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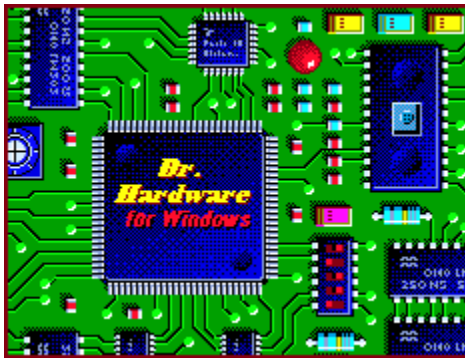
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Introduction to Dr. Hardware for Windows

Welcome to Dr. Hardware for Windows !

Dr. Hardware is the ideal software for everyone, who wants or has to know, what's going on in his PC and how fast it is. When you buy a PC, Dr.Hardware enables you to check, if dealers and brochures tell you the truth or not. When you encounter hardware or software problems, Dr.Hardware helps you to review the status and configuration of resources, setup and drivers. Also consult Dr.Hardware, before you buy other software - it will tell you, if your PC is suited for it or not.



Before you start testing your PC with Dr. Hardware please consider that this program is distributed as shareware. You are encouraged to evaluate the trial version for up to fourteen days. Once this trial period is over you have to decide if you want to continue using this software. We strongly believe you want to! So please register. The easiest way is to go directly to our homepage (URL s.b.) There you'll find links to sites where you can pay by credit card. Note: as soon as the trial period is over you can't run the shareware version any longer.

Homepage of Gebhard Software: <http://ourworld.compuserve.com/homepages/pgsoft>.

[Click here to go directly to our homepage.](#)

Email adress: pgsoft@compuserve.com.

Important!

During analysis Dr.Hardware accesses ports and registers and calls undocumented functions. Many values are snapped through unsafe and problematic methods. Therefore, GPFs and illegal operations are possible.

Tips for best usage of Dr. Hardware

Users, who use the software only from time to time, should consider the option "Quick Pick" from the QuickMenu. There you will be prompted with an alphabetically sorted list, that allows

a direct start of many analysis options.

Very often, you can find informations about a specified theme in various parts of the program.

Example: Main analysis of a VGA card is done in the information window "Graphics adapter".

But additional information about the VGA card can be obtained from the BIOS Data Segment.

And if it is a PCI-VGA card, more details will be detected via PCI analysis.

Consider Menu Services, Option "Read Me...". Here you will find information about the software and related topics.

QuickMenu's option "PREFERENCES" guides you to the dialog to configure the appearance of Dr.Hardware on screen.

Main Menu Service

Among the options of the Menu Services the following can be found:

- Read me...: General information about Dr.Hardware - purpose and capabilities, differences between shareware and registered version, improvements of the latest version, license terms, handling problems.
- Powerfull editor for viewing and editing configuration and other files.
- Register: Easily register Dr.Hardware by filling the on-screen order form. Print, sign and send your registration - or go directly to our homepage where you can order online.
- Report: Combines all informations or parts of them and prints or saves it to a file.

Information about the editor

Dr. Hardwares internal editor allows to edit large files and it supports syntax highlighting. These are two advantages against the windows editor.

Several buttons allow to execute the most common actions as printing or file saving. However there are far more options (searching, font changing etc.) that can be activated by pressing the right mouse button over the edit area which opens a popup menu with numerous options.

You can also enlarge the edit window because the editor dialog window - in contrary to all other dialog windows - is a resizable one.

Syntax highlighting can be disabled via Quick Menu option [Preferences](#) .

Order Form

This semi-automatic order-form generator allows you to order a key to register your shareware version of Dr. Hardware.

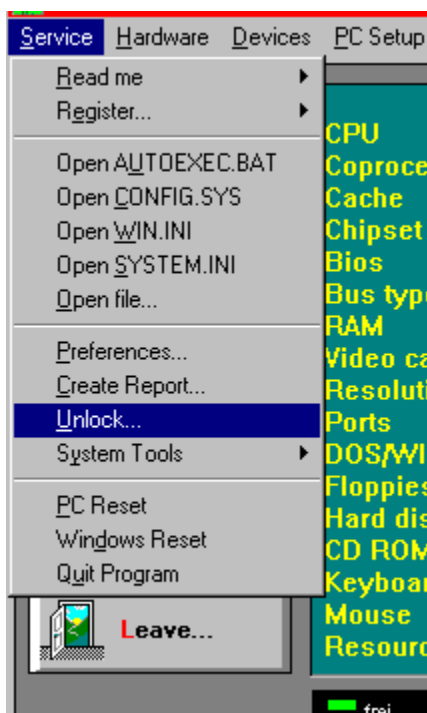
The program author's address and a field to apply your signature are printed automatically, although they are not displayed on screen. Press button "Prices And Infos" to view a pricelist.

Prices are calculated automatically for your convenience.

Don't forget to fill in the order form completely. Use the arrow keys and <TAB> to move between the entry fields.

Orders are also possible by sending a fax.

Pieces You can order both Windows and DOS version key. The DOS version has not become obsolete with the release of the Windows version. It's useful for quickly test the naked machine in the pre-installation phase. If you register both versions you will get good rebates.



To unlock the shareware version select the option "Unlock..." in the menu Service. Enter your key and the shareware transforms into a registered version.

Important: Do not try to hack the unlock algorithm because this service will be locked after four incorrect inputs!!

Delivery to Mark this button to define the delivery target. This is important

for the shipping costs that are different for Germany and outside of Germany.

Payment If you order directly at Gebhard Software you can pay by check or money order. If you want to pay by credit card, please visit our homepage with links to sale points where you can pay by credit card.

Registered User? If you have already registered a Dr. Hardware shareware version please mark the YES-option. This decreases the prices.

You will receive a key with which you can also unlock new versions of the following year free of charge. However you have to load the new shareware updates by your own. Later you can again order a new 1-year-key.

You will receive your personal key via mail, fax or eMail as fast as possible.

Address	Peter Gebhard Wilmsdorfer Str.20 D-10585 Berlin Germany
FAX	030-342 25 95
CompuServe	100537,504
E-Mail	pgsoft@compuserve.com

AUTOEXEC.BAT

General:

The file AUTOEXEC.BAT is a so called batch file and is executed during the process of starting your PC (immediately after CONFIG.SYS). The commands in this file are executed line by line. If possible, the lines are interpreted as system commands. If a line contains "mouse", for example, the system tries to start the mouse driver. The purpose is to guarantee the PC to be always in the same, individual configuration.

Under Windows 95 (and later) you can define an AUTOEXEC.BAT for each DOS application that is executed in DOS mode.

CONFIG.SYS

General:

DOS searches this file each time the PC is started and executes the commands listed in it. Mainly, drivers for special hardware or special configuration (memory managers, CD-ROM, compressed harddisks etc.) are loaded here. DOS version prior to 6.0 always executed the whole file CONFIG.SYS unconditionally. Later versions allow the step-by-step execution via function key F8.

Under Windows 95 (and later) you can define your own CONFIG.SYS for each DOS application that is executed in DOS mode.

WIN.INI

General:

Like the file [SYSTEM.INI](#), WIN.INI performs the task to configure Windows itself as well as Windows applications. The file has to be located in the Windows directory.

You'll find further informations concerning WIN.INI in the file WININI.TXT, that comes with your MS-Windows disks. Dr.Hardware displays the contents of the file.

Under Windows 95 / 98 the concept of configuration files is still supported for the reason of downward-compatibility. The new concept provides storing of configuration informations in a database called registry.

SYSTEM.INI

General:

Wie die

Like [WIN.INI](#), the file SYSTEM.INI performs the task to configure Windows itself as well as Windows applications. The file has to be located in the Windows directory. Within SYSTEM.INI, the hardware is fine-tuned. You'll find further informations concerning SYSTEM.INI in the file SYSINI.TXT, that comes with your MS-Windows disks. Dr.Hardware displays the contents of the file.

Under Windows 95 / 98 the concept of configuration files is still supported for the reason of downward-compatibility. The new concept provides storing of configuration informations in a database called registry.

Open other files

The menu "SERVICES" offers options to display the configuration files AUTOEXEC.BAT, CONFIG.SYS, WIN.INI and SYSTEM.INI. To view or edit the contents of other files select this menu option.

Note:

If you like to embedd the content of certain files into reports please write down their paths into the configuration file DRHARD.INI, section [Other files].

Preferences

Allows to adjust program behaviour and on-screen outfit. Further options, that influence some of the steps of analysis, can be accessed via the button [Experts...](#)

All options (and several more) can also be adjusted by editing the file DRHARD.INI in the programs directory (you will need an ASCII-editor). Every time, Dr.Hardware is started, DRHARD.INI is evaluated and the program is configured according to the settings in this file. If DRHARD.INI can not be found or is damaged, a default configuration is used instead.

Buttons on the bottom of the dialogbox:

Okay: Applies changes but does not save them in the file DRHARD.INI.

Save in DRHARD.INI: Applies changes and saves them permanently in the file DRHARD.INI.

Menu: Discard changes and leave current settings unchanged.

Program Behaviour

Always display general messages and infos Suppresses the display of general information messages more than one times.

No message windows in reports Turns the display of message windows off during the creation of reports and allows their creation without the need of interaction with the user. Note, that some dialogs, that require user-input, must be turned off separately via [Expert setup](#).

Bold font Mark this checkbox to select a bold font in dialog boxes.

Diagrams Choose 2D or 3D diagram and alternative background color.

Syntax highlighting Mark this checkbox for better visualization of configuration files logical structure

Expert Setup

The purpose of the options in the block Special-Tuning is mainly to allow or improve problematical analysis. Via the option group Queries confirmation messages, that are displayed after the selection of several menu options, can be skipped by predefining the yes/no-answer before.

Special Settings

<i>Hardware analysis via DMI</i>	Via DMI analysis (DMI=Desktop Management Interface) several additional data can be achieved. Some BIOS types resp. Versions don't support the DMI functions and calling them may lead to illegal operations.
<i>Skip PCI bus testing</i>	Some memory managers like EMM386.EXE can cause the PCI test to crash the system.
<i>Disable IDE analysis</i>	the analysis of (E)IDE drives cannot be executed under Windows, if 32 bit drive access is enabled. It's not advisable to disable this mode for normal operation. Therefore the analysis of IDE drives will normally not be available and should be disabled.
<i>Forbidd TSC access</i>	The instruction to read the TSC can be privileged; an execution would cause a GPF. If set to N however, CPU clock determination will be less precisely.
<i>Always test harddisk</i>	It can make sense to analyse an AT-bus harddisk, that is unknown to the BIOS and that is not installed properly to get it's parameters or to include harddisks, that are controlled by specialised bios drivers.
<i>Disable graphics chipset</i>	Especially under MS WINDOWS the routine to detect the type of graphics chipset can cause the system to hang. Also wrong results can not be excluded.
<i>CD-Bench, Long Measuring Time</i>	If you prolong the duration of the CD-benchmark You'll get much exacter results.
<i>No Soundblaster-, Gravis-Ultra-sound-, Pro-Audio-</i>	The sound card tests belongs to the tests performed in a very hardware intensive manner. The system can crash easily. Often, the GUS test is a problem, because during the test the i/O-area is read and written between 313h and 367h. In this area, often network adapters, SCSI controllers and CD-drives do reside. Because of that, the GUS test is

Spectrum-Midiport-Test deactivated by default. If it doesn't help to exclude the GUS, try just another candidate. This often has helped!

Look for 8, 16 or 32 SCSI devices Wide SCSI adapters allow to connect up to 16 resp. 32 devices against the maximum of eight in former days. On elder adapters if the maximum is set to more than eight it might happen however that the devices of ID 0 to 7 are mirrored to the id's 8 to 15 so that non-existing phantom devices would be shown.

Critical steps of analysis

Before running certain analysis procedures you will be asked via message box whether you want to run an analysis that is known for it's somehow critical behaviour. If your decision is always the same you will get angry about those permanent inquiries. You can however suppress them by prefixing your answers here below. (Write Y(es) or (N)o instead of "?" which means that you will be asked each time)

Test for IBM-CPU's in V86 Mode Risk of system crash

Test for IIT4C87 in V86 Mode Risk of system crash

Test for software compressors (logical drive analysis) Risk of system crash

IRQ assignment - Generate real interrupts Risk of system crash

Test for software cache and try to switch off (HD Bench) A software cache may falsify the result for the data transfer rate.

Flush Cache before reset If you are going to quit the program via Reset option it might be that your software cache not have written back all data yet.

- Benchmark comparison, test your PC** Put the benchmark results of your PC to the comparison list shown on the screen? If so, Dr. Hardware will first run the benchmarks on your machine
- Test floppy drive inspite of BIOS error** Bios function claims that there is no floppy drive - but there is for example a setup entry. Continuing testing this floppy? It might be a phantom.
- Sound Test** If your Sound Card is activated under WINDOWS the direct access to it may cause a WINDOWS Error message or even system halt.
- Show report file?** After generating reports you can inspect the results via internal viewer.

Windows System Tools

Numerous fly-out menus allow to easily switch to the most important Windows system tools like SCANDISK, DEFRAG or REGEDIT.

Create reports

Reports can contain all or parts of the results of the PC-analysis. It can be printed or saved to a file. During creation of the reports you are prompted with dialog windows, except this has turned off in an option of PREFERENCES. A report never includes joystick coordinates and the temporary Global Heap allocated blocks.

Important:

- ! Principally the report will be written to a file and then loaded into the internal editor. The editor then allows you to print it out.
 - ! The font selected for report files has fixed pitch. So if you open it in your word processor please choose a non-proportional font.
 - ! To start Dr.Hardware and automatically call the report-generation without having to interact with menus you have to:
 - start the program with the command-line switch -R ("DRHARD -R").
 - save output destination and options here. Additionally, a filename can be specified following the -R switch.
 - to suppress every interaction with the user during report creation
 - a) switch on "No messages in reports"
 - b) specify the results of dialog windows in the file DRHARD.INI or in the "PREFERNCES"-dialog.
- The -R switch helps you to collect data of many PCs quickly and with a minimum of effort.

File name

Let's you specify the path and the name of the file, that will contain the results of the next report.

Header

Here you can precede your report with a title or a comment.

Areas:

Because Dr.Hardware can gain many informations about your PC, you can select here, which data should be incorporated in the report. The structure of the checkboxes exactly matches the structure of the program's menus. Each column represents a single popup menu; each checkbox represents a menu option. Selecting/ Deselecting the topmost checkbox, enables/ disables all the other options of the column For each of the options above the "secondary"-checkbox on the bottom determines, if more detailed information will be included in the report or not.

Example: if the secondary-switch of the section "Hardware" is off, PCI infos will be included in the report but not the detailed description of all the PCI devices.

Clicking with the mouse or pressing <Spacebar> switches an option on or off.

By default all checkboxes are enabled except those for the WIN.INI and SYSTEM.INI.

Press <Enter> or click on <Okay> to start the generation of the report. When Dr.Hardware has finished the creation, a message is displayed.

Press <ESC> to abort the creation of the report. There may be a delay between pressing the key and the termination of the report-creation. If the printer is connected to a parallel port, You will be prompted with a message window that allows to clear the printer's memory.

System Reset

Important:

Deletes all data from memory. Therefore, a messagebox allows you to save data from an eventually installed software cache before rebooting your PC (supports Smartdrive, Norton Cache, PC-TOOLS-Cache und Super PC-Kwik).

General:

Reset not only terminates Dr.Hardware, it restarts your PC the same way, as if you had pressed the reset-switch. Reset can be useful, if due to hardware analysis done by Dr.Hardware, a device driver does not work properly any longer.

Restart Windows

Restarting Windows is required in cases when changes within configuration files shall take effect. Note that many hardware reconfigurations require a hardware reset instead of a Windows restart.

Quit

This option finishes your work with Dr.Hardware.

Main menu Hardware

Access to all hardware-analysis options of the mainboard.

Mainboard

Important:

- ! The CPU clock determination requires that no additional virtual machines (i.e. open DOS applications) are running.
- ! The test for PCI bus can eventually lock your PC. It can be disabled in the dialog SERVICE/PREFERENCES.

General

The mainboard integrates the main computer components like main and coprocessor, RAM, mainbios, chipset and bus system. Therefore the mainboard analysis is the most important part of the Dr. Hardware test ensemble.

The main processor is the heart of the computer. It's one of the main purposes of the program to identify it as exact as possible.

Mainbios

General

BIOS is the abbreviation for Basic Input Output System. It contains a special software that allows your PC to start. The BIOS also intermediates between hard- and software when the PC is running.

The mainbios supports many but not all peripheral devices of the PC. Therefore, many adapters have their own bios, that replaces the appropriate original main bios routines (for example VGA- and SCSI-bios). The bios extensions are shown in a listbox.

PCI Bus

Note

The following PCI devices can be examined in detail by marking the device and subsequently activating [Device Details](#), or by double-clicking on the listbox entry.

General

The Intel PCI bus is a local bus like the VESA local bus. CPU and memory are nearly independent from the PCI bus and connected to it with a bridge. Because of that, the PCI bus is independent from the processor.

Further bridges allow the PCI bus to be connected with an ISA-, EISA- or MCA-bus (thus reducing the performance of the connected bus).

The following factors make the PCI bus (ca. 132 MB/s - PCI 2.0, ca. 264 MB/s - PCI 2.1) so much faster than the ISA-standard bus:

1. bus width of 32 or 64 bit (ISA 8/16 bit)
2. bus clock frequency up to 66 MHz (ISA 8 MHz)
3. burst-transfer modes (ISA does not have them)
4. buffering of data that are to be written (posting) and anticipating data-reading (prefetching) (ISA does not have any).

Infos about PCMCIA-Card-Services und Cards

Important

- !** An analysis only takes place, if the so called Card Services are installed. An analysis, based only on socket services or on the hardware, is not possible.

General

Until now there are only three versions of the PCMCIA standard: V. 1.0 was limited to memory extensions, V. 2.0 supported I/O-devices (modem, network adapters), V. 3.0 added drives, who need a bigger slot (today's notebooks therefore have two slots according V. 2.0, that can alternatively combined to one slot of type 3.0).

The PC bus and the slots are connected to each other by the PCMCIA controller. All devices use a memory window for their activities. The CARD Services are a software interface to access the slots.

Infos about Plug & Play Bios

General

Plug & Play means to put an extension card into the PC, which afterwards will configure itself. PCI- and PCMCIA-bus always support the plug & play specification. Because of that the analysis here does only test, if the mainboard has an ISA plug & play extension, that is supported by modern biosses. The bios can configure plug & play cards using special I/O-ports. Cards, that are not plug & play compatible, can handled via ICU-files (ISA configuration files) similar to EISA. Additionally, in the section "plug & play" the bios setup offers the possibility to select the IRQ manually for ISA cards. Besides the bios details there is a list that displays information about PnP-cards, if available.

Multi-I/O-Chip (Device Nodes)

General

One of the jobs of the plug and play bios is to detect and notice all the units on board. Every programmable multi-I/O-chip on board belongs to that. The informations are saved in nodes (structures). The user can configure the units using the extended bios setup, for example he may wish to turn on the ECP/EPP-mode of a parallel port.

Serial Ports

Important

The analysis of the serial port that hosts a mouse may fail. Dr.Hardware tries to find out, which serial port is used by the mouse. No information about UART and FIFO status are shown. A dynamic status information for this port does not take place.

General

Hardware interfaces are ports, that allow a connection to external devices.

The main characteristic of a serial port is the bit-by-bit data transfer between the PC and the device, connected via the serial port. The bit-by-bit data transfer causes the speed of the transfer to be very slow but very safe too.

Parallel Ports

General

The most important criterion of parallel ports is the blockwise transfer of data between the PC and the connected device. The size of the blocks is one byte. The default device connected to a parallel port is a printer, but it has become a universal port for scanners, cd rom drives and other device types.

Main menu Devices

From this menu you can access all options, that analyse peripheral devices connected to your PC.

Drive List

Important

- ! If drive A: is not physically installed the analysis may take a long time. If a harddisk that has been entered in the CMOS is missing a blue screen might occur.
- ! In order to detect ZIP drives please insert a medium. However detection routine might fail anyway..

General

Dr. Hardware displays all currently installed logical drives. The number of logical drives can be higher than the number of physical drives. Among others, the main reasons are

- a harddisk is divided into a few partitions.
- an online-compression software has divided a harddisk into several logical drives (host and compressed drive)
- if only one floppy drive is available, DOS creates a phantom drive. If your single floppy drive is A: and you try to change to B:, you are prompted by DOS to insert a new disk into the drive..
- logical drives, created with the DOS commands SUBST and JOIN.
- a RAM-disk is created in the conventional or in the extended memory. A RAM-disk emulates a drive with very fast data access but the data are non-permanent (lost, when power is switched off).
- network drives

Harddisks

General

This is one of several menu options offered by Dr.Hardware to analyse the connected harddisks. It shows the most important characteristics as well as the most important media identification topics.

All values are gained by asking DOS-/Bios-functions. Only for the number of cylinders the CMOS is questioned additionally, because the bios function has a limit of 1 024 cylinders.

Partition data of all harddisks (primary and other partitions) are listed in the dialog [Partition Tables](#)—Configuration menu.

The list of [logical drives](#) shows the harddisks subdivided into logical drives

If you want to benchmark your harddisks, select [harddisk benchmark](#).

Button Next HD" shows infos about another harddisk, if available.

Button [Extended Bios](#) shows extended configuration parameters, if INT-13 extensions are supported by the bios or a software driver. Examples are DMA- or PIO-mode. Informations are only available, if the INT-13 interface fullfills the Phoenix specification according to V.2.0 or later.

Tips

One of the major problems in setting up harddisks is the more or less restricted support of harddisks with high capacity.

504-MB limitation: The reason for this limitation is an antiquated BIOS, that doesn't support the LBA mode. Solution: special device drivers (look at vendors Internet homepage) or an external controller with its own BIOS. If you have a newer BIOS an incorrect mode setup (CHS instead of LBA) could be reason for this problem. Switch to LBA or AUTO mode.

2-GB limitation: The reason for this limitation might be an internal BIOS error (if it's a flash BIOS update it) or a partition management, that doesn't support partitions bigger than > 2 GB (this is the case under Dos, Windows 3.1, Windows 95 til step A). Solution: smaller partitions or operating system upgrading.

8-GB limitation: Bios versions, that don't support the INT13H extensions (s.a.), cannot manage harddisks > 8 GB. Update your BIOS if possible or install special device drivers.

Under Windows you can improve the performance of your harddisks by installing busmaster driver, that come with your mainboard (they should at least). Caution! Installing busmaster drivers often leads to serious problems. Never install them on a ready-installed system, but at Windows first-time setup.

Floppy Drives

Important:

- ! Dr.Hardware is able to display informations about the drive itself as well as about a floppy disk, if one is inserted. If you desire to get information about any floppy disk, please insert one and afterwards call this option.
- ! Click on Next Floppy at the bottom of the window to display information about other floppy drives in your PC.

CD ROM Drives

Important

- ! A CD-ROM driver not supplied originally by Microsoft can generate errors during the analysis, if not all functions of the original MSCDEX-CD driver are implemented.
- ! Windows 95/98 installs it's own ASPI driver for non-SCSI drives by default. If this is the case or if you do have SCSI drives, detailed information can be accessed by selecting the option [SCSI-Devices](#)

Tip

During the start of your PC a CD-ROM drive is regularly accessed. You can shorten the time your PC needs to start by opening the CD-ROM's door.

General

CDs (compact disk) do offer a very high storage capacity at a very low cost. They can be used to store sound, pictures and movies. Because of that, the CD-ROM is a real multimedia device. Older types of CD-ROM drives do have an AT-BUS connection (not IDE- compatible!), while modern CD-ROMs according to the ATAPI specification can be connected with a sound card or an IDE/EIDE harddisk controller. SCSI CD-ROMs are common too. If your PC has more than one CD-ROM installed, click on the button "Next CD ROM Drive" at the bottom of the window.

SCSI Devices

Important

Shows SCSI devices with a short description for each device. Position the cursor on the desired device ID and press [Device Details](#) to get more information about the device. The host adapter however cannot be analyzed this way.

Via [Expert setup](#) you can determine up to which bus id Dr. Hardware will scan the SCSI bus for devices. The maximum number is 8 by default and it can be increased to a maximum of 32. The host adapter will not be shown in the list if it's bus id is above the maximum scan id.

General

SCSI (Small Computer System Interface) is a very powerful standard for PC-interfaces. Among others, the main advantages are:

- high rates of data transfer up to a maximum of 80 MB/s
- each SCSI bus can host eight (in Wide-SCSI even up to 32) different devices (and via a bridge control seven additional devices per device ID)..
- A PC can have more than one SCSI bus too.
- a certain compatibility of different controllers caused by standards for the device interfaces (CAM, ASPI)

Each of the seven devices, that can be connected to a SCSI bus, is given an identification number. The host adapter gets the highest number (7) and therefore the highest priority. The host adapter connects the SCSI bus with the PC and is either incorporated into the mainboard or resides on an interface card. The devices are physically connected with the adapter by one cable containing 50 wires (the modern and more powerful Wide SCSI according to the SCSI-2 specification, that supports 16-/32-bit data transfer, requires 2 of such cables resp. one 68-wired P-cable, added by an identically Q-cable on 32-bit-SCSI). Each device has its own SCSI controller, that normally is mounted on the top of the device.

Many modern mainboards have a bios-built-in SCSI-support for special SCSI host adapters. Useless without this adapter it has however the advantage that the adapter doesn't need a bios by it's own and therefore can be produced in a cheaper way.

Tip

Problems with SCSI often result from an incorrect termination. Note that both physical ends of the SCSI bus must be terminated. In general one end is the host adapter and the other the last device connected to the cable.

ASPI and CAM

The purpose of the CAM (Common Access Method) interface, developed by Adaptec and designed by the ANSI-committee, is to allow a standardised access to hostadapters of different manufacturers by the operating system and application software. The common command set and the SCSI-2 standard are a protocol for the control of the SCSI Bus by the hostadapter. Dr.Hardware uses the ASPI interface to analyze any installed SCSI device. To do so, an ASPI manager must be installed. If you do have SCSI and get an error message concerning a missing driver, then please check your driver disk and install it.

Controller and vendor infos about (E)IDE Devices

Important

- ! If the 32-Bit harddisk access is activated the analysis will fail. Please start Windows 95/98 in safe mode to test your IDE drives. If you are running under Windows 3.1 start Windows as follows: WIN /d:f.
- ! You can disable the IDE analysis in the PREFERENCES dialog box. This is advisable if the 32-Bit-harddisk access has been activated permanently so that IDE devices are invisible for the analysis.
- ! A fly-out menu lets you select the device to analyse. "Master 1" means the first connected device (harddisk C: in most cases), "Master 2" and "Slave 2" are related to devices connected to the secondary port of an EIDE adapter.

General

The AT-Bus or IDE(Intelligent Drive Electronics) Interface is the successor of the ST412/506 standard used for the former MFM- and RLL- harddisks.

Most of the (E)IDE disks can be operated in the so called translation mode. Perhaps, you remember you had to low-level-format harddisks in former times. This is not longer necessary with IDE.

In the meanwhile the IDE interface has been replaced by the more sophisticated Enhanced-IDE interface. EIDE offers improved transfer modes, a much higher rate of data transfer and an additional port adress to operate up to four devices. A slightly modified ATAPI-interface was developed too, in order to allow the connection of CD-ROMs and tape drives. An IDE harddisk and a CD-ROM can be connected to one adapter, for example as master and slave. Older CD-ROM drives, that have a cable similar to the newer ones, are not compatible.

Video adapter

Important

- ! Additional informations can be accessed by pressing the buttons VESA MODES LIST and DEVICE CAPABILITIES.
- ! The DDC analysis may take a long time on non-ddc displays. On some systems the screen gets permantly blank

General

The graphics adapter connects monitor and mainbord. On most PC systems, it is realized as an extension card. The type of graphics adapter depends on the technology of the monitor. If an Hercules B&W monitor is to be replaced by a VGA color monitor, the graphic card has to be replaced too.

Todays mainly used graphical systems are VGA and AGP. The Advanced Graphics Port was introduced along with the Pentium-II. AGP compliant adapters consist of a PCI and an AGP part, they can be used in a PCI slot as well (but not vice versa). AGP has to be supported by the operating system in order to take effect. Office pcs do not profit from the AGP features.

Network

Important:

The displayed information is distributed on four windows. Additional infos about a MS-Windows network can be found in the window [Windows](#).

The main window shows the most important data of the adapter, the network software, user- and server names. Button [Software](#) displays a list of all currently installed software modules, that support the network (as far as known).

Please note that this network analysis will be done under a Windows point of view. Therefore, if you have installed a Multi net, some of the user or machine specific data will not necessarily show that what you expect to see.

Click the button [Netware Details](#) to query for Novell Netware server information and login- and server time. Click the button [List](#) to display a list of all installed network drives (remote drives) as well as network printers.

General

In the PC sector mainly LANs (Local Area Network) are of interest. But there are WANs (Wide Area Network, for example Datex-P) too. LANs base on different hardware architectures: the most common are Token Ring, Ethernet and Arcnet. On the software side there is a server (the central of the network) connected with workstations (clients). Often, the server is dedicated, that means it is only used for network management purposes. A special network operating system is used on the server. Peer-to-Peer-networks don't need a special operating system. In these, the role of server and clients can change. Network functions are accessed via a DOS (Redirector, Shell) and a special programming interface (Novell-IPX, NetBios from IBM). PCs that are connected to a network can be operated by DOS as if they are stand-alone. Very often, the installed network software use over 100 KB of RAM.

The main purposes of a network are:

- resource-sharing (drives, printers)
- file-sharing (access to a file from different workstations)
- record-locking (lock parts of a file during access to avoid conflicts with other users)

Net Software

Dr.Hardware performs a search for some important drivers and modules that are used by the network.

Novell Netware

Important

It is necessary that a Netware Shell has been installed. If however Netware operating system hasn't been installed the data shown (if there are any at all) are of no use.

Network Drives and Printers

General

Only shared drives and printers are incorporated into the list.

Modem & Faxmodem

Important

- ! Dr. Hardware looks for a modem or faxmodem at all available serial ports. If you have second modem or faxmodem device, you can let Dr.Hardware analyse it by clicking on "Next Modem".
- ! Further configuration details can be located by selecting [Inquiries](#).
- ! The modem has to be compatible with the Hayes-instruction set (nearly all modems fulfill this standard). The faxmodem additionally has to be compatible with the "AT+F"-instruction set (TR29.2/AT norm)..
- ! If your modem is an external modem it has to be switched on..
- ! Analysis use 1 200 baud..
- ! Analysis can last up to half a minute!
- ! Because many extended AT-commands are model-specific, some parts of the analysis may fail.
- ! Under Windows 95 a modem may not be recognized properly if it is not installed into the system..

General

Dr.Hardware tests, if the modem reacts at all. This is done by sending some common configuration commands to the modem. The Modem can answer either OK or ERROR. If OK is the answer one can assume, that the modem works properly. Otherwise there is some trouble. The test does no check, if the connection with the rest of the world really works. The modem may even send OK, if there is an interface conflict or if the modem's COM port is attached to the same IRQ as the mouse.

Mouse and Keyboard

About Keyboards

The keyboard is an input device and necessary to use a PC. Without a keyboard properly connected, the PC fails to boot. Each key stroke generates a hardware interrupt (interrupt of the current process). The interrupt then directly calls the subroutine, that will handle key strokes.

About mouse

Dr. Hardware differentiates between serial mouse, bus mouse, HP mouse, PS/2 mouse and INPORT mouse and displays the number of buttons. Very often, a 3-button-mouse is shown as a 2-button-mouse, because it is configured as Microsoft-compatible (MS mouse drivers only support 2 buttons). Trackballs in notebooks often cannot be recognized properly.

Sound board, MCI devices

Important:

- ! A simple sound check will be performed as soon as you start this analysis. If your speaker are switched on (and your sound board works properly) you will hear one of the well-known Windows system sounds (XYLOPHON.WAV), played via MCI interface functions.
- ! The sound card tests are very near to the hardware and therefore can be deactivated via the option "PREFERENCES" of the QuickMenu. Especially the GUS-test is critical, because it may affect network adapters, SCSI controllers and other devices. The GUS-Test is inactive by default.

The following ports are read and written during the test:

Soundblaster: ports 210h, 220h, 230h, 240h, 250h, 260h

Gravis Ultra Sound : ports 313h-317h, 323h-327h, 333h-337h, 343h-347h, 353h-357h, 363h-367h

Pro Audio Spectrum : (if found via BIOS function) Ports 388h, 384h, 38Ch, 288h

MIDI-Port: port 330h-331h, or the port, found via P-Code in the blaster variable.

General

The following sound cards are identified: adlib and soundblaster compatible cards, the Gravis Ultra sound card (GUS), the Pro Audio Spectrum and the Roland-MPU-401-midi synthesizer. Often, one card combines more than one standard. For example, a card can be compatible with Soundblaster as well as Pro Audio Spectrum. Cards, that are compatible with soundblaster, in most cases are adlib-compatible too. That's because for all standards of sound cards, installation-check routines are executed. It is displayed for each standard if it is installed or not. If two or more types should be identified, Dr.Hardware doesn't try to find out if they are combined on one card or if there are several cards in the PC. If possible, additional information about the current configuration are displayed.

MCI-Interface

Windows integrates a high-level multimedia programming interface for easy access of devices like Wave Player, CD Player oder MIDI Sequencer. All currently installed MCI devices are listed. In contrary to the MCI interface the DirectX interface is a low-level interface with enhanced direct access of the underlying hardware.

Joystick

Important

- ! Occasionally it can happen, that another device, that uses the ports reserved for the joystick, simulates the existence of a joystick (for example scanners). This can lead to a system hang as well.
- ! Even if only one joystick is connected, the coordinates of both possible joysticks are shown due to the character of the analysis function. The coordinates of a joystick, that does not exist, should be 0:0..

General

A joystick, mainly used for interaction in PC-games, allows only very few information to be queried. Dr.Hardware offers you a routine to check, if your joystick works properly. If you move the fire stick, you should be able to see the changes of the coordinates on screen. Even pressing and releasing the joystick's button is documented synchronously.

Printer

Important

Get detailed information about the capabilities of the standard printers device driver by pressing the button [Device capabilities](#).

General

This analysis lists all currently installed printer devices which can include fax printers and scanners too. The devices will not be physically tested.

Main menu Configuration

In order to work properly, the PC system needs a set of data, that have to be defined. These data, that have to be manipulated by the system, too, are situated on different places. These lists allow the system to know exactly, which hardware and which software are available and how they are configured.

Interrupt Vectors

General

Interrupts are generated either by hardware events (key press, action of a hard disk) or by software-controlled calls. Thus, the 256 interrupts are divided into hardware and software interrupts. In both cases the same flow of actions is started: If an event generates an interrupt, the corresponding address is read out from the interrupt vector table. The address points to a function, that handles the interrupt. This function address is a far address, i.e. it has a valid segment and a valid offset address. The function, connected with an interrupt, is called interrupt handler. After the interrupt handler is terminated, program execution continues at the next step within the routine, that was executed, before the interrupt occurred.

The concept of interrupts guarantees high device-independency and compatibility. Depending on the system, the interrupt handlers, that are competent for a job, can work internally very differently. Their addresses may differ, too. But they do have the same number and they are always called by this number. The programmer, in consequence, does not have to worry about the interrupt handler's internals.

IRQ assignment

General

As explained in the [Interrupt vectors](#) topic of the help, the interrupts can be divided into hardware and software interrupts. Hardware interrupts are messages of a device (for example of the serial port) with the aim to affect the currently running program (a serial port received data, for example, and wants to transfer them). This concept of only interrupting the program flow, if an event has happened, is much better than the alternative, to always look for events (so called polling). Polling is a process, that wastes time and power of a PC. It makes more sense, when the device notices the CPU only if necessary.

The assignment of IRQs to devices is of practical interest for users. They have to be careful to avoid conflicts there, if one IRQ is assigned to two devices. In a normal ISA- or VLB-PC there is neither an interrupt sharing nor a self configuration of expansion cards (except plug and play compatible biosses and cards). That's because jumpers have to be set in a correct manner on many interface cards. In real life, most interrupt conflicts are caused by serial, sound and network cards.

DMA assignment

Important

In order to perform an optimal analysis, you should have used all DMA-controlled devices once, before Dr.Hardware is started (scanners for example). Only for floppy drives, SCSI controllers with an ASPI-/CAM-interface, harddisk controllers, CD-ROM and the network, Dr.Hardware itself tries to initiate a DMA memory transfer.

General

Using the DMA-controller (two controllers in 286-PCs or higher), data can be transferred between a peripheral device and the memory without the help of the CPU. This reduces the work of the CPU. PCs are supplied with four DMA-channels, systems with a 286-CPU or higher are supplied with eight channels. Three of them are suited for 16-bit-I/O cards, the rest for 8-bit cards. Channel no 4 is reserved for the connection of the slave controller with the master. always reserved is channel 0 (memory refresh). Devices, that can use DMA, are for example: floppy drives (DMA 2), scanners, harddisks, sound cards, CD drives or network cards. A DMA-based data transfer with a floppy drive can be realized only, if a formatted disk is inserted into the drive. The assignment of DMA channel 3 by the harddisk controller is queried by a BIOS function. Active soundblaster DMAs are detected with indirect methods.

BIOS data segment

General

Beginning with the segment/offset address 0040:0000 the RAM contains some data of the size of about 256 bytes. These are hardware-specific data, required by DOS and the BIOS. The contents of these data depend on the installed hardware. For example, offset 0 contains the number of serial ports or the type of the video adapter. They are generated by the system at startup and are updated permanently. Not all data are standardized in a unique manner. At the end of the area, they depend only on the manufacturer. Also, some of the data are only valid for 286-based PCs or better, some only are valid within PS/2-systems and some special PCs (example: Commodore) do have a supplemental BIOS data segment. Parts of the additional data are shown directly underneath the primary bios data segment. The mask details these data, that contain bit structures.

CMOS Setup

Important

The values for the century and the checksum are saved in different, manufacturer-specific formats. These are only evaluated for PS/2-PCs. So it can easily happen, that a year 1094 is displayed, because the usual, but in this case wrong register is evaluated.

General

In the CMOS (Complementary Metal Oxid Semiconductor), a permanent memory chip with a very low power consumption, important configuration data are stored. They are conserved by a battery and can be changed always. They describe the installed memory, harddisks, floppy drives and the type of video adapter. The CMOS-RAM-chip is completed with a real-time clock, that permanently updates it's time.

While some of the data are recognized automatically by the system (RAM, existence of a numeric coprocessor), others have to be entered manually by the user via the setup (mainly data of harddisks).

Advanced CMOS Setup

General

In addition to the standard setup, many boards offer an Advanced Setup to make further configurations. Older versions (before July 1991?) differ from the actual ones. That's because the information displayed here may be invalid in case of your PC. Dr.Hardware tries to identify an older bios. If this is the case, a display of information will not be possible. Some data are not shown for AMI WIN and Award Bioses, because the registers are unknown to the author.

Mainboard Chipset

Important

- ! This option is reserved for registered users.
- ! Some of the chipsets can be identified but their registers are unknown so they cannot be analyzed.

General

Today few highly integrated chips do the job, performed in by some dozens of chips in former times. The main components nowadays chipsets consists of are CPU to PCI bridge that controls the memory, L2 cache and data bus and on the other side the PCI to ISA bridge and the IDE controller. Some newer chipsets integrate all functions within one single chip, sometimes including a VGA controller. The chipset defines what type and size of memory modules are supported, defines the maximum L2 cache size, the amount of cacheable memory, the external clock rates and the IDE PIO modes supported.

Dr. Hardware tries to show the settings of these main system parameters.

Chipsets are programmable. So the user can influence the behaviour of his PC. Within limits, he can improve the performance and the cooperation of the PC's components.

The unit consisting of the programmable parts mentioned above is called chipset.

Chipset Registers

Information

If the chipset could be identified, all its registers are shown with their corresponding values. If it's a PCI chipset the complete PCI configuration space will be listed.

Partition tables

General

During the boot process, the BIOS first reads the partition sector of the harddisk (this is the first sector of the harddisk). In this sector, the BIOS will normally find the string "55AA", that signals that the partition is bootable.

The partition sector contains the description of the logical structure of the harddisk, that can be divided into a number of partitions (logical drives). Up to DOS version 3.3 it was necessary to partition harddisk with a size > 32MB, because larger partitions could not be managed by DOS. A partition is mainly characterized by the values of head, cylinder and sector it starts and ends. The start sector is the distance from the partition or boot sector, where the operating system resides.

Tip

Please note that if you are going to install a new harddisk in your system that already consists of one or more harddisks the sequence of logical drives will get confused as far as the old drive was partitioned into more than one logical drives. The reason for that is that the operating system gives priority to the primary partitions of all harddrives. This can lead to invalid paths.

Main menu Operating system

In this menu you will find information about the operating system (DOS and WINDOWS), about the various aspects of memory management (DOS: Base Memory, UMB, XMS, EMS, VCPI, DPMI, Windows: Heaps, loaded modules, tasks, processes and threads), about installed device drivers and terminate-and-stay-resident programs (TSR), about the DOS environment (that affects behaviour of software applications) and about cache-software as for example the MS-DOS-addon SMARTDRIVE.

DOS

General

This information window shows informations about the version of the operating system you have installed. The environment settings are displayed as well.

WINDOWS

General

MS WINDOWS originally was a graphic user interface for DOS. Its advantage was, that software developed for Windows, were not limited to a memory size of 640 KB. Version 1.00 could be operated from floppy disks.

Meanwhile, Windows is a graphical operating system (Windows 95).

WIN95 Boot-Setup

Only for Windows 95 informations about the boot-setup are given. They describe the way, the PC should start.

Windows Version specific Details

Important

This analysis requires Windows 95 or above.

General

This analysis precisely identifies your Windows version (including step, serial number and user identification) and shows the internal updates executed on your system. that were.

DOS Memory Overview

Important

In many cases Dr. Hardware fails to detect memory above 64 MB, because the corresponding analyse function returns a maximum of 65535 KB (= 64 MB). Sometimes it's although possible to detect the additional memory.

General

In the view of the DOS operating system, the PC memory consists of a base memory (0 to 640 KB) and an additional memory, that can contain many megabytes and that follows the base memory.

Extended Memory

Important

Under Novell DOS as well as Windows 95 it is possible, that the detection of the largest free XMS-block fails. This phenomenon is common to Sysinfo software in general and is not a bug.

General

286-PCs or better can be supplied with more than 1 MB of RAM. This additional memory is accessible unter DOS, as long as special drivers enable DOS to use it. In the real mode, a modern 486-PC acts like an old XT, that - due to only 20 adress lines it has - is limited to a maximum of 1 MB of memory. Memory above 1 MB is usable, when it is accessed as Extended Memory or as Expanded Memory by a special software driver.

XMS Handles

Important

The analysis can last - under certain circumstances - up to 1 minute.

General

The Extended memory is allocated blockwise (Extended Memory Blocks - EMBs). Each block is identified by a number (handle). If parts of the memory have to be copied between base and XMS memory, the handle numbers are required.

Expanded Memory

General

Beside the concept of Extended Memory the concept of Expanded Memory too allows to use PC memory above 1 MB. Introduced in 1985 by Lotus, Intel and Microsoft as the so called LIM-specification. Originally, the Expanded Memory was exclusively realized in form of special EMS-RAM cards.

The access to expanded memory, that is located outside the normal address space of 1 MB, works as follows: Within memory below 1 MB a "window" of 64 KB is created (page frame). This window is separated into four pages, each 16 kB. Through programming the address lines of the EMS card, parts of the expanded memory are overlayed into the window. This allows the CPU to address EMS as if it were located below 1 MB.

EMS Handles

General

The Expanded memory is allocated in blocks of pages. Each page is identified by a unique number, called "handle". The handle is used to access the page, for example to copy data between base RAM and EMS.

DPMI

General

The DPMI-standard in the history of the PC's evolution is the second attempt to try to solve problems resulting from simultaneous access to the protected mode by two or more software applications (concerning protected mode see [Extended Memory](#), concerning the VCPI see [Expanded Memory](#)).

The DPMI was originally developed by Microsoft for MS Windows. One of its most important tasks is the management of so called virtual machines, that are used by MS Windows or OS/2 within "DOS boxes". DOS boxes emulate an completely independent PC-system with 1 MB RAM plus HMA In each DOS box, a different DOS application can be run.

Under Windows in Enhanced Mode the main purpose of DPMI is to allow switching between Protected and Real Mode..

MCB chain

General

DOS structures the PC's conventional memory using so called MCBs (Memory control blocks), a chained list of entries that point to all actually allocated areas of the memory.

There are different types of memory areas. A software application is divided into code segments, data segments, a small structure called PSP (Program Segment Prefix) and the environment. The PSP precedes the code segment and always does consist of 256 bytes. It contains memory addresses important for the program, for example the addresses of the stack, of the environment, of the command interpreter and some interrupt managers of DOS. For further information of the environment see [DOS](#).

For each one of these parts DOS generates a separate MCB. Because the MCB contains information of the memory attached to it, the MCB-structure is ideally suited to analyse the segmentation of the base memory.

Especially, it offers the best overview about installed resident programs and drivers, because, under DOS, a non-resident application is removed from memory, before the next is loaded.

With more recent DOS versions, the first MCB is divided into subsegments. Those can be used to get more information about internal DOS-structures and -lists.

With DOS 5.0, MCBs are created in the upper memory area too (starting address A000:0000), if a memory manager is installed. These optionally can be connected with the base MCB chain.

Using a DOS function, memory requests can be redirected to the high memory (see [DOS-Memory](#)).

Dr.Hardware displays these MCBs too, followed by their type.

Win-16 Memory: Details

Important

- ! The memory model the following description is based on is restricted to Windows 3.1x. Under Windows 95 / 98 memory is organized in another way (the flat model); for 16 bit applications the old memory model remains valid.
- ! [User Heap](#), [GDI Heap](#) and [Globaler Heap](#) can be analyzed in detail

General

Memory under Windows is characterized by the fact that the amount of available memory is not necessarily equal to the amount of physically available memory. So called virtual memory allows to allocate additional memory from free harddisk space.

Heaps

User and GDI heap are reserved modules, that contain window and GDI objects created by applications. The local heaps of these modules are available for applications but there is only one 64K segment for all of them.

Available memory and the heap usage are shown graphically too.

Tasks

Important

Get additional information by pressing the buttons: [Modules](#) und [Classes](#).

General

Under Windows an active application is called task or process. Executable files (EXE, DLL) are called modules. Under Windows processor time is given to tasks, not to loaded modules. When tasks and modules are loaded pointers to data structures are returned that contain informations about an instance of an application or the segments of a module.

Win-32 memory: Processes, Threads

Important

This analysis requires Windows 95 or higher.

General

Each application under Windows 95/98 creates a process when it is started. Each process owns its own virtual address space of 2 GB, that is strictly reserved for this application. As a result of that applications can't influence each other. A process consists of modules, i.e. executable files (EXE file, one or more DLL's.) It can create several threads i.e. independent subfunctional units for special purposes.

Win-32 Memory: Details

Important

This analysis requires Windows 95 or higher.

General

The memory management introduced with Windows 95 (and NT) is fundamentally different from the memory model used under Windows 3.1. The segmented memory is replaced by the so called flat memory model that for example allows easier and more efficient allocation and access of data arrays.

The total address space is 4 GB; 4 MB are reserved for DOS and Windows-16 applications. Each 32-bit application gets its own exclusive 2GB virtual address space. This amount of memory is of course only available as virtual memory. Therefore task switching mostly comes along with memory mirroring onto free harddisk space.

Above this so called private area another 1-GB area is located that is used by processes and by important system components (User, GDI, Kernel). Above this area virtual device driver and other ring-0 components are suited.

Multiplex TSR

General

TSR-(Terminate and stay resident)programs stay in memory, even if they are finished. They also can work in background, while other software is active.

The list displayed here only contains TSR programs, that are embedded by the MULTIPLEXOR Interrupt 2Fh, which allows the control of several simultaneously running programs. Mainly DOS commands and drivers, such as PRINT, APPEND, HIMEM or KEYB are installed via 2Fh.

Communication Software

General

Dr. Hardware checks for the existence of many drivers, that allow a connection with "the rest of the world" (PCs and other devices), including WINSOCKET driver, Fossil-driver and ISDN-CAPI. Network software is not analysed here but in [Net-Software](#).

WinSock (TCP/IP)

The WinSock interface is based on the TCP/IP layer suite (TCP transport layer, IP Network layer, Link layer), that realize the different Internet application layers (FTP, Telnet, World Wide Web). It unifies and simplifies the accessing of the underlying often vendor specific TCP/IP layers.

Fossil Driver

Fossil Driver: Stands for "Fido/Opus/Seadog Standard Interface Layer". Enhances the bios interrupt 14h for the serial port. For example, the driver allows the selection of baud rates higher than 9600. For ISDN, there is a fossil driver too, that's purpose is to translate AT commands in CAPI commands for the use in mailboxes. Displays specification level (for example 5) and driver revision number. If possible, the driver name is displayed.

ISDN (Integrated Services Digital Network)

ISDN devices are controlled using a standardized software interface, the Common ISDN API (CAPI).

Cache Software

Important

- ! Windows for Workgroups and Windows 95 in Protected Mode support a more efficient software cache technique realized by a virtual device driver called VCACHE. See [System-Monitor](#)(Menu Benchmark)
- ! The Smartdrive analysis can also check some other software caches. In this case, the results are unreliable.

General

Smartdrive is the most widespread harddisk-cache software. It is delivered with some operating systems. It's job is to temporarily save data from harddisk in the RAM to increase the access speed. Accessing data in the PC memory is much faster than reading them from a harddisk.

DOS Device Drivers

General

Device drivers relieve the operating system from the task of interaction with hardware devices. They offer a standardized interface for the operating system to easily access these devices. For example: between DOS and the device, a mouse, a device driver intermediates. It receives its commands by DOS in a very general form. The commands are generalized, so that they are equal for all devices in principle: open, close, read, write etc. The driver then translates the general command, received from DOS, into the special commands, required by the device. If there were no drivers, DOS would have to know the internal details of all existing hardware! DOS would have to be updated every day! Beside those drivers, supplied with DOS (output to printer/screen/file, clock, keyboard input) arbitrary drivers can be added via the file CONFIG.SYS. To do so, the name of the driver is written after the command "device=". Such drivers do exist for all types of devices - for a mouse, for harddisks and for graphics adapters.

Drivers are not executable programs as indicated by their extension ".sys".

Drivers can be classified into character and block device drivers. Character device drivers access the device byte by byte, the latter perform a blockwise access (mainly 512 byte-blocks). Block device drivers can handle more than one device. They are used mainly for harddisks.

Each driver consists of a header, containing important self-describing information and a set of strategy- and interrupt-routines, responsible for the communication with DOS. If DOS needs the services of a driver, it calls its strategy routine and passes the desired function number to it. The function then is executed by the interrupt-routine. The driver functions do have such to initialize, to read and write, to support opening and closing files, to start and finish work with a printer for example (sending initialization strings) or to transfer data continuously to a device.

When the system starts, DOS creates a list of all installed device drivers; this list is displayed by Dr.Hardware.

Main menu Benchmark

This menu offers options that allow you to measure the power and the speed of the most decisive components of your computer - the performance of system, graphic, harddisks and network drives. Another option provides a comparison of the results with results of other PCs.

System Benchmarks

Important

- ! Press button *Measure again* to repeat the benchmarks without closing the window.
- ! On Cyrix processors with NOLOCK-Pin not set a second column of results will demonstrate what's the performance when the NOLOCK-Pin is set.

The index values WinHardstones and WinSoftstones, discussed below, are displayed graphically. The values of your PC are compared with values of some standard systems.

WinHardstones

This result is based on the traditional UNIX Dhrystones. It shows the overall performance of the system.

When measuring a Pentium Pro or Pentium-II you probably will be disappointed because of the weak results coming out here. This is a normal behaviour. Intel itself had announced that the Pentium Pro only works with full power under 32-bit-code. The benchmark tests that together form the WinHardstones suite are 16-bit only. The out-of-order-execution for example is heavily affected by the permanent loading of segment registers in 16-bit-code.

Run Dr. Hardwares DirectX benchmark if possible. Being a native 32-bit application the results for the system memory transfer and fill rate are more authentic for 32-bit optimized processors.

WinSoftstones

Benchmark for the floating point unit, derived from the Whetstones benchmark of Curnow/Wichman (1976). Classifies the power of the coprocessor or, if not installed, a coprocessor emulation software. The set of benchmarks includes multiplication, division, radix evolution, exponentiation and trigonometric functions.

Video Benchmarks

Important

! Press button *Measure again* to repeat the benchmarks without closing the window.

General

The performance of graphical operating systems like WINDOWS or OS/2 strongly depends on the power of the graphics adapter. The most important factors are: type of adapter, bus width (8, 16, 32 bit), for VGA adapters the technology of the chipset, the size of the video memory (for high resolutions and many colors). So called GUI Accelerators and graphics adapters with an own processor on board (TIGA standard) do show, how important the graphic speed is for todays computers.

Dr. Hardware tests the speed of the video adapter under real life conditions by executing the most important GDI functions. The GDI (Graphical Device Interface) is the Windows system library that contains all functions and components of the graphical interface.

Harddisk Benchmarks

Important

- ! To enable a test to be as objective as possible, you should switch off harddrive cache software before (in the case of Smartdrive Dr.Hardware does this for you). Cache software can influence the data throughput values extremely, because it causes memory performance to be evaluated instead of harddisk performance. If Dr.Hardware has detected a cache program, it will display a message in the result window..
- ! The test for cache software is performed only, if the corresponding request has been acknowledged. The test can cause the system to hang. Also, you may be interested in how the result is influenced by the cache.
- ! Special harddisk drivers, as used with SCSI- or EIDE harddisks, can have influence on the bios functions used during the test. It even can happen, that these bios functions do not work properly, leading the times for moving the harddisks' heads to be wrong. If this is the case, a questionmark is displayed instead of the result. Harddisk drivers should be deactivated for the benchmark, but even this does not help in all cases.
- ! Select the harddisk to benchmark via the fly-out menu. It contains options for four harddisks. If you have installed more than these ones, or if you want to test all, select the option "All".
- ! Press button *Measure again* to repeat the benchmarks without closing the window.

General

Dr.Hardware tests the performance of each of the harddisks installed in the PC. This is done mainly by measuring the times of head positioning and reading data. As far as possible, a harddisk is tested, even if errors (bad sectors) occur during the test. If necessary, you will be noticed of the errors, because they influence the results.

CD ROM Benchmark

Important

- ! The performance of a CD drive can only be measured, if a CD is inserted into the drive. The CD must be a data CD, not an audio CD. The CD also should contain a capacity of about 600 MB or more. Otherwise, the moving radius could be restricted. This would lead to too low values.
- ! Before the benchmark starts, there is a test performed for a software cache. If a cache is installed, the results may be too high. If possible, the cache is temporarily disabled by Dr.Hardware. In any case, you'll receive the appropriate message in the results window.
- ! Press button *Measure again* to repeat the benchmarks without closing the window.
- ! In Dr.Hardware's setup, suboption "Expert Setup", the measure time for 1/3 and average strokes can be extended. This would probably optimize the results.
- ! A sector size of 2 048 KB is supposed. A different size can falsify the results extremely or even can crash the system.
- ! Depending on the CD in the drive, the value differs slightly.
- ! An installed CD Software cache can lead to results that are too high, especially, when the test is executed several times.

The transfer rate gained from the benchmark allows to estimate the type of the CD-ROM. The usual types and their transfer rates:

1 x: 150 KB/s, 2 x: 300 KB/s, 3 x: 450 KB/s, 4 x: 600 KB/s, 8 x: 1200 KB/s.

The displayed results can be a little bit below. On newer (i.e. faster) devices the performance is different for different zones of the medium, so results will be gained that are below that what would be expected

System Monitor

Important

- ! The system monitor requires Windows 95 or above.
- ! The results in the listbox will be updated permanently as far as the focus is set to the listbox (click once in the list).

General

The system monitor allows to look insight of Windows machine room.

Windows 95 / 98 contains a virtual device driver that theoretically allows each other device driver to register and dynamically update statistical data at runtime. By default the VxDs VSERVER (MSNServer), VFAT (File system), VMM (Virtual Memory Manager), VREDIR (SMBRedir) and NWLINK let register their performance data; also some data of the kernel are registered. The data can be interpreted precisely because the device drivers add short descriptions of their data to the registry.

With the help of these statistics one can analyze the current state of file system, memory and cache management and network transfers. If other processes are active in the background, if data are going to be copied or files are going to be compiled the data change continuously.

SCSI/ASPI Benchmark

Important:

- ! The test will only be performed when a WINASPI driver is installed.
- ! Please insert media in CD ROM and tape drives!
- ! Note that cache software influences the results of this test when called a second time or more often.

General

The SCSI performance test allows performance testing of all ASPI driven devices installed in the system supporting all drive types (fixed disk, CD ROM, tape drives).

The test method is different from other performance tests offered by the program: while for example the hard disk benchmark is going to be realized via Bios specific commands and the CD ROM test via driver specific commands, the SCSI benchmark test consists of ASPI (i.e.SCSI) specific commands. This test only measures the data transfer rate by linear block reading operations. Although the device might have an integrated cache which will not be disabled during the test, it's influence will be reduced as far as possible by avoiding to test certain media zones more than once.

Network Benchmarks

Important!

In the worst case, the whole network can be blocked or crashed as a consequence of the operations, performed during the measure. Therefore, the network should be in a safe status, no files should be open.

General

This routine benchmarks the read/write-performance of network drives, i.e. drives of other PCs, accessed via the network. To perform the measure, it is important, that you have the right to access the drive for reading and writing data. A minimum of 11 KB free disk space is recommended to create a temporary file, too. A file with the name "DRHNET.\$\$\$" may not exist. In addition to the network drives the local harddisks are measured too. This allows a better comparison of the results. Also, the measures taken here base on other operations than the measure performed in [Harddisk Benchmarks](#) (There, the devices were accessed directly using bios functions, here a file is created, written and read out).

The results can be interpreted best, when they are performed on all connected computers. This allows to see the loss of performance of a harddisk due to the network's overhead.

The benchmark uses a function of a very high level programming language, which transfers data from a buffer into a file via DOS function 40h. It is possible, that benchmarks of other software, using different functions, do show higher results.

Comparison of Benchmark results

Important

- ! This option is only available in the registered version.
- ! Click the button [Graphical](#) to view the values in graphical manner. The file BENCHVGL.DAT, that contains values of other PCs, can be edited. you can add your own entries, as far as this is done in ASCII-clear text. The first line is reserved for internal purposes of Dr.Hardware. Do not change or remove this line!
- ! Don't compare the results with results received by the DOS version.

General or: Why are comparative values necessary?

Benchmarks are not absolute values but allow a comparison of your system with other PCs. Benchmarks do consist of many sub-benchmarks of the devices built into the PC. For example: The speed of a graphics adapter depends on the performance of the system too. The same can be said about harddisks. The speed of the system itself depends on a bunch of factors. If the BIOS shadowing is switched off, the results differ strongly; if you have an old 486 without external cache and with slow memory chips, you would find some fast 386-PCs faster. Always remind the benchmark to be a result of the combination of the performance of all components your PC contains. The benchmarks of the comparison list may help you to relate the speed of your system to the speed of others.

You should further note, that the values for harddisk access are gained using real reading of data and not via positioning the head. This does not work any more with the latest SCSI- and IDE-harddisks.

Main menu Help

With this menu you can access the help system of Dr.Hardware and related topics. Help on help explains, how to use the help system; a table of contents and an index containing the important key words are offered too. Furthermore, the Aboutbox contains informations and copyright notices.

About...

Contains the version number of Dr.Hardware and the usual copyright notices.

VESA Mode List

General

The VESA interface is a BIOS extension of the video interrupt 10h. It can be used to access the non-standardized VGA modes. Dr.Hardware describes the VESA modes, supported by our SVGA graphics adapter.

CMOS Registers

General

This information window displays the CMOS register values as they are. The window [CMOS-Setup](#) displays the configuration of your PC in clear text.

The detailed presentation of all the CMOS' registers may be eventually important, because only the highest registers do have a standardized meaning. The others are used in a manner differing from PC to PC. They are not evaluated in the CMOS-Setup window (see also the option [Advanced-Setup](#)).

Quick Pick

Purpose

This selection list completes the pulldown menu system of Dr.Hardware. It is suited mainly for users, that are not yet familiar with the structure of the menus. Supposed, you would want to know, which version of MSCDEX is installed on your PC. The advanced user would select menu Hardware, option CD-ROM. But if you do not know, in which menu to find which option, the analysis-picklist offers you it's services. Here you can select among far more than 100 keywords the desired program action. To complete the example from above: you would scroll through the list, until you'd have found "MSCDEX". Then you would press Enter or double-click with the mouse on MSCDEX to start the CD-ROM analysis. The resulting analysis window would show you the MSCDEX version among other information.

Tips:

Mouse:

It is very comfortable to scroll through the list using the mouse.

Keyboard:

Simply enter the keyword you are searching for. The appropriate entry is highlighted.

Advanced Power Management

General

The power management controls the power-saving mechanism in the PC, if there is any. It is mainly used in notebooks to prolong the time, they can be used without connection to the grid. Electrical power is saved mainly by switching off harddisks and monitor.

CD Disc Info

Important

At this time, informations are only displayed for iso-9960 compatible CDs. Therefore, CDs according to the elder HSG-file format cannot be analyzed.

Audio CDs cannot be analyzed, too.

On most CDs, some informational entries are empty. In addition, sometimes the assignment of the entries to the normal fieldnames is handled very flexible.

General

The CD infos in this analysis window are restricted to general information concerning product, copyright and capacity. A description of the directory tree is not made.

Select chipset

Important

An incorrect selection can cause the system to crash during analysis. If a chipset is selected, that is similar but not equal to the chipset on board, the results of the analysis can be partly right or partly wrong.

General

Dr.Hardware is not able to analyse every chipset in the world, because each chipset makes different usage of the registers. For each of the uncounted chipsets a bunch of data would be required. Therefore, the analysis is limited to some of the most widespread chipsets. Sometimes, the analysis fails, because the type of chipset cannot be identified via an identification string in memory. For such cases, the chipset selection is incorporated in the program. If you do know the type of your PC's chipset, you can enforce it's analysis. Eventually, the ID helps, that can be found in memory and that is displayed under [Mainboard](#). Otherwise, please consult your PC manual, ask the dealer, where you have bought the PC or look on the mainboard of your computer.

Soundblaster Details

Important

Immediately after the analysis window opens, a short sample sound (from the file DRHARD.WAV, 8 bit mono, direct mode) is played by the simple wave player, embedded into Dr.Hardware. If you can hear the sound, the sound card does work in principle.

The amount of further informations depends on the version of the card. Elder versions do not have mixer infos, because these cards don't have a mixer.

Mixer

The mixer is used to regulate the loudness for the different sources of recording (master, micro, CD, FM, MIDI, for SB 16 PC-speaker, too) and the setting of filters. Another name for mixer is equalizer.

Driver

All Soundblaster cards were and are delivered with some drivers, for example drivers to play samples, output language, FM-synthesis etc. Programmers can control the Soundblaster in an easier way by using the drivers instead of having to low-level-access the card.

PCI Device Details

General

The detailed description of the PCI devices implies four parts: product description, setup, status and features supported by the unit.

SCSI Device Details

General

This window shows informations about a SCSI device.

Graphic Benchmark comparison

The comparison list, displayed in the window opened before, is visualized here in a graphical form. Select a comparison PC from the small listbox.

Tip

If you want to change the file with the comparison data, you have to strictly respect the predefined positions of the numbers. Otherwise, the diagram cannot be displayed correctly.

In bar graphs, longer bars symbolize a higher performance in most cases. This does not apply to the access time of harddisks.

PnP Device Description

The devices (= device units) of the ISA-PnP adapter, listed in the plug&play-info window opened before, are analyzed here to detect the resources they use. Used IRQ- and DMA-channels, I/O-ports and memory areas are displayed.

Each device can be configured relatively flexible via the logical device configuration register.

The registers act as so called descriptors, that can be set to appropriate values by the system software. For each aspect - DMA and IRQ for example - not only one but several descriptors are available.

INT13 Extension Configuration parameters

General

Software applications access the harddisks via the interrupt 13h of the main bios. These functions don't offer a possibility to handle the new features of modern harddisks: more than 1024 cylinders, new transfer modes (PIO, DMA modes), connection of more than two harddisks, removable media (CD-ROM). The INT13h extensions (IBM/Microsoft) and EDD (Enhanced Disk Drive Support Spec. of Phoenix) do offer these additional features.

PCMCIA Socket Details

Important

An analysis is only performed, if a PCMCIA card is inserted into a slot.

Award Bios APM Setup

General

Beside the Standard, Advanced and PCI Setup all modern systems offer a setup for the Power Management. The user has the choice to select between maximal, minimal or user-defined power-save configuration or to switch the APM off.

CPU Functions and Counters

Important

The Time Stamp Counter will not be analyzed as long as the CR4 control register has not been erased.

General

More recent types of the Intel processors do support the CPUID instruction, which not only informs about the CPU type in general but also informs about the additional functions this CPU supports. Also, several internal counters can be activated by using so called machine-specific registers, with which some processes can be measured, that are relevant for the system's performance.

Internal Cache

Informations about L1 cache and Translation Lookaside Buffer are given to a few processors only that support the corresponding CPUID instructions.

LPT - ECP Details

General

The Enhanced Capabilities Port is the result of a collaboration of Microsoft and Hewlett Packard. Compared with the IBM Standard Port, the ECP-Port has the following additional features:

- up to 32-Bit Data width
- FIFO Buffer for uninterrupted transfers
- bidirectional
- software configurable (plug&play conform)

Properties of the Graphics device driver

General

The analysis of the Graphic device driver is of interest because it's the purpose of the driver to give support to the special abilities of the adapter. Often graphic related problems are the result of bad drivers.

Properties of the printer device driver

General

The informations about the properties of the printer device driver are restricted to the standard printer. For graphic and printer device context are equal under a Windows point of view the analysis is exact the same as for the graphics device driver.

List of loaded modules

General

Under Windows a module means an executable file - EXE-, DLL or font (.FNT-)file. One module can be loaded multiple times by building instances of it. Each instance generates a task. There can be several tasks for one module. For each module a task database is created. Dr. Hardware for Windows lists the contents of this database.

List of active classes

General

The visible part of Windows applications consists of one or more registered window classes with a lot of child windows. For example Dr. Hardware for Windows consists of window classes for the main window, the status line and the diagram windows.

The term window subclasses listboxes, buttons and radio buttons. The window classes are stored in the heap of the User module.

Global Heap Objects

General

The Global Heap is open for all applications and restricted to totally 8192 objects. Besides the global heap each application gets its own local 64k heap, that is also used for stack and data segment.

When applications allocate memory blocks, handles rather than addresses will be returned. To receive an address a second step is necessary that is called locking. A valid address is taken from the selector table that is hardwired into processors since the 386. The main advantages of the protected mode memory management is the ability to create virtual memory and to move memory blocks in order to create new and optimized free blocks.

User Heap

General

The User module is the most important Windows internal module. It contains over 50% of commonly used applications (among other windows messaging). The standard User Heap, that is going to be analyzed in this window, is reserved for data structures like classes, menus and strings. Its size is restricted to 64K.

Under Windows 3.1 and above further User heaps coexists with the standard user heap. They are mainly reserved for menu data. This is the reason why the portion of menu data is meaningless in the standard user heap.

GDI Heap

General

The GDI (Graphics Device Interface) is the Windows interface for device output (graphics, printer). The GDI heap stores all created GDI objects like pens, brushes, fonts and bitmaps.

Modem Inquiries (ATIx instructions)

General

Using the I-commands of the Hayes Command set, the ROM of the modem can be accessed and information, saved there, can be inquired. Among others, these for example contain product ids or connection statistics.

Data, that are put out by the modem per command, are displayed in the list without an assignment. Partly, the data are self-explaining, but it is also possible, that only mysterious sequences of bytes do occur. Therefore, you'll need the modem's manual.

What is shown

The list contains the command executed (incl. a short comment about it's function) and below the answer of the modem. For commands like ATi2 (internal RAM test), the modem only answers "OK" or "ERROR". For unsupported commands, the modem probably always answers "ERROR".

The modem is given 20 seconds to fire it's answer.

DMI Data Pool

General

Many users have already seen this short message coming onto the screen shortly after powering on the machine: "Verifying DMI Data Pool". Dr. Hardware tries to analyze and list the contents of this data pool.

The DMI (Desktop Management Interface) is thought to enable the system, to get information about system configuration and status whenever needed.

The main premise is a main bios that supports DMI. Nowadays almost all newer BIOS version support DMI.

However the DMI functions were not correctly implemented in some older BIOS versions. Therefore the analysis may lead to an illegal instruction. When this happens try to update your BIOS if possible. Furthermore, accessing the DMI data pool sometimes fails. In most cases it succeeds under DOS, so you should run Dr. Hardware / Dos in Real Mode. Beneath that the collected data should always be considered with critical eyes because incorrect data can often be found in the database.

The DMI specification provides a plenty of different data structures - for processor, memory controller, memory modules, L1 and L2 cache, slots, ports and so on.

Current Configuration

List of all components registered by the operating system (Windows 95/98). Below the listbox the registry path and the device status are shown. The error code of possibly problems or conflicts (yellow questionmarks in the device manager) is shown as well. All data are from the registry.

Unlock...

Important:

! Do not try to hack the unlock algorithm because this service will be locked after four incorrect inputs!!

In order to transform the shareware into a registered version please enter your registration key into the editbox of this dialog window. After that the

You can unlock all newcoming updates with your key within the next year. When the key has become invalid you will be informed about that and you get the opportunity to order an updated key.

DirectX Benchmark

Important

- ! The DirectX Benchmark requires DirectX 5.0 or above. DirectX will be installed during setup of newer 3D accelerators by default. Please take the latest drivers. Sometimes the installation of DirectX can cause problems. It is not advisable to install DirectX only to enable this benchmark.
- ! This benchmark is a complete application (DirectBench) - we recommend to also run it stand-alone. The animation will be running with greater fluidity. Note that the program has to reside in the Dr. Hardware program directory.
- ! During this benchmark hardware accesses will be performed. Problems on certain hardware configurationen can not be excluded.
- ! The transfer rate will be measured at a resolution of 800 x 600, because at lower resolutions cache effects could influence the results..
- ! This bnchmark is based on several DirectX5-SDK example sources, copyrighted by Microsoft.

General

Microsofts Multimedia interface DirectX allows direct accesses of hardware components what would be impossible The interfaces DirectDraw (2D) and Direct3D allow direct video memory access.

With this benchmark Dr. Hardware is able to get the real performance of system and video adapter.

