the parent menu without changing the current drive.

Error Messages and Comments

'No Response from Hard Drive - Error'

Unable to determine drive capacity: as a result, the hard disk tests are likely to fail for this drive.

5.5.4 The Test Settings Menu

The Test Settings Menu allows you to configure the testing parameters used by the tests presented in the Hard Disk Tests Menu. Tests are split into two classes: media tests and device tests. Media tests diagnose integrity failures with the data stored on the disk's media. Device tests diagnose faults pertaining to the firmware logic and mechanical operations of the device.

Number of Retries

This option allows you to select the number of retries per test performed after a test operation fails (e.g. a read, write, seek etc.). Any failure, regardless of the number of retries set, will be logged in the error log, but it will not be counted as an error until the specified number of retries has been exhausted. For example, if this value is set to two, the test will try an operation three times (logging each failed attempt in the error log) before counting this operation as an error (and failing the device). See Test Settings >> Set Maximum Errors for a description on how to stop testing when a number of errors have occurred.

Note: *The default value for this setting is zero. This means that failed operations will not be retried – they will be immediately considered errors.*

Maximum Errors

This option allows you to select the maximum number of errors per test that may occur before a test terminates. If this value is set to fifty,

the fiftieth error will cause this test to terminate (give up). The first error will cause the device to fail. See Test Settings >> Set Number of Retries for a description of what is considered an error.

Note: *The default value for this setting is 50. This means that testing will continue until 50 errors have been logged.*

Check SMART First

Enables/disables the "Check SMART First" facility.

Note: *Many modern hard drives incorporate SMART (Self Monitoring Analysis and Reporting Technology), which attempts to predict device failure. SMART software on the HDD monitors the internal performance of motors, media, heads and electronics of the drive. SMART software on the host monitors the overall reliability status of the drive. Any errors are logged by the drive firmware.*

SMART only functions if it is switched on at the level of the drive firmware, typically via a drive manufacturer's utility. Pc-Check also facilitates the switching on or off of SMART, via the "Enable SMART" and "Disable SMART" options in the Utilities Menu of the Hard Disk Tests (q.v.).

IMPORTANT

Just because SMART generates an alert, do not assume that there is definitely a drive problem. Conversely, do not assume that the lack of an alert means the drive cannot possibly be faulty.

If *Pc-Check* detects a SMART alert, you are recommended to stop using the drive, and contact your drive manufacturer's technical support department for instructions. They may ask you to run additional diagnostics using their own dedicated drive utilities. *Do not ignore the alert.*

Assuming that SMART itself is enabled, then, if Check SMART First is also enabled, the Read Test, Read Verify Test, Non-destructive Write Test, Destructive Write Test, Mechanics Stress Test and Internal Cache Test perform an initial 'quick check' of the SMART Summary Error Log for the commands that they issue. For example, the Read Test

will check for previous failures of the READ SECTOR(S) and READ SECTOR(S) EXT commands prior to executing the actual test.

If any failures are found, the test is failed outright, because SMART has already established that the drive is faulty. This can decrease test time significantly for drives that support the SMART feature set, and which have already logged failures via SMART.

Note: *"Check SMART First" should not be confused with "Enable SMART". The latter ensures that SMART itself is activated on the drive at a fundamental level, and continues to apply after Pc-Check has terminated. The former is an option within a Pc-Check session which causes Pc-Check to behave in the way described above.*

HPA Protection

The Host Protected Area is an area located at the end of the physical disk. Applications and certain operating system functions cannot access this area. This area is typically used to store system restoration data (so you can restore your operating system etc. to the state they were in when you or your manufacturer imaged your machine). It can also have other functions such as storing incremental backups etc.

When HPA protection is enabled, (potentially) destructive tests (Non-Destructive Write, Destructive Write and Internal Cache Test) will NOT test this area for safety reasons. The Read Test, Read Verify Test, and Mechanics Stress Test will always test this area.

When HPA protection is disabled, all tests will use this area during testing. A prominent warning is displayed on screen when the user disables HPA protection, to ensure that they understand what they are doing.

The Media Test Settings Menu

The Media Test Settings Menu allows you to configure testing parameters for the Read Test, Read Verify Test, Non-Destructive Write Test, and Destructive Write Test.

Select Test Duration

Setting media tests to test by duration will cause them adaptively to alter their coverage to complete within the requested time frame.

The user is presented with a frame that shows the time in the format "##h ##m ##s". The two digits left of the hours field will be highlighted.

Up, down, left and right cursor keys can be used to move between fields. Pressing <ENTER> on a field will allow the user to edit the value in that field. Pressing <ENTER> again (after typing a number or not) will commit the field value; pressing <Esc> will cancel editing the field and the field will not be committed. Pressing <Esc> when no fields are being edited will exit out of the set duration dialogue.

If any field values have been committed, the whole duration will be committed. If no fields have been committed, the duration will not be changed.

The duration entered here will only limit the duration of media tests. It will not extend them. When tests are selected to test by duration, the coverage is calculated automatically as the test runs, to ensure that the test completes in the requested time frame. If the test is taking too long, the coverage is reduced. If the test is running too quickly, i.e. it will complete before time with the current coverage percentage, then the coverage is increased. Coverage never exceeds 100%; i.e. no one part of the disk is tested more than once in a single test instance. Setting a test duration value changes the test coverage to Auto.

Select Test Coverage

Setting media tests to test by coverage will cause them to take as long as is necessary to cover a specified percentage of the selected test range.

The user is presented with a frame that shows a filled bar and a percentage. Up, down, left and right cursor keys can be used to modify the coverage value by 1%. Page up and page down cursor keys can be used to modify the coverage value by 10%. Pressing <ENTER> commits changes. Pressing <Esc> cancels and changes are not committed. Setting a test coverage value changes the test duration to Auto.

Test Range

The user is presented with a frame requesting the start and end sectors. Start of range is inclusive, end of range is exclusive (e.g. hexadecimal 00000000:00000000 to 00000000:00000010 will test exactly 16 sectors starting at the beginning of the disk).

The end sector must be at least one higher than the start sector. The end sector may not be greater than the first inaccessible sector of the disk (one past the end sector). Any attempt to violate these rules will be automatically corrected for you.

Note: *When changing drives, the test range is set to span the entirety of the disk's media.*

The Device Test Settings Menu

The Device Test Settings Menu allows you to configure testing parameters used by the Mechanics Stress Test and Internal Cache Test.

Select Test Duration

Same as Test Settings >> Media Test Settings >> Select Test Duration, but for device tests. When device tests are set to test by duration, the testing level is automatically adjusted in order for the test to complete within the specified time frame. Setting test duration changes the test level to Auto.

Select Test Level

Similar to Test Settings >> Media Test Settings >> Select Test Coverage, but instead of specifying the percentage of the test range that will be covered, it specifies the 'level' of the testing performed. In short, a value of 50% will mean the test is half as effective as it would otherwise be at 100%. For example: the full Mechanics Stress Test performs 50,000 seeks – a setting of 50% would make it do 25,000 seeks; the Internal Cache Test hits as many cache locations as possible – a setting of 50% would make it hit half of them. Setting test level changes the test duration to Auto.

5.5.5 Read Test

This is a media class test. The Read Test reads sectors from the currently selected hard disk (within the selected test range). This test diagnoses the device's mechanical functionality, media integrity and ability to transfer data to the host controller. The test screen (as with all media tests) shows the name of the test (Hard Disk Diagnostics – Read Test) for the title, followed by a section containing the model number, firmware revision, serial number, capacity, and status of the drive under test. The next screen section contains a table. A typical snapshot might resemble the following:

	Elapsed	Remaining	Total
Duration	15m	45m	1h
Coverage	25.00%	75.00%	100.00%
Data	50.00 GB	150.00 GB	200.00 GB
Sectors	00000000:05D21DBA	00000000:1176592E	00000000:174876E8

The duration-elapsed field shows that the test has been running for 15 minutes. The duration-remaining field shows that the test will take another 45 minutes to complete. When media tests are set to test by coverage, the duration-remaining and duration-total fields are estimated.

The coverage-elapsed field shows that 25% of the selected test range has been tested so far. The coverage-remaining field shows that 75% of the selected test range is still to be tested before the test will complete. When media tests are set to test by duration, the coverage-remaining and coverage-total fields are estimated.

The data-elapsed field shows that 50 GB of the test range has been tested (this is calculated from the test range size multiplied by the elapsed coverage). The data-remaining field shows that 150 GB of the test range is still to be tested before the test will complete. When media tests are set to test by duration, the data-remaining and data-total fields are estimated.

The sector fields show the same information as the data fields but in hexadecimal logical block address notation.

Following that you will see the current sector number and a progress bar spanning the width of the screen.

The final section of the screen is filled with the bottom of the error log (most recently logged information).

5.5.6 Read Verify Test

The Read Verify Test checks the media of the currently selected hard disk drive for bad sectors etc. This test causes the device physically to read the media but NOT transfer the data to the host controller. This results in faster testing, with much the same benefits. However, unlike the Read Test, this test does not test the device's ability to transfer data to the host computer.

See "Read Test" for a description of the screen layout.

Note: *This test cannot be run on non-IDE drives and drives connected via custom controllers. When run on these drives, this test will display an appropriate error message and set the result of the test to N/A.*

5.5.7 Non-Destructive Write Test

WARNING

Please ensure you have a valid up-to-date backup of your data before running this test. If this test is interrupted by power loss or user reboot, data corruption will occur.

This is a media class test. Although this test is theoretically safe, it does involve temporary changes to the disk, and is therefore vulnerable to the effects of power loss etc. Therefore the user is requested to repeat the challenge key 'YES' (case insensitive) before the test executes. This challenge will be presented on entry to the test (in interactive mode) and at the start of burn-in (in burn-in mode).

This test will take approximately double the time which the Destructive Write Test takes to complete (unless, of course, media tests are set to test by duration, in which case, they will both take the same amount of time to complete).

See "Read Test" for a description of the screen layout.

5.5.8 Destructive Write Test

WARNING

Please ensure you have a valid up-to-date backup of your data before running this test.

THIS TEST WILL DESTROY THE ENTIRE CONTENTS OF YOUR DISK.

This is a media class test. Due to the destructive nature of this test, you are requested to repeat a random 8-character challenge key. This challenge will be presented on entry to the test (in interactive mode) and at the start of burn-in (in burn-in mode).

See "Read Test" for a description of screen layout.

5.5.9 Mechanics Stress Test

This is a device class test. This test exaggerates the mechanical stresses caused by fragmented file systems in the day-to-day use of a drive. It can show up faulty seek logic, overshoot and undershoot problems, etc.

The test screen begins with a section containing the model number, firmware revision, serial number, capacity, and status of the drive under test. Following that is a section containing a table. A typical snapshot might resemble the following:

	Elapsed	Remaining	Total
Duration	15m	45m	1h
Level	25.00%	75.00%	100.00%

The duration-elapsed field shows that the test has been running for 15 minutes. The duration-remaining field shows that the test will take another 45 minutes to complete. When device tests are set to test by level, the duration-remaining and duration-total fields are estimated.

The level-elapsed field shows that 25% of the test has been executed so far. The level-remaining field shows that 75% of the test is still to be executed before the test will complete. When device tests are set to test by duration, the level-remaining and level-total fields are estimated.

Following that you will see a position bar that shows the current position of the head in the Mechanics Stress Test and the (theoretical) current cache read/write address in the Internal Cache Test. This is followed by a progress bar spanning the width of the screen.

The final section of the screen is filled with the bottom of the error log (most recently logged information).

5.5.10 Internal Cache Test

WARNING

Owing to the active nature of *Pc-Check's* cache-sizing algorithm, this test can be potentially destructive, if, for example, it is interrupted by power loss or user reboot.

Please ensure you have a valid up-to-date backup of your data before running this test.

This is a device class test. Because this test can be potentially destructive, the user is requested to repeat the challenge key 'YES' (case insensitive) before the test executes. This challenge is presented on entry to the test (in interactive mode) and at the start of burn-in (in burn-in mode). The integrity of the drive's internal cache is tested. Hard disks currently support RLA (read look-ahead) and write caching.

See 'Mechanics Stress Test' for the screen layout description.

5.5.11 SMART Test Menu

Note: *Refer to the notes under the "Check SMART First" option for more information and advice about SMART.*

Some hard disk service organisations will no longer accept hard disk returns unless at least a SMART short self test function has been performed.

Theoretically the self tests also benefit from sensors and specific knowledge to which *Pc-Check* cannot obtain access. However it should be remembered that the precise implementation and performance of the test is entirely under the control of the hard disk manufacturer and their individual firmware implementation.

Note: *If SMART operations had been disabled for this drive, they are temporarily enabled for the duration of these tests, and then reset to disabled.*

SMART Immediate Test

Checks the entire SMART Error Log for previous failures of all hard disk commands (0x01 to 0xff). If errors are found, the number of errors is reported and warnings are displayed for those commands that have failed. If the drive has experienced so many, or such severe, problems that the drive has exceeded a manufacturer-defined threshold, the drive status is then set to failed. Where possible, additional diagnostic information is displayed.

All errors that appear in the SMART log are of physical significance, i.e. they do not relate to programmatic errors, such as out of range sector values. However, these errors may have come to pass due to something as simple as a sharp knock or power fluctuation during operation. Therefore a drive's status may remain as passed, even though warnings of command failures have been listed during the test.

In the case of a drive with more than two warnings, it is good practice to monitor the drive more closely in future, in case this is an early indicator of a more serious problem.

SMART Short Self-Test

A bar reports progress in 10% increments. On completion, the result is displayed in the bottom section of the screen.

Typically, this test should not take more than 10 minutes.

SMART Extended Self-Test

Note: *If the SMART Short Self-Test fails, there is no point in running this Extended Test.*

If both of these tests are selected under burn-in, then, should the SMART Short Self-Test fail, the SMART Extended Self-Test will automatically be set to failed, and the burn-in will move on.

This test will (typically) test the entire medium, but do so far more quickly than a *Pc-Check* 100% coverage test. This is because the test takes place entirely on the drive by the drive's own controlling processor, and no data need pass out of the drive. However, bear in mind the caveat given above regarding the manufacturer's implementation of the test.

The user interface for this test is identical to that of the SMART Short Self-Test.

The duration of the SMART Extended Self-Test is dictated by media size, and could take several hours.

5.5.12 View Error Log

Shows error log screen. The Error Log looks like this: -

```
Read Test: Drive 80H (Primary Master)
   Read error at sector 00000000:00041F5C
   Read error at sector 00000000:0021CF20
Read Verify Test: Drive 80H (Primary Master)
   Read error at sector 00000000:00041F5C
```

…etc.

Press 'C' to clear the error log (you will be prompted for confirmation); 'S' to save the error log to disk (you will be prompted for a filename); 'P' to print the error log to line printer (LPT1); or <Esc> to exit.

5.5.13 The Utilities Menu

Save Master Boot Record

Saves a copy of the currently selected hard disk master boot record (MBR) to a floppy disk. You are asked to provide a floppy disk filename for the MBR being saved: the default name includes the LUN value, e.g. MBR_80PM.BIN. Several MBR files can be saved to the same floppy disk by giving them different filenames. Read the important notes below.

Restore Master Boot Record

Restores the MBR for the currently selected hard disk from a copy held on a floppy disk in drive A:. You are prompted to enter the filename from which you wish to restore the MBR. See important notes below.

IMPORTANT

If you are running *Pc-Check* from a floppy diskette, remember to replace the program disk AS SOON AS the Save/Restore operation with the backup disk is completed.

Always be sure to restore saved data only to the hard drive from which it was saved. Check that the appropriate hard drive is indeed the one currently selected.

Enable SMART Operations

Enables SMART operations for the currently selected drive. Future errors will be logged by the drive (even while Pc-Check is not running) and will cause it to fail the next time the Smart Immediate Test is run.

Disable SMART Operations

Disables SMART operations for this drive – future errors won't be logged at any time until the feature is re-enabled by whatever means.

5.6 CD-ROM/DVD Diagnostics

5.6.1 Configuration requirements

You will require just one CD-ROM/DVD drive, regardless of the medium from which you are running *Pc-Check*. Both the Transfer Test and the Random Seek Test require a data only CD-ROM or DVD (as appropriate), whereas the Audio Disc Player requires an audio only disc.

The CD-ROM / DVD Test Disc Read requires either:

a Eurosoft CD Test Disc (which is typically an integral part of a *Pc-Check* CD-ROM Program Disc)

or:

a Eurosoft DVD Test Disc. The latter is a multilayer DVD9 disc, and is required to perform the DVD Laser Refocus Test.

Note: *Contact Eurosoft if you require a multilayer DVD Test Disc.*

For ATA CD-ROMs/DVDs, *Pc-Check* will drive the device directly in the absence of a DOS device driver. For other types of CD-ROMs/DVDs, the user must have loaded the relevant DOS device driver. Hence these tests won't work under Self-Boot *Pc-Check* for non-ATA CD-ROMs/DVDs. See Appendix A for advice on how to test such drives by running *Pc-Check* under a full DOS.

Note: ***Execution Times for CD-ROM Tests.*** *Older CD-ROM drives transfer data at a considerably slower rate than more recent models. Inherently, comprehensive testing of older drives can take a considerable time to run to completion.*

During testing, the upper area of the screen lists a number of technical parameters for the CD-ROM/DVD drive and interface, together with a continually updated display of the sector under test.

Use the cursor keys to highlight the required option and press <ENTER>.

5.6.2 Select CD/DVD Device

If more than one such device is fitted, allows a particular drive to be selected; otherwise states that only one device is present.

5.6.3 CD/DVD Transfer Test

Determines the sustained transfer rate of the CD-ROM or DVD drive by reading the inserted disc for a given period. The result is displayed in Kilobytes per second, and will be given a speed rating. Should the drive not deliver more than 150KB/sec, then it does not even provide the minimum CD-ROM data rate required for the reproduction of CD audio, and will be deemed to have failed the test.

Note: *The inserted disc will need to have at least 100,000 sectors containing data before it can be used to run the test. The more data on the disc, the more likely that the test will exhibit the full performance of the drive.*

Error Messages and Comments

'This test requires a CD-ROM/DVD data disc'

5.6.4 CD/DVD Random Seek Test

Produces the average seek time for the CD-ROM/DVD drive by reading random sectors from the inserted disc for a given period. The test will fail if the average seek time is more than 1 second: this represents the minimum acceptable standard for early multi-media systems.

Note: *The inserted disc will need to have at least 66,000 sectors before it can be used to run the test, but the results may not be accurate unless the disc has at least 260,000 sectors: a warning will appear on the screen in this case.*

Error Messages and Comments

'This test requires a CD-ROM/DVD data disc'

'The inserted disc has less than 66,000 data sectors: it is too small to give meaningful results'

'The inserted disc only has a small number of data sectors: this may adversely affect the results'

5.6.5 CD/DVD Tray Test

This test is for tray-loading CD-ROM/DVD drives **only**. Ejects and closes the CD-ROM/DVD tray and confirms the success of each operation.

IMPORTANT

Do not run this test if you are using a slot loading CD-ROM/DVD drive, because such drives cannot perform the "close" operation. The consequences are:

The test will be logged as a failure. This could possibly distort the final outcome of the test report.

If Pc-Check is being run unattended, the disc will no longer be available!

5.6.6 Audio CD Disc Player

This tests the sound capability of the CD-ROM/DVD Drive. By inserting an audio disc and selecting this option, the disc will then proceed to play from the first track and continue until the end of the disc. It is recommended that you monitor the sound via headphones connected directly to the player. The sound might or might not be audible

via the computer's speakers, depending upon whether you have digital or analogue connections.

Error Messages And Comments

'This test requires an audio disc. CD-ROM/DVD data discs and mixed data and audio discs are not supported'

5.6.7 CD/DVD Test Disc Read

This test requires a Eurosoft CD or DVD Test Disc which is specially laid out to test CD-ROM or DVD drives fully. The test reads from the beginning of the proprietary test file contained on the disc to the end of the file, ensuring that each block is readable, and verifies that it contains exactly the correct information.

The test can be interrupted by pressing <Esc>, giving an aborted result.

Note: *If your package does not include a CD or DVD Test Disc, and you require one, contact Eurosoft.*

5.6.8 DVD Laser Refocus Test

This test is for multilayer DVD drives, and requires the Eurosoft multilayer DVD Test Disc. If your are not running from the CD-ROM/DVD drive, insert the DVD Test Disc. If you are running from CD-ROM, you will be prompted to swap out the program disc and insert the DVD Test Disc.

The test moves back and forth between the layers, ensuring that the test data is read accurately.

If appropriate, you will be prompted to replace the CD program disc.

5.7 ATAPI Devices

If no ATAPI devices are installed, a message to this effect is displayed. If only CD-ROM/DVD devices are detected, you are prompted to use the CD-ROM/DVD tests instead. Otherwise, a menu is presented which lists all ATAPI devices found (CD-ROM, LS-Floppy, ZIP).

If CD-ROM/DVD is chosen from this menu, you are transferred to the standard CD-ROM/DVD tests, as described in the appropriate sub-section of the manual.

Choosing LS-Floppy or ZIP leads to a test sub-menu.

IMPORTANT

Two of these tests involve non-destructive writing to the disk. There is always a slight risk of data loss in such a procedure (for example a power failure during the test), so do not risk using a disk containing information which is not backed up.

5.7.1 Linear Read Test

A contiguous read of the disk is performed.

5.7.2 Non-Destructive Write Test

Writes contiguously to the whole of the disk.

5.7.3 Random Read/Write Test

Reads and writes non-destructively to the whole disk in a random order.

5.7.4 ATAPI Device Test Results

This option can be used at any stage to provide consolidated information on the tests performed. A submenu allows you to view the results, print the results to LPT1, or save the results to a file, by typing the **full** file pathname.

Note: *It can take the drive up to a minute to detect the presence of media.*

5.8 TPM (Trusted Platform Module)

This test displays information about the TPM device, before running the test and displaying the results.

Note: *A Trusted Platform Module (TPM) is a hardware device built to the specification of the Trusted Computing Platform Alliance (TCPA). Essentially it consists of a secure micro-controller plus cryptographic functions. It works with supporting software and firmware to prevent unauthorised access to passwords and other sensitive data, and to support secure transactions.*

If Pc-Check does not detect a configurable device which supports a TCPA implementation, an appropriate error message is displayed.

Note: *Currently, the test only supports TPM devices from the manufacturer Atmel.*

5.9 Serial Port Diagnostics

Note: *A set of loop-back plugs may be ordered separately from Eurosoft by contacting us at the address or phone/fax numbers given at the beginning of this manual.*

One test (Serial Port Internal Loopback) does not require a serial loopback plug. For all other tests, please ensure that your serial loopback plug is inserted into the correct port before you begin these tests.

The screen is divided into two parts: the left-hand panel shows details of the selected serial port, including the current results status of the tests, while the right-hand panel contains a serial port selection menu.

5.9.1 Serial Port Selection Menu

The menu displays all the serial ports in the system with the port number, I/O address and IRQ level for each port. Additionally, if the modem tests have previously been run in this session, the menu will show which ports are serial ports and which have modems attached. The latter, if selected, will refuse to run and will recommend that the modem tests are used instead.

Once a serial port has been selected, the next screen displays details of this port and the status of the tests in the left-hand panel, and a menu of tests in the right-hand panel.

5.9.2 Serial Port Tests Menu

The right-hand panel uses the standard cursor keys to permit selection of a particular serial port, and to decide whether to run all tests or individual tests.

The serial port tests are full duplex and interrupt driven to apply maximum stress to the components during testing.

IRQ Test

The IRQ test will already have a result at this stage: it cannot subsequently be run. Since the serial port tests are interrupt driven, then, if this test has failed, the problem must be corrected before any other tests can be run: a message to this effect will appear on the screen.

5.9.3 Select Another Serial Port

Displays the Serial Port's Selection Menu again, or gives a message if only one port was detected.

5.9.4 Run All Serial Port Tests

When you select this option, all the tests listed below on the menu are run in sequence on the currently selected port. You can then insert the loop-back plug into the next port and choose "Select Another Serial Port". The option "Run All Serial Port Tests" will repeat all the tests on the Serial Port Test Menu in sequential order as before.

5.9.5 Serial Port Line Control Test

This tests the serial port's ability to transmit and receive data with various combinations of parity, stop and data bits. Once started, the right hand panel shows data transmitted and received from the serial port, whilst the message at the bottom of the screen shows the current line control status.

5.9.6 Serial Port Handshake Test

This tests eight signals of an RS232 serial port. The panel on the right of the screen will indicate a PASS/FAIL result individually for each signal, whilst an overall result is recorded in the results of the left hand panel.

5.9.7 Serial Port Loopback Test

This tests the serial port's ability to transmit and receive data simultaneously (Full duplex) at various baud rates. Once started, the right hand panel shows data transmitted and received from the serial port, whilst the message at the bottom of the screen shows the current line control status.

5.9.8 Serial Port Internal FIFO Test

This tests the serial port's ability to transmit and receive data simultaneously (Full duplex) at 115,200 baud using the advanced serial port's internal FIFO buffer (First in first out). Once started, the right hand panel shows data transmitted and received from the serial port, whilst the message at the bottom of the screen shows the current line control status.

This test will refuse to run if the port under test does not have an internal FIFO, and will display an appropriate message for five seconds.

5.9.9 Serial Port Internal Loop Test

This test permits signals to be looped internally in the UART (port driver chip) using a special diagnostic mode supported by most chips. This means that some testing is possible without inserting a loopback device.

Note: *By looping internally to the device, there is no test of the electronic tracking, and/ or cable connections, to the physical port on the system case, and the number of handshake signals tested is reduced. For these reasons an external loopback device remains the preferred method of testing.*

5.10 Parallel Port Diagnostics

Note: *A set of loopback plugs may be ordered separately from Eurosoft by contacting us at the address or phone/fax numbers given at the beginning of this manual.*

Please ensure that your parallel loopback plug is inserted into the correct port before you begin these tests.

The screen is divided into two parts: initially the left-hand panel shows the above message while the right-hand panel contains a parallel port selection menu.

5.10.1 Parallel Port Selection Menu

The menu displays all the parallel ports in the system with the port number and I/O address for each port. Press <ENTER> to select the desired parallel port for testing. The next screen displays details of this port and the status of the tests in the left-hand panel, and a menu of tests in the right-hand panel.

5.10.2 Parallel Port Tests Menu

The right-hand panel uses the standard cursor keys to permit selection of a particular parallel port, and to decide whether to run all tests or individual tests. The current status of the test being performed is then displayed in the right-hand panel.

5.10.3 Select Another Parallel Port

Displays the Parallel Port Selection Menu again, or gives a message if only one port was detected.

5.10.4 Run All Parallel Port Tests

When you select this option, all the tests listed below on the menu are run in sequence on the currently selected port. You can then insert the loopback plug into the next port and choose “Select Another Parallel Port”. The option “Run All Parallel Port Tests” will repeat all the tests on the Parallel Port Test Menu in sequential order as before.

5.10.5 Parallel Port Controller Test

Determines whether the parallel device is performing correctly.

5.10.6 Parallel Status Port Test

Verifies that the parallel port is operating correctly, and is connected to the outside world.

5.10.7 Parallel Port Interrupt Test

Checks that the parallel port is generating an interrupt, and is connected to the outside world.

IMPORTANT

If your system's BIOS setup has the facility to configure advanced parallel modes, please do *not* select EXTENDED, as the IRQ cannot be detected in extended mode. The test works correctly for other modes (e.g. NORMAL, STANDARD, EPP, ECP).

5.11 Modem Diagnostics

Software Modems

There is a new type of modem appearing which is controlled entirely by Operating System drivers. These are not tested at the hardware level by *Pc-Check*.

It is important that your modem is in the idle state before you begin these tests. This can be achieved by resetting your modem (if your modem has a reset button) or by switching the modem off and then on again. If you have an internal modem without a reset button, this will not be necessary.

During the various modem tests the message 'ERROR' may occasionally be observed. This is an expected reply from your modem and does not indicate a failure of any kind.

The above message is displayed on screen while Pc-Check detects all active modems. The modem detection may take 30 seconds or more to complete, as it is very thorough: please be patient during this period. If no active modems are detected, a message to this effect is displayed before returning to the Advanced Diagnostics Menu.

If more than one active modem is detected, and assuming that a full duplex data path could be established with each, a modem selection menu will appear. Once you have selected a modem using the keys indicated, or if only one active modem was detected, the left-hand panel shows modem details while the progress of the data collection test is displayed in the right-hand panel. Upon completion of data collection, the modem tests menu is displayed instead.

Data collection

The modem data collection phase is performed once only after a modem is selected, and the left-hand panel is updated. The 'Data collection' result in the left-hand panel will be updated upon completion. In general, a fail here indicates that communications broke down during the data collection.

Important notes for internal modem users

Pc-Check has adopted the convention used by DOS and the BIOS for mapping the COM port numbers to the actual I/O port addresses. Some other software products do not adhere to this method, so a little care may be needed to ensure that the results provided by *Pc-Check* for a particular hardware setup are not misinterpreted.

With DOS, up to four serial ports can be used, with base I/O addresses at 3F8H, 2F8H, 3E8H and 2E8H. These addresses are hidden from the DOS user via a set of pseudonyms, the COM port numbers. At bootup, the BIOS searches for serial port devices, and allocates *successive* COM location numbers to them in turn.

If a hardware configuration uses all four ports, there is no ambiguity, since, for example, the fourth base address 2E8H will have COM4 allocated to it. But consider the case of a system with two serial ports at 3F8H and 2F8H, plus just one internal modem which the manufacturer has set as COM4 (i.e. effectively I/O address 2E8H). DOS and the BIOS assign this device to COM3, **not** COM4, i.e. it is the third device to have been detected. *Pc-Check* reports the value used by DOS and the BIOS, so that in this example the modem will be logged as being Serial Port COM3 at I/O Base Address 2E8H.

5.11.1 Modem Selection Menu

This is only displayed if more than one active modem is detected. The menu displays all active modems with the port number for each. Pressing <ENTER> brings up the test menu for the chosen modem.

5.11.2 Modem Tests Menu

The right-hand panel uses the standard cursor keys to permit selection of a particular modem, and to decide whether to run all tests or individual tests.

5.11.3 Select Another Modem

Displays a menu of modems again or gives a message if only one was detected.

5.11.4 Change Local Baud Rate

This option allows the user specifically to change the baud rate used for testing.

Note: *The 'Max/Current Local Speed' field in the left-hand panel indicates the baud rate currently being used to perform the various tests, and will also be the maximum possible local baud rate, However, if the baud rate has been explicitly changed using the 'Change Local Baud Rate' option, then the chosen baud rate will be shown here and used for testing from then on.*

When a new baud rate is selected, *Pc-Check* will attempt to establish communication at this speed. If it is unable to do so, a message will be displayed before allowing another baud rate to be chosen. <Esc> returns to the modem test menu.

5.11.5 Modem Register/Loopback Test

When selected, this function performs two tests sequentially: the "Modem Register Test" and the "Analogue Loopback Test". During these tests the communication to and from the modem may be viewed in the 'Transmitted' and 'Received' windows in the right hand panel. These tests can take several minutes each.

5.11.6 User Interactive Modem Test

This test requires user intervention, as its title suggests. Initially, the modem has to be initialized and this may take a few seconds: a message is displayed during this period.

Two tests are performed in sequence: the 'Data Carrier Test' and the 'Dial Tone Test'.

Each test will generate tones **within a few seconds** of the message appearing. Acceptable keys are 'Y/y' to record a pass result (and switch

off the tones), 'N/n' to record a failed result, or <Esc> to abort the test and record an aborted result.

5.11.7 Pc-Check Dumb Terminal

The dumb terminal is provided for the more experienced user or those that would like to test their modem on-line. There are only two special function keys: F1 to clear the screen and F10 to exit the terminal.

Sample session to test modem on-line:-

1 Using "Change Local Baud Rate" option, select a speed appropriate for the service

2 Enter the Dumb Terminal and type:

ATDT <BBS telephone number>

3 The BBS system will answer and come on-line

4 After closing BBS session, type ATH0

Note: *ATH* ***Zero,*** *not alphabetic O, in the above line.*

5.12 ATA

These tests probe for and perform basic register checks on ATA controllers of both parallel and serial type.

Note: *It is possible that you might see the message: "No serial ATA controllers were identified", even though such devices exist. Furthermore, you might possibly find that they are tested and listed under* ***Parallel*** *ATA Tests. The explanation is as follows.*

Some earlier serial controllers were given a generic class type, or in some cases, the existing (parallel) ATA class code. For those devices given the generic storage class, it is not possible to differentiate the device from other controller types, and so these devices will not be tested.

However, those classed as if they are parallel ATA devices will test as PATA, but, because SATA controllers provide a parallel compatible interface subset, the test will still pass.

5.12.1 Parallel ATA Test

This test displays vendor and device information, various command base addresses, and a Pass/Fail indication.

5.12.2 Serial ATA Test

The tests and display are very similar to those for the Parallel ATA test.

5.13 USB

Note: *If present, USB support in the BIOS* ***must*** *be enabled before running these tests.*

Pc-Check's USB diagnostics support multiple-controller configurations.

No USB devices should be inserted or removed during testing.

The left-hand panel provides USB details and the status of the tests, while the right-hand panel contains a test menu with the following options:

5.13.1 Test USB Controllers

A series of tests is performed on the USB, including BIOS Handoff, Initialise Controller and Register Tests. Details of detected USB controllers are displayed below the test results. Press <ENTER> to continue.

5.13.2 USB Functional Tests

Requires the fitting of a Eurosoft USB Diagnostic Loopback Plug. A preliminary message to this effect is displayed. Various tests for the USB interface, system interface and communications interface are performed. Details of detected USB loopback plugs are displayed below the test results. Press <ENTER> to continue.

5.13.3 USB Device Information

Device data relating to the USB root hub ports is first read and cached before being displayed to screen. The data includes controller number, device number and vendor ID. Press <ENTER> to continue.

5.13.4 Exit USB Tests

Returns to the Advanced Diagnostics Menu.

5.14 Firewire (IEEE 1394)

Tests controllers for FireWire (IEE1394, DV, iLink). The left-hand screen panel provides FireWire information, and the right-hand side displays the test menu.

5.14.1 Test Controllers

Runs a series of controller tests, displaying measured results and pass/fail conditions.

5.14.2 Controller Information

Produces a scrollable display of FireWire controller information.

5.15 System Stress

Performs effectively simultaneous device access (time sliced) to hard disk, memory and CD/DVD, while loading the CPU. Support is provided for multiple CPUs, multiple CD/DVD drives, and unbalanced mirrored RAID assemblies.

Memory testing will fail if an excessive number of ECC (Error-Correcting Code) events are detected: the default is 10, which can be altered via the command switch /ET.

The menu allows the various tests to be included or omitted (toggled via the <ENTER> key), and to set the duration of the test.

The default duration is 20 minutes. As an example, to alter the test duration to 5 minutes, type: 0h 5m 0s and press <ENTER>.

Begin the test by selecting “Perform Tests”. The main test screen displays information and progress for the individual and collective test processes.

5.16 Keyboard Diagnostics

This test requires operator interaction, by pressing all the keyboard keys and checking that the display responds in the expected manner.

On initial selection, a menu of keyboard types is presented, in decreasing order of key numbers. For DOS *Pc-Check,* keyboards which are suitable for the current DOS country code setting (as set up in config.sys) are highlighted: the first of these will be selected. This menu has no top-to-bottom wrap: you may need to scroll if a large number of keyboard types is listed. After selecting a keyboard, the Keyboard Tests menu appears.

5.16.1 Verify Keyboard

Displays a representation of the selected keyboard type. Since the exact layout of any one keyboard will vary slightly from others of the same class, occasionally there may be slight differences in the placement of keys. For keyboard types that do not support LED switching under software control (typically 83 or 84 key keyboards), you will be requested to enable the CAPS lock if it is not already on. If this is the case, then the test will proceed the moment that CAPS becomes enabled, or that another key is pressed (for instance if CAPS is faulty).

You should press every key at least once. When each key is pressed, the on-screen key is highlighted both on the key top (legend) and on the bar at the bottom of the key representation. The key legend remains highlighted only when the key is pressed, while the bar will remain highlighted once the key has been 'visited'. If all keys are successfully highlighted, the test ends with a pass result. Note that for mono screens, the key "disappears" when pressed and the legend becomes bright: only the key top returns when the key is released.

During testing, the CAPS lock and Shift keys retain their normal behaviour and the CAPS lock LED will light as per normal. Note that the Scroll Lock and Num Lock LEDs will **not** operate during this test. When either the state of the CAPS lock is changed or a Shift key is depressed, the legends of the keyboard representation will be altered appropriately.

At the bottom of the screen, the current hardware scan code is listed, along with the state of the CAPS Lock and Shift keys. Opposite, the

state of the currently- or last-pressed key is given, along with the legend of the key in both the shifted and unshifted state.

To exit this test without pressing all keys, <Esc> must be pressed twice. You will be asked to confirm this action. A selection of keys is provided for both the positive and negative responses in the various dialogues of this test.

If, on exit from this test, either through completion, or by user action, *Pc-Check* believes that certain keys may have become stuck down during testing, it will list them and ask if you wish to record a pass or fail result. If a fail result is recorded, no further questions are asked.

If all keys have not been pressed, you will again be asked if you still wish to record a pass result. You will then be returned to the tests menu.

5.16.2 Keyboard Controller Tests

Automatically asks the keyboard controller to perform its self-test and interface test, using the same method as in the appropriate 'Motherboard Test' (*qv.*) under which the result of this testing will be stored.

5.16.3 Key Repeat Test

You will be requested to press and hold an alpha-numeric key. The key must be held until the program requests its release (about 2 seconds). If the key is released early or other keys are pressed, the test will fail. After the key is released, the test will report pass or fail, and you may return to the tests menu.

5.16.4 Keyboard LED Test

If you are using a keyboard type that does not support LED switching under software control (typically 83 or 84 key), then you will be informed that this test is not possible. Otherwise, each LED will be lit in turn and you will be asked to confirm that this and only this LED has lit. This will occur for all LEDs regardless of the result for previous LEDs. When all LEDs have been tested, the result is displayed and you may return to the tests menu.

5.17 Mouse Diagnostics

If no mouse is connected a message to this effect is displayed. Otherwise information relating to the mouse as well as the status of tests is displayed in the left-hand panel, with the following message in the right-hand panel:

In order to perform the mouse tests the video mode will require to be changed. If your video card and monitor have not been configured for use in these modes some screen distortion may occur. This will not harm your system but may make some tests difficult to complete.

Press a key to continue or <Esc> to abort testing now.

If you press a key to continue, the first mouse test (the Button Test) starts. The right-hand panel holds a diagram of a mouse: as each button is pressed in turn, the colour of the screen 'button' changes. However, if you failed to respond within the test's timeout period, or the buttons on your mouse are faulty, the test status is set to FAILED and you are returned to the Advanced Diagnostic menu. Tests for the CENTRE button will only respond if your mouse has 3 buttons and its driver is configured to recognise the centre button. *(Refer to the manufacturer's manual)*.

Otherwise, if the test passed, the next test begins (the Ballistic Test); for this and subsequent tests, the X and Y co-ordinates of the mouse are displayed along the bottom of the screen. There are two versions of both the Positioning and Area Redefine tests, one for text mode, the other for graphics mode. The final test, Graphics Cursor Redefine, is by implication for graphics mode only.

All tests have a timeout period (of fair duration for a correctly functioning mouse). Failure to complete the test successfully in this time leads to a test failure and subsequent exit from the mouse option. You may terminate any test by pressing <Esc>; the test status is set to ABORTED, and the option exits.

For the Ballistic test, you are asked to confirm the ability to change the speed of response of the mouse. For the Positioning tests, click the left mouse button over the four extreme corners of the full screen (not the dots on the diagram!). For the Area Redefine tests, confirm that the

cursor cannot move outside the rectangular area, and then click on the four corners as indicated. For the Graphics Cursor Redefine test, you are asked to click on the box that best describes the appearance of the cursor; the test passes if you click on the appropriate box.

5.18 Joystick Diagnostics

Up to two joysticks will be automatically detected if the game port in the computer under test supports more than one joystick. The performance of the second joystick is monitored in a separate panel on the right of the screen (this secondary screen is otherwise irrelevant). If an attached joystick is not detected then either the joystick or the game port to which it is attached is faulty, or there are two game ports installed and enabled: for example, a multi-I/O card plus a soundcard.

The joystick is calibrated by being moved to the top left, bottom right and centre positions: a failure will be reported if no difference can be detected between the centre and a corner.

The status of four fire buttons is displayed: 1 and 2 correspond to the first, primary joystick; 3 and 4 to the secondary joystick.

If a second joystick is fitted, then on the second panel, movement of the cursor is represented by sliders.

On joysticks such as the Microsoft Wingman, movement of the 'hat' control appears on the secondary axis status panel.

5.19 Audio Tests

Performs tests on AC'97 integrated audio.

Results of these tests can be viewed in the Results Summary or printed in the Results Report, both accessed from *Pc-Check*'s Main Menu.

5.19.1 Internal Speaker Test

This test will play the "William Tell Overture" through the PC Speaker for about 40 seconds. You are prompted to confirm hearing the speaker: if you can hear the tune, press 'Y' to pass the test, otherwise press 'N' to fail.

5.19.2 Real-time PCM Test

You should immediately hear a constant tone from both the left and right speakers. Once again you will be asked to confirm hearing the sound. Press 'Y' or 'N' as before.

5.19.3 Streamed PCM Test

A progress bar "Reading PCM Data" should be followed by music from both speakers, and a message "Can you hear the audio stream, and does it sound correct?" Press 'Y' or 'N' as before.

Note: ***If you do not hear the expected sound through your loudspeakers when running the Real-time and Streamed PCM tests, try the following before declaring that the tests have failed.***

1 Ensure that any volume and mixer levels for the external speakers are high enough.

2 As a temporary measure, reply "N" to the test, and then connect the speakers successively to the other audio sockets, as follows. Switch off the speakers. Remove the speakers' mini-jack plug from the normal computer audio output socket (typically coloured green on many modern sound systems), and insert it into any other available audio output socket. Switch the speakers back on, and rerun the tests. If this does not produce sound, repeat the sequence by connecting to the audio line-in socket (often coloured blue).

Then choose "Y" or "N" according to whether you do eventually hear the sound. Replace the loudspeaker lead into its normal position on completion of the tests.

Note: *This apparently anomalous effect, whereby an ostensible input channel provides an output, and an output channel does not, can be the result of running audio hardware, designed to be used under Windows control, in a DOS environment.*

5.19.4 SPDIF Run DMA Test

This test is available for some chipsets. A message is displayed if *Pc-Check* does not support SPDIF for the audio card.

A message is displayed for a few seconds indicating that the test is running, and that it may cause a tone to be emitted from connected SPDIF capable hardware. The test then sets the final result and returns to the Audio Tests menu.

5.20 Video Diagnostics

This menu gives a comprehensive range of tests, most of which require user intervention. Test results can be viewed in the Results Summary or printed in the Results Report, both accessed from *Pc-Check's* Main Menu.

Note: *The screen may go blank for a short while at the beginning of some tests, and when changing to a different video mode.*

5.20.1 Warning – Video Test Initialisation

On first-time entry only, the following message is displayed:

> **Pc-Check is about to test all the video modes that are supported by your graphics card. This will cause your screen either to flicker, or to go blank. This process usually takes only a few seconds but may take longer on some systems. This will not damage your hardware and will only occur the first time these tests are run.**
>
> **Please also note that these tests make all supported modes available for testing, some of which may have scan rates too high for your monitor. Please deselect incompatible modes using the mode selection menu. Thank you.**

This panel will not be displayed again until after *Pc-Check* is restarted. The panel does not appear during Burn-In testing.

If the video card is unable to change into all the modes which it reports as supported, these modes will be automatically removed from the Select Modes for Testing list (see below): a message to this effect is displayed.

5.20.2 Video Driver Information

Lists basic information about the Video card configuration.

5.20.3 Select Modes for Testing

A table of video modes is presented, initially all preceded by a small symbol, indicating that they are selected for testing. Pressing <SPACE> or <ENTER> against an entry toggles between selection and non-selection of that mode. Press <F10> when the selection is complete. You will be unable to exit with either no modes selected or only 8 bit mode(s) selected: messages to this effect are displayed in these circumstances. <Esc> cancels any selection changes and exits the panel.

5.20.4 Check Gamma

Provides an estimate of the current Gamma value of the monitor. The lower half of the screen is a horizontally-graduated, calibrated grey-scale rectangle. The point at which the brightness of the top solid rectangle matches the lower gradient is the current gamma value. Press any key to return.

5.20.5 Colour Linearity

Tests for Red+Green (yellow), Green+Blue (cyan) and Blue+Red (magenta) are run in succession at the highest available resolution. Press <Esc> to quit the tests, or any other key to move to the next test.

5.20.6 Colour Purity Test

The Colour Purity Test displays four screens of solid colour: red, green, blue and white, each at full intensity. The control keys are as follows:

<Esc> key	**Returns to the video tests menu and records an 'ABORTED' result.**
Y key	**Records a 'PASSED' result.**
N key	**Records a 'FAILED' result.**

5.20.7 True/High Colour Test

For each selected video mode, two display screens are generated. The first of each pair shows the additive and subtractive primary colours as stripes, from black through maximum intensity to white. The second displays squares of graduated primary or secondary colour combinations. The control keys are as for the Colour Purity Test.

5.20.8 Alignment Test

For each selected video mode, a rectangular grid pattern with concentric circles is displayed, to check for distortion on CRTs, and also projector displays. The control keys are as for the Colour Purity Test.

This is a test of the monitor and will confirm that the coils and magnets have been correctly aligned on the tube and that the vertical and horizontal amplitude and linearity are correctly adjusted. If the test fails you should firstly check that all cables and connectors are securely attached and then check for transit damage; otherwise you may need to replace the monitor if adjustment of the display controls (horizontal/ vertical/pincushion etc) does not correct the misalignment.

***Note**: On no account should untrained personnel open a monitor.*

***Note:** On some LCD screens, pixels in certain modes may be displayed square where they would be rectangular on a VGA monitor. The effect will be to produce an elliptical rather than a circular pattern for this test. Likewise, if the resolution is not the 'native' display resolution, the lines may appear blocky or blurry. These effects do not imply misalignment.*

5.20.9 LCD Test

Tests for dead pixels by displaying a series of checkerboard screens: Red+Green, Green+Blue, and Blue+Red, mapped pixel-for-pixel with the LCD screen. This checkerboarding makes dead pixels more obvious than solid colour, and indicates which colour sub-pixels are stuck on or off. The control keys are as for the Colour Purity Test.

5.20.10 Test Card

Provides a quick visual check of the performance of several video parameters, at each of the selected screen modes. The control keys are as for the Colour Purity Test.

***Note:** The screen will blank (go black) while the video mode is changing: this process may take several seconds.*

5.20.11 Video Memory

This option employs exactly the same series of tests described under the "Test Video Memory" option of "Memory Diagnostics", and indeed automatically diverts to that screen panel.

On first-time entry only, the following message is displayed:

> **Your video card's memory will be tested using the standard Pc-Check memory test algorithms, and hence the same options are available to video memory as to ordinary memory.**
>
> **Pc-Check will now enter the Memory Tests menu where you will find the 'Test Video Memory' option. When you leave the Memory Tests menu, you will return here to the Video menu. This message will not appear next time.**

When the Memory Diagnostics screen appears, use the cursor keys to select "Test Video Memory". The tests may take several minutes, during which a variety of patterns will occupy the screen. After the tests are complete, the main Memory Diagnostics panel reappears. Pressing <Esc> returns to the Video Diagnostics panel.

5.20.12 Exit Tests

Returns to the main Advanced Diagnostics Menu.

5.21 Printer Diagnostics

Pc-Check can send a test printout to both serial and parallel printers. If you are using a serial connection to your printer via a COM port from the available ports that *Pc-Check* shows, you will be asked to specify the protocol (baud-rate, data-bits etc.) from the computer end to agree with your printer's setup. Refer to the manufacturer's manuals to make switch adjustments for input type and serial data rate on the printer. Having adjusted the settings, select 'Use Current' to advance to the Printer Type section.

Having selected the appropriate port, the printer type can be selected from Generic, Epson 9-pin compatible, Epson 24-pin compatible, Epson 9-pin wide, Epson 24-pin wide, HP LaserJet, PostScript, IBM 9-pin compatible, IBM 9-pin wide, IBM 24-pin compatible and IBM 24-pin wide.

Before selecting the test, check that the printer is switched on, connected to the specified port and is On-line. If it still does not print, check the cable using another computer and/or printer.

5.21.1 *Pc-Check*® Print Test

A series of test prints is produced, appropriate to the type of printer. For example, a grey-scale shading test is included for laser printers, and a character attributes test is performed for dot-matrix printers.

Generic text printer

Rolling characters test	Demonstrates basic text generation of all the major characters across the width of the page.
ASCII character set	Prints the character set supported by the printer in the form of a table.
CR, LF, backspace test	Tests these basic printer head control functions.

9 and 24 pin Epson/IBM compatible / wide dot matrix

Rolling characters test	As for the generic printer.
ASCII character set	As for the generic printer.
Extended character set	Prints the additional characters supported by the printer in the form of a table.
CR, LF, backspace test	As for generic printer.
Character attributes test	Bold, underline, super/sub script, emphasised, double strike, strike out, italic modes.
Parallel cable test	As LaserJet printer.
Individual pin test	Determine that all 9 or 24 pins are firing.
Reduced line feed test	Check printer's ability to move vertically by small amounts.
Head alignment test	Tests printer's ability to align output on separate (in some cases reversed) printing passes with the output from previous passes.
Banding test	Demonstrate printer's ability to produce an area of continuous black with minimal noticeable horizontal banding (can occur either because of worn ribbon or incorrect paper advancement).

LaserJet Laser (some inkjets)

White line test	As PostScript.
LED array/ toner test	As PostScript.
Ruler test	As PostScript.
Raster graphics test	Demonstrates ability to reproduce simple raster graphics at increasing resolutions.
Parallel cable test	To prove that the eight lines of the parallel interface are working correctly and consistently.
Grey scale shading test	Similar to PostScript: however PCL does not produce continuous greys like postscript.
Internal/overlapping pattern	Proof that the printer is a compatible LaserJet implementation by generation of internal fill patterns.
Roman 8 character set test	Further compatibility and information.
Characters per inch test	Further compatibility and information.

PostScript

PostScript is a language, and so, unlike other printers, the printer must understand how to run programs written in that language to build a page, i.e. the printer is significantly more intelligent.

DPI test	Provides visual method for determining/ confirming printer resolution.
Grey scale shading test	Confirm linear greyscale from 0% (white) to 100% (black).
Clipping test	Graphics confined to complex text shape.
Computational test	Uses a simple fractal pattern to give an approximate idea of speed of postscript implementation, for use as a benchmark for comparing printers.
White line test	Ability to resolve hairline white in an area of solid black horizontally and vertically.
LED array/ toner test	Some “laser” printers use a high density array of LEDs: this test confirms that all are functioning; for true lasers, the test ensures that toner distribution is even over the width of the page.

Ruler test	Prints an inches and centimetre ruler, such that scaling can be confirmed with a real ruler if required.
RGB colour test	For colour laser printers, produces three overlapping circles of red, green and blue with all the resultant combinations; for non-colour printers the image should be represented in grey scales.
Line cap test	Ensure that the different line joining/ending methods are supported.
Trigonometric test	Ensure basic trigonometric functions are available and are ranged appropriately.
Installed font list	Lists all installed fonts

5.22 ACPI

5.22.1 General Information

This option returns information related to Advanced Configuration and Power Interface (ACPI) on ACPI-compliant systems. ACPI is an industry common interface enabling operating system-directed device configuration and power management. It provides an abstract interface between the operating system (OS) and the hardware, enabling power management to be moved from the BIOS to the OS.

If ACPI is supported, the main ACPI screen is displayed. Otherwise an error message is superimposed over the System Information Menu, to be cleared by pressing <ENTER>.

The left-hand panel of the main screen holds a display box listing the following details:

ACPI version

OEM ID

PM profile

The possible ACPI version values are 1.0 and 2.0. These differ chiefly in relation to the System Description Tables (see below).

The OEM ID is an OEM-supplied string that identifies the OEM (Original Equipment Manufacturer).

PM profile can have the following values:

Unspecified
Desktop
Mobile
Workstation
Enterprise server
SOHO server
Appliance PC
Reserved

This field is set by the OEM to indicate the system's preferred power management profile to the OS on boot up. The OS may use the field to set default power management policy parameters.

The right-hand panel holds a menu with the following options:

Verify ACPI Tables
System Description Tables
Show ACPI Address Ranges

5.22.2 Verify ACPI Tables

The parameters verified are: Root System Pointer, Checksumming, Root Parametrics, Fixed Descriptions and Firmware Control.

5.22.3 System Description Tables

The addresses of the system description tables are displayed. These tables list devices on the system board and their capabilities, enabling the OS to control their configuration and power management. The tables are loaded into memory on boot up.

The RSDP (Root System Description Pointer) address is in low memory and hence is given in segment:offset format. This structure points to the root system description table, either the RSDT (Root System Description Table) on ACPI version 1.0 systems or the XSDT (Extended System Description Table) on ACPI version 2.0 systems.

The root table always points to the FADT (Fixed ACPI Description Table), which provides fixed hardware information such as the addresses of various register blocks. The FADT in turn points to the FACS (Firmware ACPI Control Structure) and the DSDT (Differentiated System Description Table). If the address of any of these tables cannot be determined, then "Not located" is displayed in place of the address.

The root table may in addition point to other tables; if so, pressing <ENTER> displays these additional tables' addresses. The names of these remaining ACPI tables are as follows:

MADT	Multiple APIC Description Table
SBFT	Simple Boot Flag Table
DPT	Debug Port Table
ECBRT	Embedded Controller Boot Resources Table
ETDT	Event Timer Description Table
OEMSIT	OEM Specific Information Tables
PSDT	Persistent System Description Table
SBST	Smart Battery Specification Table
SLIT	System Locality Information Table
SPCRT	System Port Console Redirection Table
SRAT	Static Resource Affinity Table
SSDT	Secondary System Description Table
SPMIT	Server Platform Management Interface Table

Press <ENTER> to return to the ACPI Menu.

5.22.4 Show ACPI Address Ranges

Information relating to ACPI address ranges is displayed via a call to a BIOS interrupt function. ACPI address ranges are of 2 types:

Reclaim memory	The ACPI tables are loaded here at boot up; once the OS has read the tables it becomes available RAM.
NVS memory	Prior to the system entering the S4 Non-Volatile Sleep state, the OS writes all system context to this area of non-volatile memory; upon resume from NVS state, the OS reloads the system context.

For each address range that is located, its address type (reclaim memory or NVS memory), base address (in 32-bit linear format) and length in bytes are displayed. If the base address or length of an address range cannot be determined, then "Undetermined" is displayed in place of a value. Press <ENTER> to return to the ACPI Menu.

If no ACPI address ranges are located then an error message to this effect is displayed. Press <ENTER> to clear the message.

5.23 PCI Express Links

Note: *This test can be run from the Advanced Diagnostics menu or selected for Burn-in. It requires the user to pre-supply a configuration file, as described below.*

This configuration file must reside alongside the Pc-Check executable, except in the case of a CD-ROM boot, when it can reside separately on a floppy diskette (allocated as drive B:).

The test compares the link configuration of installed PCI Express devices against a description held in a configuration file.

PCI Express slots come in an assortment of performance levels. The performance level of each slot is dictated by the number of 'lanes' of data that are available to devices installed in that slot – either 1x, 2x, 4x, 8x, 12x or 16x. This is known as the link width. Initial communication with a PCI Express device is always at 1x, and then, after a negotiation phase, the slot reconfigures to the best mutual connection.

If the desired configuration is known and static, a description of the slots and the expected link widths can be setup in a configuration file, which *Pc-Check* can verify as part of a burn-in script.

Unfortunately, the system BIOS support for PCI Express configuration data is often overlooked. For example, the system BIOS might lack any extended configuration information, or these records might have been filled out incorrectly by the system BIOS.

Therefore *Pc-Check* first runs a number of validation checks. If the *Pc-Check* data validation fails, the link width test will not be run, suitable warnings are generated, and the information is displayed in its original form.

Unless you have been given a validation failure message, you should not see:

a) slots with the same number;

b) slots which have a current configuration greater than the maximum possible;

c) a zero value for the maximum.

The configuration file is simple and takes the following form:

* Comment lines that start with a semicolon character are ignored.

* Configuration lines shall contain ‘s=x, w=y’ where ‘x’ is the slot number and ‘y’ is the link width (either 1, 2, 4, 8, 12 or 16). Multiple width options may appear for the same slot if desired on separate lines in the file.

Example file content:

```
; s=slot number, w=required link width
s=2,w=8
s=1,w=16
```

The file must be called ‘PCIELINK.TXT’ and either be in the default directory or on B:\ if *Pc-Check* is booted from CD.

If a mismatch occurs ensure that the failed result is attributed to the correct slot.

This page is intentionally left blank.

Section 6

CONTINUOUS BURN-IN TEST

It is important for a newly assembled or a repaired PC system to be subjected to a 24-hour or more *Pc-Check* Burn-In Test before delivery to the end user. It is also very sensible for the user to subject a machine in regular use, especially where corruption or loss of data could lead to costly or time-consuming rework, to the kind of tests performed by *Pc-Check* that will expose any weakness that may have started to develop. You should do this after regular maintenance, at 3 to 6 month intervals or shortly after a repair or system rework.

Note: *These diagnostics are usually used for reliability testing and not for casual fault-finding. As one would expect, if a component FAILS during Burn-In, this will be the final result regardless of subsequent passes during Burn-In testing.*

6.1 Immediate and Deferred Burn-In

Pc-Check provides two methods of continuous Burn-In testing: immediate and deferred, both of which are available from the main menu. *Immediate Burn-In Testing* is designed to allow a required set of tests to be set up and carried out on the same machine. *Deferred Burn-In Testing* allows a set of tests to be designed for running on one or more other machines.

The user-images for the two options differ in only two respects, which are now summarised:

(i) The menu for Immediate Burn-In contains an extra option to allow the tests to be performed, which by definition is not available for Deferred Burn-In.

(ii) The range of tests available for Immediate Burn-In is restricted to those devices which are actually present on the machine. For Deferred Burn-In, a complete list of tests is provided, since in general the specification of the target machine is not known.

6.2 The Burn-In Menu

Selecting either of the Burn-In Testing options from the Main Menu leads to the Burn-In menu. An information panel at the top of the screen displays the current options, which can be altered by the Change Options menu described below.

6.2.1 Load Burn-In Script

The name of a prepared script file of Burn-In commands can be entered. When this is loaded, the contents can be altered via other menu options if required. See the note below for the source of the file.

6.2.2 Save Burn-In Script

The Burn-In options selected can be saved as a script file for future use, perhaps for regular reliability testing, or, in the case of Deferred Burn-In, for transfer to another machine. Any valid DOS filename is allowed, for instance BURNFILE.DAT. The file can be edited with any text editor, including *Pc-Check's* own.

Note: *If you are running from CD-ROM, you can use a floppy diskette to save or load your Burn-in scripts.*

If you are running from USB flash device, you can use either the flash device itself or a floppy diskette to save or load your Burn-in scripts.

If you are running from floppy diskette, you must not replace the program floppy diskette with another diskette: burn-in files must be located on the program diskette.

Note: *Remember to supply the full pathname of the file, including the appropriate drive letter (see Appendix C for details).*

6.2.3 Change Options

This leads to a sub-menu of Burn-In options, which allow the parameters in the panel at the top of the screen to be altered. Some options lead to yet another sub-menu, some allow a Yes/No toggle via the <ENTER> key, while others allow a value to be entered directly from the keyboard.

In some cases the options are interdependent: for example, if Pass Control is set to “Individual Passes”, then Duration is always “N/A” (Not Applicable). If Pass Control is set to “Overall Time”, the units of Duration are hours and minutes (ranging from 00:01 to 99:59); the default Duration is 1 hour (01:00).

If the Pause on Error option is set to “Yes”, a screen panel will appear during burn-in testing if an error is detected, allowing the user either to resume, or to abort the entire Burn-In test.

6.2.4 Select Tests

This option leads to a panel which allows the available devices and tests to be selected from a list. Pressing <F1> brings up a Help panel detailing the keys which control the selections:

↑↓	Chooses device or test
<ENTER>	Toggles testing of the highlighted item
<TAB>	Toggles testing of all devices
<ESC>	Exits to the previous menu

When “Individual Passes” has been selected from the Change Pass Control option, use the numeric keys to enter the number of times to run each test.

Selecting a device will display a list of individual tests. All selected items are prefixed with a diamond symbol. The key controls given in the Help panel can then be used to amend the list. If “Individual Passes” has been selected under Pass Control, then the number of passes for each test can be specified (default 1, maximum 9999). For the other Pass Control options, you can choose between running the test or not (Y/N). On completion, use <ESC> or <F10> to save your selections and return to the Burn-In Menu.

If the number of tests selected overflows the page, the list can be scrolled using the cursor or PgUp/PgDn keys. Arrows are shown to indicate when there are more tests above or below the displayed section of the list.

6.2.5 Perform Burn-In Tests

This option is only present for Immediate Burn-In Testing. If the Hard Disk Non-Destructive Write Test has been selected, a special panel will appear advising that a suitable back-up should exist before continuing. If required, the Non-Destructive Write Test can be disabled by pressing <ESC>. The remaining Burn-In tests will then continue.

During testing, information at the top of the screen monitors progress of the current test and the overall tests, including information about the last three errors found. If <ALT-S> is pressed at any time during the running of the tests, the display toggles between the panel and the detailed description of the tests in progress.

Note: *Command Line switches set via the Advanced Start-Up Options in the current session will apply to Immediate Burn-In testing.*

When testing serial/parallel/USB ports ensure that loopback plugs are inserted in the appropriate connectors. When testing modems and printers, ensure the devices are plugged in and switched on ready to go.

There is a time-out at the beginning of each printer test during Burn-In to allow for the previous pass to finish. This will be observed as a delay of up to two minutes before the test begins again. The Pass number is printed during Burn-In.

When testing floppy disk drives, ensure that you have a formatted diskette in each drive you wish to test. Similarly ensure appropriate disks are inserted for the CD-ROM/DVD and ATAPI Devices tests. However, remember that the program medium must not be swapped out, unless the activity is specifically sanctioned by Pc-Check.

Some tests entail a delay in updating the screen, in which case a message to that effect is displayed (except for video tests).

Burn-In testing can be interrupted at any time by pressing the <ESC> key. After a short pause, a dialogue box will appear to say that testing has been interrupted. You are offered three options:

1. Resume from where testing stopped by pressing ‘R’.
2. Abort the current test and skip to the next test by pressing ‘S’.
3. Stop completely by pressing <ESC> again.

6.3 Running *Pc-Check*® with Beep Codes

Pc-Check can output beep error codes when items under test fail during Burn-In testing mode.

Note: *The Advanced Diagnostics tests do not give beep codes.*

To utilise beep codes, include parameter /BB in the command line parameter list (as described in the Section of the manual “Command Line Operation”).

For instance, either type:

/BB <ENTER>

or an optional file name of your choice may be added:

/BB [Burnfile Name] <ENTER>

Note: *Refer to the Section “Command Line Operation” for Burn-In filename instructions.*

A short high beep ‘S’ is defined as a single continuous tone of 880Hz for approximately 200mS Duration. A long low beep ‘L’ is defined as a single continuous tone of 440Hz for approximately 300mS duration.

When an error condition has occurred the associated beep code will be played and repeated approximately every 2 to 2.5 seconds. The user may press <ESC> to terminate the beep code, and may optionally continue testing or stop Burn-In and go to the *Pc-Check* results screen for further information.

When an error beep code is issued, the detected error is automatically sent to the Results Summary and may be printed from the *Pc-Check* Results Report section.

The Beep codes for the nineteen groups of POST Card Diagnostics are given in the sub-section “Post Codes and Beep Codes” below.

6.4 SIB (Status Indicator Box)

Pc-Check's SIB can be obtained from Eurosoft, and provides added support during Burn-In. The SIB can be used for testing PCs even when there is no monitor attached. Plug *Pc-Check's* SIB into the first serial port.

To utilise a SIB, include parameters /BS /BD in the command line parameter list (as described in the Section of the manual "Command Line Operation").

Note: **/BD** *is required in order that Pc-Check exits after testing, so that final results can be saved, and displayed on the SIB.*

Codes

During Testing

Steady Yellow	Testing is in Progress
Red and Green	The First Serial Port is being Tested

Upon exit from *Pc-Check* session

Steady Green	All Tests Passed
Flashing Red and Yellow	Some Tests Failed

6.5 Post Codes and Beep Codes

To enable *Pc-Check* to output diagnostic codes to a POST Card during Burn-In, include the parameters /BP and /BD in the command line parameter list (as described in the Section of the manual "Command Line Operation").

While a burn-in test is running, its POST test code is displayed in hexadecimal on the POST card; when the test completes, the test code and either 00 (for Pass) or FF (for Fail) are flashed alternately on the card.

The audible Beep code is derived from the binary representation of the decimal value of the Group Number, where 0 = Long ("L") and 1 = Short ("S"), as shown below.

POST Test Code (decimal)	(hex)	Test	Group	Beep Code
1	(01H)	CPU Core Processor	1	S
2	(02H)	CPU TT_AMD64	1	S
3	(03H)	CPU Maths Co-Processor	2	SL
4	(04H)	CPU Known Design Faults	2	SL
5	(05H)	CPU MMX Extensions	1	S
6	(06H)	CPU 3D-Now! Extensions	1	S
7	(07H)	CPU SSE	1	S
8	(08H)	CPU SSE2	1	S
9	(09H)	CPU MP Symmetry	1	S
10	(0AH)	Motherboard DMA Controller	3	SS
11	(0BH)	Motherboard System Timer	3	SS
12	(0CH)	Motherboard Interrupt Controller	3	SS
13	(0DH)	Motherboard Keyboard Controller	3	SS
14	(0EH)	Motherboard PCI Bus	3	SS
15	(0FH)	Motherboard Real-Time Clock	3	SS
16	(10H)	Memory Seating	4	SLL
17	(11H)	Memory Inversion Tree	4	SLL
18	(12H)	Memory Progressive Inversion	4	SLL
19	(13H)	Memory Chaotic Addressing	4	SLL
20	(14H)	Memory Block Rotation	4	SLL
21	(15H)	Memory Microtopology	4	SSL
22	(16H)	Cache Inversion Tree	4	SLL
23	(17H)	Cache Progressive Inversion	4	SLL
24	(18H)	Cache Chaotic Addressing	4	SLL
25	(19H)	Cache Block Rotation	4	SLL
26	(1AH)	Cache Microtopology	4	SLL
27	(1BH)	Floppy Linear Read	5	SLS
28	(1CH)	Floppy Read Verify	5	SLS
29	(1DH)	Floppy Non-Destructive Write	5	SLS
30	(1EH)	Floppy Mechanics Stress	5	SLS
31	(1FH)	HD Read Test	6	SSL
32	(20H)	HD Read Verify	6	SSL
33	(21H)	HD Non-Destructive Write	6	SSL
34	(22H)	HD Destructive Write	6	SSL
35	(23H)	HD Mechanics Stress	6	SSL

POST Test Code (decimal)	(hex)	Test	Group	Beep Code
36	(24H)	HD Internal Cache	6	SSL
37	(25H)	HD SMART Immediate	6	SSL
38	(26H)	HD SMART Short	6	SSL
39	(27H)	HD SMART Extended	6	SSL
40	(28H)	Video Memory Inversion	7	SSS
41	(29H)	Video Memory Progressive Inversion	7	SSS
42	(2AH)	Video Memory Chaotic Addressing	7	SSS
43	(2BH)	Video Memory Block Rotation	7	SSS
44	(2CH)	Video Memory Microtopology	7	SSS
45	(2DH)	Video Colour Purity	7	SSS
46	(2EH)	Video True Colour	7	SSS
47	(2FH)	Video Alignment	7	SSS
48	(30H)	Video LCD	7	SSS
49	(31H)	Video Test Card	7	SSS
50	(32H)	Serial Line Control	8	SLLL
51	(33H)	Serial Handshake	8	SLLL
52	(34H)	Serial Loopback	8	SLLL
53	(35H)	Serial Internal FIFO	8	SLLL
54	(36H)	Serial Internal Loopback	8	SLLL
55	(37H)	Parallel Controller	9	SLLS
56	(38H)	Parallel Status Port	9	SLLS
57	(39H)	Parallel Interrupt	9	SLLS
58	(3AH)	Printer Test	10	SLSL
59	(3BH)	CD/DVD Read	11	SLSS
60	(3CH)	CD/DVD Seek	11	SLSS
61	(3DH)	CD/DVD Disc	11	SLSS
62	(3EH)	CD/DVD Lens	11	SLSS
63	(3FH)	Modem	12	SSLL
64	(40H)	ATAPI Linear Read	13	SSLS
65	(41H)	ATAPI Write	13	SSLS
66	(42H)	ATAPI Random Read/Write	13	SSLS
67	(43H)	Audio Internal Speaker	14	SSSL
68	(44H)	Audio Direct PCM	14	SSSL
69	(45H)	Audio Stream PCM	14	SSSL
70	(46H)	Audio Direct SPDIF	14	SSSL
71	(47H)	Keyboard	16	SLLLL

POST Test Code (decimal)	(hex)	Test	Group	Beep Code
72	(48H)	Mouse	17	SLLLS
73	(49H)	Joystick	18	SLLSL
74	(4AH)	Parallel ATA	18	SLLSL
75	(4BH)	Serial ATA	18	SLLSL
76	(4CH)	USB Controllers	19	SLLSS
77	(4DH)	USB Functional	19	SLLSS
78	(4EH)	HII Compare	20	SLSLL
79	(4FH)	FireWire Controller	21	SLSLS
80	(50H)	Firmware/ACPI	22	SLSSL
81	(51H)	System Stress	25	SSLLS
82	(52H)	Trusted Platform Module	26	SSLSL
83	(53H)	PCI Express	27	SSLSS

This page is intentionally left blank

Section 7

SHOW RESULTS SUMMARY

The status of those Advanced Diagnostic Tests which have been run is displayed, grouped by device. If your computer has more than one processor, for example, then the primary processor results will be in column 1, the secondary processor results will be in column 2, and so on.

Each test will have one of the following results:-

PASSED The test was completed successfully

FAILED The test was not performed satisfactorily

N/A The test was not applicable

***Note**: If a test invokes a FAILED status then the test will remain FAILED irrespective of any following tests during Burn-In.*

ABORTED The test was not completed, either due to operator interference, or machine limitations

ABSENT The test cannot be performed as the relevant equipment is not available

NOT RUN The test was not selected for testing

If you attempt to exit *Pc-Check* after running tests without having displayed the Results Summary, a warning message appears to remind you that the results have not been displayed and ask if you are sure that you want to quit.

This page is intentionally left blank.

Section 8

WRITE RESULTS REPORT

Pc-Check reports facility is very useful for all users. In particular, manufacturers and repair professionals can keep file and/or printed copies to maintain a formal record of their quality-control procedures and standard practices. They can also track distribution and service to the customer. *Pc-Check* assists in reporting errors throughout manufacturing by identifying a drop in quality or failure in components bought in from other suppliers. For the independent machine user, a set of reports maintained over the life of the machine provides a record of any significant changes.

When selling a machine that has reached a stage where further upgrading will not be advantageous, the records will indicate to a buyer the machine's past history and its reliability. It may also increase its resale or trade-in value by more than the original cost of *Pc-Check*!

Pc-Check can produce an output text file of the test results in the form of a summary of each PASSED or FAILED test. You are first requested to type in details to identify the machine and the tester, plus the number of copies of the report required. You are also asked if you want to include all test names on the list even though some may not have been carried out.

Instruction Summary

Type in Machine Name.

Type in Tester Name.

Type in Machine Serial Number.

Type in Number of Copies Required or Press <ENTER> for one copy.

Do you want to report only on tests that are run? In response to the 'Y/N' prompt, type 'Y' to restrict the report to only the tests run or type 'N' to report all tests.

Press <TAB> to move between entries.

Press <F10> to generate the report.

'File or Device to report to' has a default value of REPORT.TXT. This output filename can be modified. Using the value PRN directs output to the first parallel port, which can be used to print the results immediately provided that you have a printer which supports ASCII text (see note below).

Note: *Remember to include the full pathname with the appropriate drive letter, in order to save your results to the correct medium.*

Note: *If the filename for the output is invalid, for example if you are attempting to write to the Pc-Check program CD, a warning message is displayed. Pressing <ENTER> then returns to the main menu. Re-entering the Write Results Report will enable you to re-direct the output.*

Note: *Because output is in ASCII form, it cannot be handled by either Postscript or GDI (so-called "Windows") printers. If such a printer is connected to the machine under test, output MUST be saved to a file, for subsequent off-line printing by a suitable device.*

Output

Output is in the form of a Quality Assurance Report, divided into two main sections: Machine Configuration, and Quality Assurance Testing Results.

There is a section on the output where the tester can sign to certify the report, and a certification code is produced, which can be used to check for results tampering, for example via Eurosoft's eTest Manager facility.

For Burn-In testing, a 3-line summary section at the end of the Report indicates when testing began and ended, and gives the duration.

Section 9

PROBLEM REPORTING

9.1 Introduction

In order to provide a quick response to any technical enquiries you may have, Eurosoft has taken specific steps to help you report problems to our technical staff.

An important procedure in tracking and processing suspected problems is the use of Technical Problem Report forms or TPR's. The basis for TPR forms is a well-validated measure ensuring that any reported problem is acknowledged, documented and responded to. This is a standard procedure strictly adhered to at Eurosoft. The TPR forms are straightforward and logical. An on-line form and instructions can be obtained via a link provided in the "readme.html" file on the *Pc-Check* CD-ROM. The form may also be printed from a pdf file on the program CD. The filename is: Eurosoft_TPR_Form.pdf.

9.2 Technical Problem Report Forms (TPRs)

The form should be used to document details of the fault and the system on which it occurred. Failure to give all the relevant information may make it impossible to identify the problem or may mean time is wasted in finding the correct solution. For these reasons, it is very important that Eurosoft should be given as much information as possible.

9.3 Technical Support Contact Information

Eurosoft (UK) Ltd.

Head Office
3 St. Stephen's Road
Bournemouth
Dorset BH2 6JL
United Kingdom

Tel +44 (0)1202 297315
Fax +44 (0)1202 558280
Email: support@eurosoft-uk.com
Website: www.eurosoft-uk.com

or

Eurosoft (US) Inc.

Support Office
310 Third Avenue NE
Suite 108
Issaquah, WA 98027-3346
USA

Tel +1 (425) 369-8582
Fax +1 (425) 642-8088
Email: support@eurosoft-us.com
Website: www.eurosoft-us.com

Support

Europe	support@eurosoft-uk.com
United States	support@eurosoft-us.com
Pacific Rim	support@eurosoft-au.com

Note: *Please advise us of any change of address so that we can keep you updated about revisions, new releases and other Eurosoft product information.*

Appendix A

RUNNING *PC-CHECK* UNDER DOS

A.1 Reasons for running under DOS

Self-boot *Pc-Check* successfully insulates itself from the normal operating system environment of the computer under test. This is achieved by having its own internal version of the DOS operating system (EuroDOS), which is loaded instead of the normal OS for the duration of the *Pc-Check* session. More information about EuroDOS is contained in Appendix E.

However, there are a number of situations where it is necessary to operate *Pc-Check* in a full version of a Microsoft-compatible DOS, in order to provide particular functions.

1 There are a few device drivers which EuroDOS cannot supply, which affect: non-ATA CD-ROM/DVD tests; SCSI utilities; and the PCMCIA information. The reason for these exceptions is the plethora of low-level drivers which exist for individual devices: it is not possible to provide generic device drivers. SCSI hard drives can be tested under Self-boot *Pc-Check* via the hard drive diagnostics facility.

2 Advanced users might wish to include a *Pc-Check* session within a larger context, regaining control after it has finished, in order to perform additional activities. This can also be achieved by operating *Pc-Check* under a full DOS environment.

A.2 Preparing to run *Pc-Check* under DOS

A.2.1 Issues to be considered

The major issues are:

1 Is a version of DOS installed on the machine under test.

2 If DOS is installed on the machine under test, does this DOS configuration reference a memory manager.

3 If DOS is not installed on the machine under test, can a bootable DOS floppy diskette be generated.

4 Are any of the device drivers specified above required.

Figure A.1 is an overview of the impact which these issues have on the process of running *Pc-Check* under a full DOS, as described below.

A.2.2 Implications of Extended Memory Managers

If there is no extended memory manager present, you can ignore this sub-section and move to Section A.2.3 below.

In order for *Pc-Check* to run all tests under a full DOS, any extended memory manager must first be disabled. This is achieved by generating and loading a bootable DOS floppy diskette which does not reference any memory management software. This process is described later.

Note: *The HII menu cannot be accessed if memory managers are loaded.*

A.2.3 If DOS is installed on the test machine

If no memory manager is present, *Pc-Check* can be run immediately, as described later. However, if for any reason there is still a requirement to generate a bootable DOS floppy diskette, this can be achieved directly on the test machine, as described later.

A.2.4 If DOS is NOT installed on the test machine

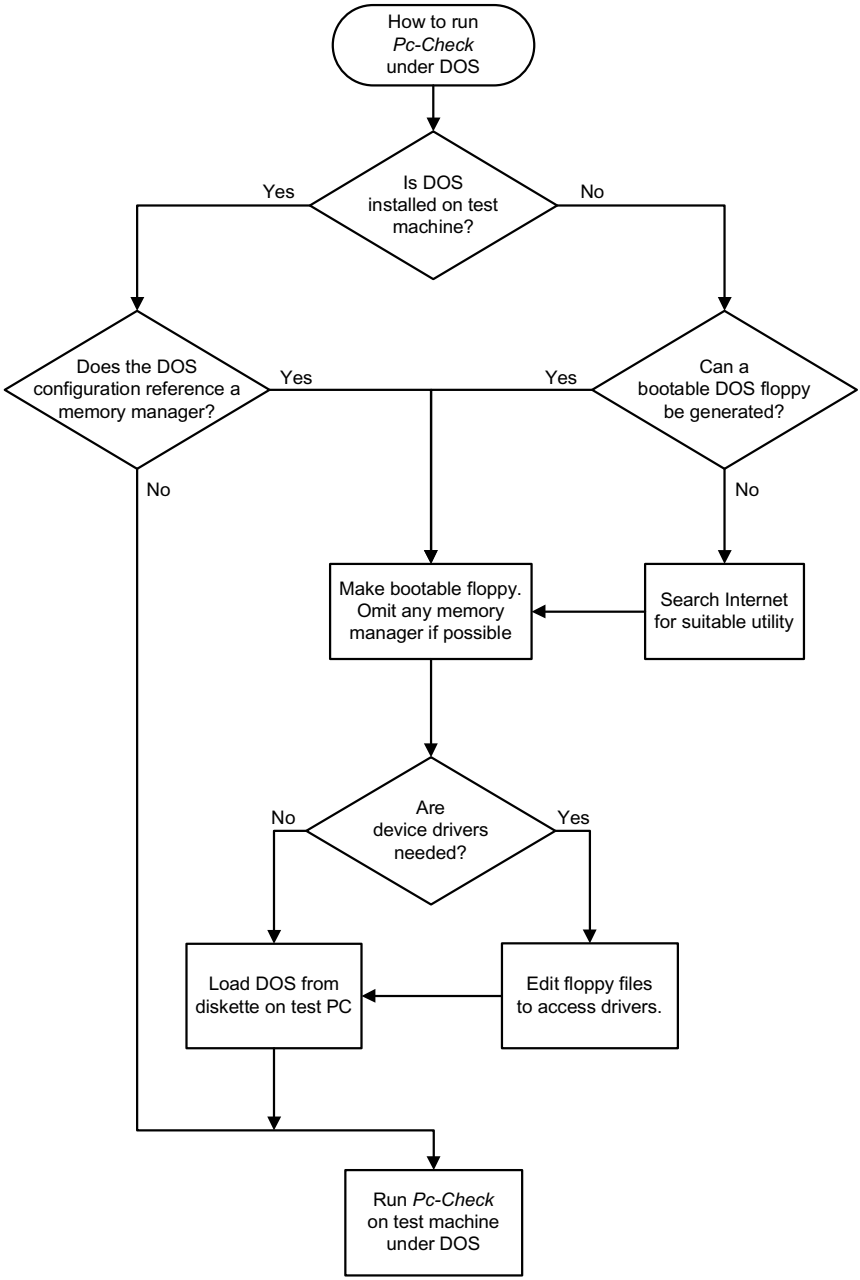
If the test PC (or any other available machine) is capable of generating a bootable DOS floppy diskette (this varies with individual Windows™ operating systems), you can use this to provide a means of running *Pc-Check* under full DOS on the test machine, as described later.

If no such machine is available, there are many utilities provided on the Internet which can be used to generate a suitable DOS diskette.

A.2.5 Implications of a need for Device Drivers

If any of the device drivers listed above are required, they will have to be loaded and referenced manually. This is achieved by generating and loading a bootable DOS floppy diskette which contains the required drivers. You will require appropriate knowledge in order to perform such a manual configuration under DOS.

Figure A.1: DECISION TREE FOR RUNNING UNDER DOS



A.2.6 Generating and Using a Bootable DOS Diskette

If the computer under test has access to DOS, and **does not** use an extended memory manager, you can ignore this section and move directly to Section A.3

In all other cases, it is necessary to generate a bootable DOS floppy diskette, in order to run *Pc-Check* under full DOS. The amount of work required depends upon whether you do or do not require device drivers to be loaded.

Creating a Clean Boot Diskette

You will first need to create a 'Clean Boot' diskette, either from a machine running DOS, or by formatting a floppy diskette from Windows™ Explorer, if the version of Windows™ supports creating an MS-DOS Startup disk.

From DOS:

1. With DOS running on your computer, insert a blank formatted diskette in drive A:
2. At the C: command line prompt type the following DOS command:

   SYS A:

This command will copy certain setup files that normally reside in the root directory of drive C: to the diskette.

Or, from Windows™ Explorer:

Format a floppy diskette, remembering to tick the option "Create an MS-DOS startup disk". This diskette will not be completely "clean", and will therefore require editing to remove inappropriate references.

Editing boot files (if required)

If you require any of the special device drivers, you will need to obtain and load them.

This is because the CD-ROM/DVD Tests (other than ATA), the SCSI Utilities, and the PCMCIA Information, cannot function when the system has been clean booted, as the relevant device drivers will not

be loaded. They must therefore be added after the clean boot diskette has been generated.

This involves installing the required drivers, and editing DOS system files such as CONFIG.SYS and AUTOEXEC.BAT, in order to access these drivers.

Further editing may be required in order to avoid reference to memory management software such as HIMEM.SYS or EMM386.EXE, or to other inappropriate features.

Loading DOS from the bootable diskette

Insert the boot diskette into the floppy drive of the machine under test, and reset the computer. After a short time you will see the floppy drive prompt. Then remove the boot diskette. You are now ready to insert your *Pc-Check* programme medium.

A.3 Operational constraints

Do not run *Pc-Check* on a PC which is being used as a file server, or under any version of Windows™, OS/2, Linux or Desqview. Disable any Power Management system.

A.4 Running *Pc-Check* under DOS

A.4.1 Loading *Pc-Check*

Operate the machine under DOS, either by loading DOS from a bootable floppy diskette as described above, or, in the one case where DOS is available on the test machine, **and** no memory managers are loaded, by booting the machine into DOS.

Insert the *Pc-Check* programme medium, set the path to the appropriate drive letter if necessary, and then type:

PCCHECK <ENTER>

This will bring up the *Pc-Check* Main Menu, allowing interactive use in the same way as with the self-boot method.

A.4.2 Command Line Syntax under full DOS

There is just one difference compared with running *Pc-Check* in self-boot mode. The word "PCCHECK" **must** be inserted at the start of the list of command line parameters. Thus the command line example used in the main section of the manual becomes:

PCCHECK /JF ERRORS.FIL /RF BURN03.RPT /RA /BD /BS BURNFILE.DAT

A.4.3 Command Line operation under DOS

You have a variety of options for running *Pc-Check* from the command line under DOS:

1 Type in instructions such as in the example above, and run jobs directly from the DOS prompt.

2 Write the command line parameters to a BAT file using a file editor, and run the job under DOS.

3 Instead of using a file editor, use the interactive facilities described in the main part of the manual to generate CMDLINE and burn-in files, as with self-boot *Pc-Check*, but remember to carry out the following additional steps:

   (i) edit the command line string to insert "PCCHECK" at the start of the parameter list;

   (ii) change the filename extension of the command line file to .BAT, e.g. change CMDLINE.TXT to CMDLINE.BAT

   (iii) to run the session, type "CMDLINE.BAT" at the DOS prompt.

Appendix B

LIST OF POWER MANAGEMENT EVENTS

Event Name	Description
System Standby/Suspend Request Notification	The APM BIOS wishes to put the system in the standby/suspend state
User System Standby/Suspend Request Notification	The user wishes to put the system into the standby/suspend state
System Standby Resume Notification	Indicates that a system resume from standby has occurred
Normal Resume System Notification	Indicates that a system resume from suspend has occurred
Critical System Suspend Notification	Situation detected where system must be suspended without notification to APM-aware applications
Critical Resume System Notification	Indicates that a system resume from critical suspend has occurred
Battery Low Notification	The system's battery is running low, but still contains enough power to suspend or shutdown the computer ~ 10 minutes
Power Status Change Notification	The system's power status has changed (eg. the AC line status or battery status have changed, or the number of installed batteries changes)
Update Time Notification	Indicates that the time should be updated (eg. following a resume from standby or suspend)
Capabilities Change Notification	Change to the system's PM capabilities (eg. via a setup utility or the addition/ removal of devices)
Reserved System Event Reserved Device Event OEM-Defined APM Event Reserved Event	Unlikely to be invoked via *Pc-Check*

This page is intentionally left blank

Appendix C

DRIVE LETTER ALLOCATION

The *Pc-Check* software can be run from a variety of media. As a consequence of the fundamental nature of PC design, the drive letters which are allocated to the various hardware drives depend upon which particular medium is being used to run *Pc-Check.*

The allocation table for booting *Pc-Check* from various media is:

***Pc-Check* booted from:**	**Drive letter allocated for:**			
	Pc-Check software	Floppy Diskette	HD (FAT)	HD (Hidden)
CD-ROM	A: (read only)	B:	C:	X:
USB	C:	A:	D:	X:
Floppy Diskette	A:	A:	C:	X:

Thus, for example, if you are running *Pc-Check* from CD-ROM, you will need to reference the floppy drive as B: when defining the path for the burnfile in CMDLINE.TXT. If you are running from USB flash device, then *Pc-Check* itself is on the C: drive, and any floppy diskette has the drive letter A:.

"HD" is included above, because results output can be sent to a FAT hard drive partition (including hidden types), if desired. Additional available hard drives take the next available letters in their sequence, so a second hidden hard drive partition would be drive Y:.

A list of accessible drives appears during the *Pc-Check* boot process.

Note: Some legacy BIOSes cannot be relied upon to handle the above drive letter allocation correctly. If you are running Pc-Check from a read-only medium, e.g. CD-ROM, this can cause a problem when you attempt to use an additional write-enabled medium to read or write data, such as a burnfile, or a report.

Assuming that you have set the correct full pathname, if you unexpectedly incur a "Write Error" message, your BIOS could

be at fault. If so, it is suggested that you make up your own floppy diskette copy of Pc-Check, as described in the main manual, and use that to run the program, instead of the original (e.g. CD-ROM) version.

Appendix D

ADVANCED XML OPTIONS FOR HII FILES

Note: *It is beyond the scope of this document to describe XML and XSL in detail: the user is referred to the many specialist publications on these subjects. A knowledge of XSL would allow the user to generate reports which, for example, contained the company logo, or otherwise complied with the corporate image. This Appendix is confined to providing guidance regarding the content of a typical XML HII file produced by the Pc-Check compare process, and providing hints on how it might be customised.*

Note: *XML HII files from versions of Pc-Check before V5.60 are not compatible.*

D.1 Basic HII Facilities

Section 4 of this manual describes how Hardware Identification Images (HII) can be generated and used to ensure identical builds, or to identify and document component changes within a system. The HII facility can generate XML files for viewing and printing in a clear report format.

Two typical scenarios in which a reference configuration HII file can be used to compare against the current system are:

(i) Support engineers can capture and retain HII images for the systems they maintain: differences since the last HII 'snapshot' may highlight forgotten or unauthorised component changes;

(ii) For the manufacture of batches of identical systems, assembled systems can be checked to ensure an exact match with an original, tested, reference unit.

To permit automated use, the HII Compare feature is available as a burn-in test option. For unattended operation, command line switches facilitate input of the reference image name and the name of the output difference log. If selected, the test is performed once at the start of the burn-in sequence. See the description of switches /IC and /IO in Section 3 of this manual for more information.

D.2 Advanced Facilities

Without making any alterations to the captured HII file, the basic HII Compare feature already provides a powerful facility to ensure continuity of a hardware specification. Advanced facilities exist which enable customised reports to be generated, not only in order to modify the report layout, but also to specify more complex match rules. For example:

(i) a particular component can be selectively excluded from the report, based upon some attribute;

(ii) an item can be made a permitted option, so that its presence or absence does not trigger an alarm;

(iii) selected attributes can be ignored;

(iv) a tolerance can be set to specify a range of values of a parameter which are deemed to be an acceptably close match to the reference design.

When viewed with a browser, the XML files, containing the HII configurations and the HII differences, refer to included XSL files, which control formatting of the HII data. This facilitates creation of a pleasing and clear report for display or print. Knowledge of XSL allows modifications to the XSL files to be made, in order to produce personalised report formats, without affecting the content of the HII files themselves.

D.3 Modifying HII XML Files

To modify an XML HII reference image, simply edit the file with a plain text editor (for example Notepad).

Here is an example of a typical component entry in an XML HII file:

```
<component label=”Processor” description=”Processor”>

  <attribute label=”Manufacturer” description=”Manufacturer” type=”text”>AMD</attribute>

 <attribute label=”Name” description=”Name” type=”text”>AMD Duron(tm) Processor</attribute>

 <attribute label=”Type” description=”Type” type=”text”>Central processor</attribute>

  <attribute label=”Socket” description=”Socket” type=”text”>SLOT 1</attribute>

  <attribute label=”Frequency” description=”Frequency” type=”value” tolerance=”10”>649 MHz</attribute>

</component>
```

The *‘component’* XML start and end tags delimit the section of the file that describes that component.

In the start tag, the *‘label’* defines the application’s name for the component, while the *‘description’* gives the user, or displayed, name. This convention carries through to the component *‘attribute’* tags.

Each *‘attribute’* describes something about the component. They may either be a *‘text’* or a *‘value’* attribute, which influences the way in which they are interpreted during a comparison.

In this example, the ‘Frequency’ attribute carries a *‘tolerance’* value, allowing a range of inclusive acceptable values to be defined. All *‘value’* type attributes can optionally have a tolerance specified, which permits the value to be greater than or less than the specified value, provided the difference between the measured and reference values does not exceed the tolerance. In the above example, this allows for fluctuations in the processor speed measurement algorithm. For memory, it could be used to allow for variations in on-board video allocation.

When a component is compared, all attributes specified in the reference image file must be present, and must match successfully against those currently detected on the system. If an attribute does not matter – for example if you were concerned only about the frequency of the CPU – you can delete all the other attribute tags from the reference image.

By default, a component is assumed to be a *'required'* component: if it appears in the reference specification, it must be matched. This is equivalent to the first tag line reading as:

```
<component label="Processor" description="Processor"
match="required">
```

The *'match'* option may also be specified as *'optional'* or *'excluded'*:

An *'optional'* component effectively stops a component from being reported either as 'missing' because it was given in the reference specification, or as 'added' if it was absent from the reference specification.

An *'excluded'* component must not be matched on a system. Working again with this example, it would be possible to create an 'excluded' processor component with the Manufacturer as the only attribute. This would have the effect of failing all systems containing a CPU from that Manufacturer.

Note: *When using exclusion and/or optional components, ensure that they appear before required components of the same type, because the reference file will be evaluated 'in order'. In the current example, you would need to specify 'excluded' based on manufacturer before requiring a CPU based on frequency: otherwise a match on frequency may cause the processor to be 'accepted' before its manufacturer has been evaluated.*

Note: *XML is sensitive to character case.*

In some situations a component may logically (or potentially even physically) encapsulate other (sub-) components. An example of this in most XML HII files would be that of the *'Memory'* component, which typically has *'MemoryModule'* components within it. The top level component may contain attributes that describe collective properties: in the case of memory, the total amount of memory is given. Should

you wish only these top level attributes to be considered, i.e. you wish to match only on the total amount of memory installed, but are not concerned with how this has been achieved, add *'thisonly=''yes''* to the *'memory'* tag, i.e.

```
<component label=”Memory” description=”Memory” thisonly=”yes”>
```

This page is intentionally left blank

Appendix E

EURODOS

When *Pc-Check* is operated in self-boot mode, it loads and runs under its own version of DOS, called EuroDOS. This is not a full implementation of DOS. Some of the facilities and restrictions are summarised below.

EuroDOS understands all FATs (12, 16 and 32 bit) and will operate on all BIOS driven media – typically floppy and hard disk drives, but may sometimes include ZIP or LS120 drives, for example. When hard disk partitions are scanned, EuroDOS will recognise partitions of hidden type. Normal (visible) hard disk partitions are lettered in the normal sense (C:, D: etc), while hidden are given X:, Y: or Z: – so that consistent drive lettering is easy to arrange in manufacturing. See Appendix C for more information about drive lettering.

The restrictions of EuroDOS are as follows:

1 A maximum of 4 logical volumes are supported from the possible set of 2 removable floppy devices and 8 primary partitions of the first two logical hard drives. So, as an example, the 4 logical volumes might be: A: (floppy emulated by CD boot); B: (relocation of real floppy); C: (FAT32 Window 98 installation); X: (hidden FAT diagnostic results partition).

2 No paths capability: EuroDOS will only understand the root directory of each volume.

3 The medium from which *Pc-Check* is executing cannot be changed while it is running, because *Pc-Check* is 'paged' in sections.

4 There is no long filename support – all filenames must be 8.3 format, even for FAT32 partitions.

EuroDOS provides some advisory messages on a red banner across the top of the screen, including write protection, disk changed at the wrong time (files still open), no space left on the media, printer not ready, etc.

When EuroDOS launches *Pc-Check,* it will display the command it is executing, e.g. it will show the *Pc-Check* EXE name and any command line switches currently active in CMDLINE.TXT.

EuroDOS tests the memory that is subsequently used to load the *Pc-Check* program. If memory faults are found, it will attempt to load the program avoiding the fault. The result of this test is collected and used by *Pc-Check*.

Glossary

TERMS IN COMMON USE

This glossary covers many of the terms used in this manual and gives our interpretation of their meaning. It also gives our interpretation of many of the terms that the reader will find in other documents relating to computer usage. We have given explanations as they apply in computing and electronics generally and a more specific meaning where this may be in general variance when applied to personal computers of IBM or IBM-compatible types.

We make no excuse for including quite a few terms that should have obvious meanings to most of our readers because, in many cases, the interpretation tends to 'drift' to fit the need in the ever-changing world of computers. The fine-tuning of the meaning of some terms and the broadening of others will continue to change gradually with time.

Access
An operation on a data-storage device such as a disk drive or a computer memory to read or write data.

Add-on Card
A circuit board that can be fitted to an electronics assembly. In the personal computer context, this specifically refers to circuit boards that plug into a row of connector sockets called expansion slots on a personal computer's motherboard. These latter are normally electronic interfaces to peripheral devices.

Address
A numerical reference, usually rendered in hexadecimal, used to uniquely identify the location of data or a place where data can pass into or out of the system. In the personal computer context, this is normally restricted to its base and extended RAM, its BIOS and CMOS chips and peripheral interfaces plugged into the motherboard.

AGP
Accelerated Graphics Port. A bus specification which allows graphics cards faster access to main memory than is possible via the regular PCI bus.

Alignment
A general mechanical term relating to the physical position of one item with reference to another. More specifically, the term is used when referring to the accurate positioning of a disk drive's read/write heads over the circular magnetic tracks on hard or floppy disks.

Alpha-Numeric Character
A sub-set of the 8-bit byte set that includes all the printing or display alphabet characters. i.e.:- letters, numerals from 0 . . 9, most of the accented letters, space and punctuation.

ANSI
Abbreviation for American National Standards Institute.

APM
Advanced Power Management. Facility of particular application to portable computers, allowing devices such as hard drives and the screen to be powered down when the machine has not been active for a specified period, and the CPU to operate at reduced speed and power.

Application
This term normally refers to a computer program that runs on a PC under the user's direct control, such as a word processor, spreadsheet, drawing package etc. The application may initiate several other programs during its use. On termination, these supplementary programs return to the calling program and are transparent to the user.

Argument
Part of a command in a batch file or in a command line instruction. The argument is added where the command requires a specific parameter such as OFF after the command ECHO when you don't want to see the steps in a batch file displayed on screen as the commands are being executed.

ASCII
Abbreviation for American Standard Code for Information Interchange. A standard code of 7 binary elements giving 128 different combinations (2^7). Except for the zero (null) value, each code represents either an alpha-numeric character, punctuation character or a control signal.

AT
A computer configuration designed by IBM using the Intel 80286 chip as the central processor, having a 20M-byte hard disk and eight expansion slots for peripherals.

AT-Compatible
Usually understood to mean a computer design based on the IBM AT configuration built by non-IBM manufacturers. Disk capacity, memory size and speed very often being superior to the IBM standard.

AUTOEXEC.BAT
An MS-DOS (or compatible operating system) batch file consisting of a set of DOS commands that are carried out in the listed sequence automatically after the execution of the CONFIG.SYS sequence when a PC is switched on or reset. This facility enables a user to organize the way the computer should be initialised without the need to carry out a tedious set of command line instructions.

Backup File Copy
An expression having several closely associated meanings. Responsible computer users protect themselves against loss of data due to equipment or media failure by keeping copies - most frequently on diskettes but also on magnetic tape or through a network file server. Backups of files containing user-generated data are taken from the PC's hard disk or from working diskettes at appropriate intervals. It is also sensible, whenever possible to make copies of applications software diskettes so that the often-costly original manufacturers' distribution copies can be stored safely.

Base Memory
The memory on a PC addressed from zero to 640KB. This memory holds the current part of the application being run, some or all of the associated data and a small area reserved for the BIOS and O/S (Operating System).

Batch File
A file that may have any 8-character filename with the extension '.BAT', containing a set of DOS commands. (AUTOEXEC.BAT is a reserved name for the file that is automatically called on system boot). Batch files are a simple way for the user to avoid manually keying in a series of complicated or monotonous command-line instructions that need to be executed before some other operation can be started.

Baud Rate
The data transmission rate between two serial devices (e.g. modems), measured in bits per second.

BCD
Abbreviation for Binary-Coded-Decimal. A method by which 4-bit binary counters increment from 0000 to 1001 (9_{10}) normally and reset to 0000 on the tenth count and set their 'carry' bit. Counters of this type are available as chips or can be implemented in software and are normally used to provide human-readable decimal outputs.

Binary
A numbering system having only two fundamental values, these being 0 and 1. Digital computers store and manipulate all data in this binary form.

BIOS
An abbreviation for Basic Input/Output System. A software program usually stored in read-only memory (ROM) components located on the computer's motherboard. The BIOS controls the routines for the central processor and chipset components which, in turn, unite external devices such as disk drives, screen and keyboard to permit applications software to be utilized efficiently.

Bit
A single binary digit (i.e. having a value that can only be 0 or 1). The value is held either as the state of a binary electronic switch, as a capacitive charge or as a uniformly polarised magnetic region on a disk.

Board See Card

Boot
The initialization process that occurs between the switching on or reset of a PC and the time when it is available for its user. The boot process includes the BIOS initialization and tests, but these are not executed when a 'soft' reset is performed (CTRL-ALT-DEL). It includes the loading of the operating system, defining devices, running their configuration routines and processing the AUTOEXEC batch file.

Boot failure
Failure of the system to attain the normal user-ready state on power-up or reset.

Buffer
A temporary data storage area in a computer or an associated peripheral device. When data is passed from one system to another (e.g. a character en route from the system bus to a printer), it can be held temporarily in a buffer until the receiving area can accept it and thus allow the data source to continue with further operations.

Bug
A computer hardware fault that causes a system to malfunction or a program fault having a similar effect.

Bus
Sometimes, and more understandably, called the 'highway' that connects the computer's central processor to its memory and other immediate control, coprocessor and management chips and its peripheral interfaces. PCs have two main busses for data and addresses and a small bus for control signals. -See also ISA and EISA.

Each bus consists of a number of parallel conductors. The number of conductors (lines) in each bus being a function of the CPU chip. The 80286 address bus is 24 bits wide giving 2^{24} (16 Megabytes) of addressable locations. This increases to 32 bits (4 Giga-bytes) on 80386/486 but is physically restricted to a sensible value on the motherboard. The data bus on the 80286 is 16 bits wide and on the 80386/486 it is 32 bits wide.

Byte
A structured group of 8 bits. Normally the basic unit for data exchange between system areas.

Card
An electronic assembly of chips and other components mounted on a fibre glass-resin substrate having copper tracks to make component interconnections. Also referred to as a 'Board', 'PCB' or 'Printed-Circuit Board'.

Card Services
Software server designed to co-ordinate and ease the work of PCMCIA Card (PC Card) drivers. Requires prior installation of socket services.

Central Processor Unit
On a computer, the component or set of components that carries out the arithmetic operations under the control of a program to perform the desired functions. On a PC these functions are all contained on a single chip.

Character
A letter or numeric symbol in the alpha-numeric character set that can be printed by a printer or displayed on the screen.

Chip
An integrated-circuit device where the active components are produced by forming semiconductor junctions or field-effect channels on a substrate consisting of a rectangle (chip) of almost pure silicon, germanium or gallium arsenide having a near-atomically-flat surface. The chip is enclosed in suitable packaging to make it handleable and mountable.

Chipset
A family of integrated circuits centred on a CPU chip that can be combined to form the basis of a computer. In PC terms, this means a chip or set of chips that contain all the peripheral components to produce the basic PC architecture.

Circuit
A combination of electronic components, including semiconductor devices with electrical interconnections that performs some specified operation, e.g. an amplifier.

Circuit Board See Card

Clock
On a computer, all switching and data transfer operations are synchronised by a master timing source referred to as the 'Clock' which generates an uninterrupted chain of electrical logic 0/1 pulses. In addition to the CPU clock, a computer may also contain other clock sources to record the time and date and to organize the operation of video displays and data exchanges with peripherals. The speed at which a computer can carry out instructions is controlled by the pulse rate of the CPU clock. This, in turn, is normally set to ensure that the associated electronics has time to respond correctly before the next operation step is initiated. The original PC design specified a clock rate of 4.77 MHz but current chipsets allow manufacturers to employ clock speeds of hundreds of MHz and higher.

Clone
A near copy of a well-known manufacturer's design. See 'Compatible'.

CMOS
Abbreviation for Complementary Metal Oxide Semiconductor. An integrated-circuit design system that employs field effect junctions to perform the active switching operations. Generally, these devices use less current than their TTL counterparts so allowing device component density to be increased considerably without overheating.

CMOS RAM
On a PC, a battery-supported memory element fitted to AT and higher machines that retains the user-defined system BIOS setup data plus the time and the date while the computer is switched off.

Command Line Instruction
An instruction that the user must type in from the computer keyboard in a recognisable DOS format. This may be a standard DOS function followed by any additional information or arguments that may be required, such as command line switches, paths, filenames or other parameters. Alternatively it may be the name of a program to be executed or a batch file to be run.

Command Switch
Additional information frequently required when executing a DOS command usually in the form '/X' separated from the command by a single space where 'X' is a character or a string.

Compatible
A computer design that is functionally identical to one of the original IBM personal computer specifications. This means that the machine will run software and accept add-on hardware designed for the corresponding IBM machine.

CONFIG.SYS
A file accessed by the PC during its boot-up sequence after loading DOS and before running AUTOEXEC. BAT. The file contains a set of definitions and commands that configure the system to make best use of the available memory and initialise other drivers required by the hardware that is installed.

Console
Now an out-of-date term describing the keyboard and display of a PC. It still retains a significance in some DOS commands such as COPY where the command switch CON is telling the computer to send the data specified to the screen display.

Controller
On some lap tops and budget machines the control circuits for obligatory peripherals may be integrated into the motherboard but generally controllers are add-on cards that interface between the system bus and peripherals such as disk drives, video monitors, communications modems, scanners etc.

Conventional Memory See Base Memory

CPU Abbreviation for Central Processor Unit

CRC
Cyclic Redundancy Code: an error correcting protocol.

Cylinder
On a multi-platter hard-disk drive, a series of corresponding circular tracks arranged one above the other on both sides of each platter. Thus all the tracks of a specified number constitute the cylinder of that number.

Data
Recorded or temporarily captured information. All computer data consists of binary numbers stored either as a switch state (on/off), an electrical charge or magnetic polarity. To be usable, data must be stored at a known and accessible location. When data is sent to a printer, display or other suitable peripheral it can be converted into human-readable or machine interpretable form.

Data Pattern
Regular patterns of binary data. These are often applied to devices when testing their integrity such as checking read/write operations on semiconductor or magnetic memory. Certain pattern combinations of 1's and 0's can be applied to memory during continuous read/write operations in a way that is most likely to detect latent weaknesses in the device. In semiconductors, electrical weakness between physically adjacent cells can be detected and, on magnetic storage, media-faults, alignment-faults and electronic-circuit faults can be stimulated to occur.

DEBUG
A utility provided in many DOS packages to enable programmers to diagnose, modify and repair program operations by single stepping through the sequence and noting the effects. Novell DR-DOS contains a similar utility called SID (Symbolic Instruction Debugger).

Decimal
A counting system used by humans that uses ten characters (0 . . 9) to quantify any definable integer or fractional value. See also Binary, Octal and Hexadecimal.

Diagnostic
A sequence of operations and tests designed to identify the source of a fault. This is usually in the form of a computer program that may run under user control or, in certain cases, may be left running for long periods to identify transient faults.

Digital
Describing a system that operates in binary mode having only two recognisable states. CMOS and TTL chips designed for 5-volt supply operation on the motherboard and associated peripherals give an output between zero and 0.6 volts to represent a '0' and an output between 2.6 and 5.5 volts to represent a '1'. (Any voltage between 0.6 and 2.6 volts is transitory and may be ignored).

Direct Memory Access
A technique for passing data between memory and another part of a system without CPU intervention. This increases the speed at which large blocks of program data can be loaded and unloaded to and from the memory and peripherals.

Diskette
A thin disk of flexible plastic sheet coated with a magnetic film enclosed in a square flexible or rigid plastic protective container. It is used as a semi-permanent data-storage device. Data can be written to or read from the diskette when correctly inserted into a suitable drive unit.

Display
The display device onto which the computer outputs visual data for the user. Also called the 'Screen' or 'Monitor'.

DMA
An abbreviation for Direct Memory Access (*qv*).

DOS
Abbreviation for Disk Operating System. The environment in which the computer receives, creates, manipulates and disposes of data and other files and provides an interface with the user via the keyboard and display. Several variants of DOS exist but the most common is Microsoft's MS-DOS. Some manufacturers offer their own version and Novell also produces its version under the name DR-DOS

DOS Format
The act of writing high-level structural information onto a diskette, creating the necessary housekeeping data for DOS to maintain files and directories (e.g. a File Allocation Table). Sometimes referred to as 'high-level formatting'. Most makes and versions of DOS use compatible structures, allowing data to be exchanged freely.

The formatting commands available vary between DOSes supplied by different equipment manufacturers. Some DOSes have special commands for hard disk high-level formatting, (for example DR-DOS). We give details based on the standard Microsoft MS-DOS.

The DOS FORMAT command is used to format floppy disks from scratch, while hard disks must have previously been low-level formatted and partitioned. Note that under DR-DOS the partitioning utility FDISK performs the high-level formatting of hard disks, not the FORMAT command.

See also Format, Low-Level Format, Partition.

Drive
A data-storage unit in which the data is stored on disks. The disks may be removable diskettes or may be permanently enclosed 'hard' disks. Data is stored on concentric tracks on the disk surfaces and accessed by the read/write heads which are mechanically aligned to the required tracks as the disk rotates.

Drive Type
An identifier used to specify to the BIOS the type and configuration of the hard disk fitted to the computer. Modern computers have at least one option (47) into which the user is able to specify the drive parameters.

Driver
A program that employs BIOS functions to permit operation with a particular peripheral. Standard devices such as keyboards, displays and normal drives have transparent drivers in the BIOS. Normally, drivers for other customised facilities are installed at boot time by being specified in the CONFIG.SYS file.

Dynamic RAM
A type of memory chip that uses the principle of storing data as an electrical charge on each cell. Its disadvantage over the other types of memory is that the charge leaks away very quickly, leading to data

corruption, so it needs to be refreshed before it is lost. When used, dynamic RAM has a special controller chip that dynamically refreshes the data stored. The advantage of dynamic RAM over non-volatile memory is its comparative speed and price.

Earth
Parts of a system's electronics that have a direct connection to the Earth pin on the plug that connects the computer to the a.c. power source.

ECC
Error Correction Code.

EIDE
Enhanced IDE. The interface for modern hard drives, etc. An improvment on IDE (*qv*).

EISA
An abbreviation for Enhanced Industry Standard Architecture. A standard that enlarges on the ISA standard to include a 32 bit data bus and expansion slots modified to permit more contacts while maintaining compatibility with existing ISA hardware. The enhancements permit faster DMA and I/O rates to be achieved.

EMS
An abbreviation for Expanded Memory Specification. EMS is a combination of software (an Expanded Memory Manager) and hardware (control circuitry fitted to motherboards and add-on memory cards). It allows applications written to work within the 1 Megabyte address space of an XT computer to access many megabytes more memory.

EPROM
An abbreviation for Erasable Programmable Read Only Memory. A type of ROM that can be erased by shining an ultra-violet light through a transparent 'window' in the chip package, and then re-writing data to it with an EPROM programmer.

Expanded Memory Manager See EMS.

Expansion Slot
An in-line edge connector socket mounted on the PC's motherboard to provide access to the computer's bus and power supplies by add-on cards such as disk controllers, video cards and interface cards for other peripherals.

Extended Memory
All memory with addresses above 1 M-byte.

Extended Memory Manager See XMS.

FAT See File Allocation Table.

Fault Finding
Analysis of the symptoms of a failure followed by specific tests to check what is causing these symptoms and specifying the necessary remedial action.

File
An organised collection of data that may represent a program or the data that could be manipulated by a program. Files may be written to and read from any mass storage device such as hard or floppy disks or magnetic tape. The basic structure and organisation of its placement on disk is controlled by the DOS.

File Allocation Table
Often abbreviated to FAT. This is a table created and maintained by DOS and kept on a floppy or hard disk. The FAT records which parts of the disk are occupied by files and directories. DOS uses the table to find unused space on the disk for new files. The FAT is also used by DOS to indicate defective areas on a disk so that those areas are not used for storing data.

File Extension
An addition to the name of a DOS file in the form of up to three characters delineated from the filename by a point (.).

Firmware
A program that is stored in ROM rather than as software held on disk. For example, the BIOS program that runs on power-up or reset is held permanently on ROM so that it can run immediately the CPU initialises.

Flags
Bits that appear in certain CPU registers to indicate that certain conditions exist.

Floppy
An alternative name for a diskette. Modern diskettes are 3.5" in size and rigid, but the name derives from older 8" and 5.25" types which are, within limits, flexible.

Format
The act of writing information to a diskette or hard disk that prepares it for the organized storage of data. The DOS FORMAT command is used to prepare diskettes in this way. The process for hard disks is a little more involved, consisting of up to three stages: Low-Level Format, Partitioning and DOS Format. See those topics for further details.

Gigabyte 1024 Megabytes.

Graphics Adaptor See Video Adaptor

Ground See Earth

Hard Disk
A magnetic disk drive unit which is normally fitted permanently to the PC. This has totally enclosed rigid platters. See also Drive and Diskette.

Hardware
The physical components that constitute a computer and its peripherals.

Hardware Identification Image (HII)
A file stored in a format that is convenient for further processing which contains a detailed configuration snapshot of the host PC. Files can be used for inventory records, or if compared against previously saved images can be used to pinpoint configuration changes.

Hardware Interrupts
Hardware Interrupts, also known as IRQs or interrupt requests, are electronic signals generated by peripherals to indicate to the CPU that they require attention or ‘servicing’. A serial port, for example, might generate an interrupt when it has finished sending a byte.

The CPU responds by suspending whatever it is doing and running instead a special program in memory called an Interrupt Service Routine. This might, in the example given, supply the serial port with the next byte to send. When the service routine has finished, the CPU returns to where it left off and resumes normal operation.

XT-type computers have 8 different IRQs available for peripherals, AT computers have 16. Not all of these IRQs are accessible from the expansion slots, however, as some are reserved for standard items like the keyboard. In addition, each peripheral must usually use a different IRQ to avoid conflicts.

These interrupts are assigned different priorities so that when several IRQs are generated at about the same time, the most urgent situations get dealt with first by the CPU

Head
The part of a disk drive that traverses the tracks to read or write data. In the write mode, a current through the head produces a magnetic field in the part of the disk track that is under it at that instant. The head current flows one way to induce a logical '1' and in the reverse direction to induce a logical '0'. In the read mode, the magnetised parts of the track pass below the head as the disk rotates inducing small currents in the head coil. These are amplified and processed by the drive electronics and output as logical '0s' and '1s'

Hex An abbreviation for Hexadecimal - see below.

Hexadecimal
A numbering system used by engineers and programmers to make the computer's binary numbering more manageable. Any integer value in the range 0 . . 15 (the number of combinations possible with 4 bits) are represented by the numerals 0 . . 9 followed by the letters A . . F where the numerals represent their decimal values and the letters represent 10 . .15. Thus $0_{16} = 0000_2$ and $F_{16} = 1111_2$. Hex values are normally suffixed by an upper- or lower-case 'H' to identify them as such.

High Memory
The first 64K-bytes of memory above 1 M-byte of RAM on an AT or higher motherboard. This area is accessible on 80286 and higher CPUs in real mode without the need for complicated switching. See the chipset manufacturers' data book for more details.

Host
A term used to differentiate the control or main computer in a system from the other units with which it is associated. For example, a laser printer has its own CPU to organize the bit-map images it generates and it communicates with the host CPU during the data transfer process.

IDE
Integrated Drive Electronics. An early industry standard for hard drive interfaces.

I/O
An abbreviation for Input/Output. Operations where data is exchanged between the computer and a peripheral via an I/O interface.

Interrupt
One method by which a peripheral can indicate that it requires the attention of the CPU. See Hardware Interrupt.

IRQ Abbreviation for Interrupt Request - see Hardware Interrupt.

ISA
An abbreviation for Industry Standard Architecture. This specifies the basic architecture for the IBM 'AT' computer in terms of interface circuits and signal timing, interrupt allocations, DMA facilities and timer and clock characteristics. See also EISA.

Keyboard
The PC user's primary input device. (Although this function may be taken over by the mouse). The keyboard is a unit with a QWERTY key panel, a numeric keypad and a row of function keys plus assorted keys for deleting and moving a cursor around the screen etc.

Kilobyte
1024 bytes, abbreviated to 1KB using the upper-case K to avoid confusion with the standard 'SI' quantity descriptor k used for 1000. Many publications ignore this differentiation and their styles may follow other house standards.

LED
The abbreviation for Light-Emitting Diode. LEDs are semiconductor devices that are often used as visual indicators and are available in a variety of colours. Infra-red emitting diodes are also available and are often used for detection and control operations.

Low-Density
A type of diskette that holds about one quarter of the data that the AT standard high-density disk can accommodate, i.e. 360K-bytes. These are only available in 5¼" format.

Low-Level Format
This is a process that writes information on a hard disk by dividing each surface into a series of concentric circular tracks. Each track is, in turn, divided into an equal number of sectors. Each sector can typically hold up to 512 bytes of data. Any tracks or sectors found to be defective are marked so that the operating system does not use them in future for storing data.

Most IDE and SCSI hard disks are low-level formatted by the manufacturer and need never have this process applied to them again. See also Format and Partitioning.

Manufacturing Test Port
Normally the I/O port with the address 80h that most modern BIOSes send POST codes to during the BIOS startup sequence - see POST.

Maths Co-Processor
A chip used in conjunction with the CPU to increase system speed when performing complex floating-point arithmetic such as matrix operations (spreadsheets etc.). Available as the Intel 8087, 80287 and 80387 and Weitek. The 80486-DX CPU chip contains its own integrated maths co-processor.

MCA
Abbreviation for Micro Channel Architecture. An IBM specification for the architecture of the PS/2 computer model 50 and up.

Megabyte
1024 Kilobytes, normally abbreviated to MB.

Micro Channel
A facility provided in IBM PS/2 models 50 and up that allows peripherals to take over bus control via their intelligent interfaces in order to make high-speed data transfers.

Microprocessor See CPU.

MMX
Multi-Media Extensions. Hardware extensions to instructions for multi-media operations.

Monitor
A term frequently used to describe a computer's display device.

Motherboard
The circuit board assembly of the PC that holds the CPU chip, its associated components and memory. It also houses the expansion slots for all the add-on boards.

Mouse
A pointing device that you move about on your desk or on a 'mouse mat' to move a pointer or cursor about on the screen. It has two or three active buttons to allow you to make selections.

MS-DOS See DOS.

Nibble (Alternative spelling 'Nybble')
Four bits which may be either the most-significant or least significant half of a byte.

NMI
An abbreviation for Non-Maskable Interrupt. The highest-priority CPU interrupt, used to halt program operation when impending catastrophic failures such as memory parity errors are detected.

Noise
Randomly-generated natural electrical background impulses having no intelligible data content. The level of this noise is what limits the minimum strength of the signal that represents a usable data bit.

NPU
Abbreviation for Numeric Processor Unit - see Maths Co-processor.

Operating System
The software that is automatically loaded into the computer's memory after the POST tests are successfully completed. PCs use DOS but another popular operating system mostly used on more powerful computers is UNIX. Before the PC took over the low-end market, various 8-bit computers used an operating system called CP/M.

Overflow
An error or fault condition that occurs when there is insufficient memory to contain the data generated or the memory set aside for data is insufficient.

Overwrite
The operation of writing data into RAM addresses or onto disk sectors that already contain data.

Parallel
A data transfer operation in which several bits are processed simultaneously, typically 8, 16 or 32 bits.

Partitioning
Partitioning consists of information written to reserved areas of a hard disk describing its size and other physical characteristics. This is usually for the benefit of operating systems. It can optionally also split a single physical hard disk into two or more smaller 'logical volumes' or 'partitions' that appear to DOS to be separate hard disks. This can be useful for organizing data to make it more manageable, for installing different operating systems on one drive and for overcoming limitations placed on hard disk sizes by older versions of DOS. The DOS utility FDISK lets you edit the 'partition table' of a hard disk. In DR-DOS, FDISK performs similar functions but also facilitates high-level formatting.

PC
The abbreviation for Personal Computer. This is generally understood to mean the type of computer that is based on the original IBM design that is capable of running software intended for IBM machines and accommodating add-on cards designed for IBM machines.

PC Card
Hardware device in a compact and portable form, similar to but thicker than a credit card.

PCI
Peripheral Component Interconnect: a high performance bus.

PCI-X
A higher specified version of PCI, capable of data transfer rates exceeding 1 gigabyte per second.

PCMCIA
Personal Computer Memory Card International Association. Originators of the PC Card Standard.

Peripheral
A unit usually connected externally to the computer such as a printer, image scanner, keyboard etc. either via an add-on card or directly. Some peripherals, such as modem and fax cards, however may be mounted directly in expansion slots and simply plug into a phone or network socket.

Port
An address belonging to a group that is not allocated to memory but which is made permanently available to give access to external devices. AT and above machines set aside 64K of addresses for this purpose.

POST
An abbreviation for Power-On Self Test. This is the sequence carried out after switch on or a hard reset by the BIOS to check that the machine is behaving correctly.

Power Supply
All modern PCs are fitted with a high-efficiency switched-mode power supply providing stable +5V, -5V, +12V and -12V outputs and a logic-level 'power-good' signal. If the a.c. supply voltage falls below the minimum limit, the outputs are switched off.

Program
A set of instructions that the computer carries out in a logical sequence to perform the operations required by the programmer.

Programmed I/O
A data transfer between an I/O device and the memory made under direct CPU control via the CPU's registers. See also DMA.

PROM
Abbreviation for Programmable Read-Only Memory. This is a memory chip that can only be written to, or 'blown', once and is designed to contain permanent system information.

RAM
Abbreviation for Random Access Memory. The term applies to either a single chip or to all the computer's memory. It is usually implemented by using dynamic (refreshable) RAM chips (see Dynamic RAM). Data can be written to and read from RAM but it is volatile and data will be lost when the power supply is switched off.

Read
Extraction of data from memory or any other device containing stored data such as a disk drive. Reading is normally a non-destructive operation and there is no practical limit to the number of times the data may be read.

Read/Write
The capability to extract or copy data from or to a source as described above (Read) or to place data from another source in or on some medium that is capable of retaining it either temporarily or permanently.

Refresh
The regular periodic operation performed on a dynamic RAM to prevent the electrical charge on the memory cells from leaking away. This operation is normally performed by the dynamic RAM controller chip.

Register
Temporary storage areas, mainly in the CPU chip but also in other chips associated with peripheral device controllers. In the CPU the binary data in the registers is examined and manipulated by the operation codes given to the CPU by the program.

Reset
The action of causing the computer to re-boot without the need to turn off the power. Most PCs have a reset button for this on the front panel. A 'soft' reset may also be initiated by holding down the CTRL and ALT keys while the DEL key is pressed. In this case, the computer skips the BIOS check sequence.

ROM
Abbreviation for Read-Only Memory. This is a memory chip that has its data content permanently installed during manufacture. Certain makes of BIOS chips may be implemented in ROM.

Sector
Part of a track on a diskette or a hard disk platter. Disks have some form of physically detectable area against which all the tracks' start points are referenced. Each track is then divided into an equal number of sectors beginning at a fixed angular displacement from this point. Typically a 3½" high-density diskette has 18 sectors per track and 80 tracks on each of the two surfaces: each sector contains 512 bytes of data plus a numerical identifier and a cyclic check code. This gives a capacity of 1,474,560 bytes.

Seek
On a disk drive, the positioning of the head(s) over the required track (cylinder).

Seek Time
The time it takes for a disk drive to reposition its head(s) over a different track. This is the most critical parameter for the speed of operation of a disk drive.

Semi-conductor
The basic material used in the fabrication of integrated-circuit chips, transistors, LEDs etc. Usually in the form of extremely pure silicon to which extremely small quantities of other 'enhancing' or 'depleting' elements are added locally to create the required conductive properties. Also germanium mainly in older simpler devices and gallium arsenide for light-emitting/detecting applications.

Serial
The transfer of structured binary data bit patterns or electrical pulses one after the other at intervals along a single conductor. See also Parallel.

SETUP (1)
Generally the name of a program supplied by a software vendor to install and customise an application such as a word processor or an environment for running other applications (such as Windows).

SETUP (2)
More specifically a routine built into the BIOS software of AT and higher machines to allow a PC user to customise the way the BIOS configures the computer before loading DOS etc. This setup information is stored in battery-backed CMOS RAM and can therefore remain current for the life of the battery.

Shadow RAM
The area of RAM between 640K and 1 M-byte that may be used to hold copies of program code for the BIOS and video adaptor ROMS. The BIOS remaps these parts of the memory over their normal ROM address areas. This enables the machine to run faster because the access time to this memory is faster than ROM chips.

SIB
Status Indicator Box. Device permitting display of diagnostic results. Useful in absence of video monitor (available from Eurosoft for use with *Pc-Check*).

Socket Services
Low-level software driver for PCMCIA Host Bus Adapter logic.

Software
The instructions that tell the computer what data it must operate on and what it must do with it. These instructions usually come in the form of a program.

Software Interrupt
Software interrupts provide a method by which applications can request facilities provided by the BIOS, DOS or other operating system. For example, interrupt number 13h is used to ask the BIOS to perform operations on the floppy and hard disks. There are 256 different types of interrupt but those in use at any one time are determined by the software the computer is running. Many of the interrupts have no standard usage.

Spiral Diskette
A diagnostic tool in the form of a diskette in which the tracks are in the form of a spiral, like a gramophone record, rather than as separate concentric tracks. These are required by certain types of diagnostic software to check head alignment and sensitivity on diskette drives.

Time Multiplexing
The use of time slicing to arbitrate between several devices which share the same IRQ.

Track
A circular concentric magnetised strip on the surface of a hard disk or diskette containing a number of identifiable sectors written to the disk during the formatting process. Each sector may contain up to 512 bytes of data.

Trouble Shooting See Fault Finding.

UDMA
Ultra DMA. An interface standard based on EIDE (*qv*), providing improved data transfer rates and capacities. When followed by a number, eg UDMA100, this specifies the data transfer rate in MHz. See also DMA.

Upper Memory
The memory between the top of the 640K base memory and 1 M-byte.

USB
Universal Serial Bus, A specification for connecting peripheral devices to a PC using a fast serial interface.

Utility
A general term that usually describes a relatively simple program like a DOS command, a simple diagnostic etc. For example, a program that changes the format of a text file produced using one word processor to a format that will be compatible with another word processor.

Vcc
Normal operating voltage.

Video Adaptor
The add-on adaptor card that interfaces between the computer bus and the display unit.

Vpp
Programming voltage.

Write
The action of placing data into memory or onto disk by transferring the appropriate electrical charge to a cell, or magnetising part of a track sector.

Write Protect
A mechanical protection against writing and therefore risking damage to valuable data. Alternatively, individual files written to disk can be protected against erasure and overwriting by the use of the DOS ATTRIB command.

XMS
Abbreviation for Extended Memory Specification. XMS is a method for applications to use memory above 1 Megabyte in AT and above computers. It consists of software, in the form of an Extended Memory Manager that controls access to this memory and prevents conflicts between applications that want to use it. Some Extended Memory Managers also have the capability to use extended memory to emulate expanded memory and thus also providing EMS facilities

XT
A computer configuration designed by IBM using the Intel 8088 chip as the central processor, having a 10 M-byte disk and 7 expansion slots for peripherals. It was the forerunner of the 'AT' configuration.

This page is intentionally left blank.

Eurosoft
pc reliability solutions

Eurosoft (UK) Ltd.
3 St Stephens Road
Bournemouth
Dorset
BH2 6JL
United Kingdom

Tel: +44(0) 1202 297315
Fax: +44(0) 1202 55828

www.eurosoft-uk.com