



miroVIDEO 20SD miroVIDEO 20SV miroVIDEO 40SV ergo

User's Guide – Hardware –



miroVIDEO 20SD/miroVIDEO20SV/miroVIDEO 40SV ergo

User's Guide

– Hardware –

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VDOK-VD20-100

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About the manual

This manual explains how to install the miro graphics board in your computer.

The quick installation chart provides an overview for the hardware and software installation. To ensure the correct installation, read the detailed explanations in this manual.

In the margins are subheadings and ideograms to help you quickly find your way through this manual.



Important text passages are marked with the «hand» and this format.

Bullets mark step-by-step instructions:

- Insert the graphics board into the slot.

All keyboard commands appear in this font:

install <↵>

<↵> represents the enter key.

Menus, commands, options or buttons which the user can select are written in *italics*.

For your own safety

In the interest of your own safety and the flawless functioning of your new product and computer system please note the following:

- Before opening the computer make sure that the power plug is disconnected from the main socket.
- Computer components such as graphics boards are sensitive to static charge. Divert any electrostatic charge from your person before touching the components with your hands or any tools.
- Make sure that the components you want to add to the computer are in compliance with the computer's characteristics.
- Only use a shielded cable to connect the monitor to the computer.
- Do not use any cable that supplies the power through the computer.
- Make sure that your graphics board is **in compliance with the slot**.



For changes that have occurred after the manual has been printed, refer to the README file on the disks supplied with your system!

Quick installation chart

The following quick installation chart provides a hardware and software installation overview.

Hardware

1. Check the system requirements, make copies of the supplied disks.
2. Open the computer.
3. Depending on its bus type, install the graphics board into the VL or PCI slot.
4. Connect the monitor.

Software

5. Install Video for Windows 1.1d.
 - ↳ *Video for Windows (Video for Windows Runtime version)*
The Video for Windows Runtime disk is needed.
Insert *Video for Windows Runtime disk # 1/1*.
In the Windows Program Manager in the *File* menu select *Run...* .
Depending on your disk drive, enter **a:setup** or **b:setup**.
Follow the instructions given by the installation program.
6. Install the miro Software.
 - ↳ *miro•win (Windows drivers, miroWINTOOLS)*
The miro•win disks are needed.
Insert *miro•win High speed drivers for Windows, Install disk # 1/2*.
In the Windows Program Manager in the *File* menu select *Run...* .
Depending on your disk drive, enter **a:install** or **b:install**.
Follow the instructions given by the installation program.
 - ↳ *miro•win (CAD drivers)*
The miro•win disks are needed.
Insert *miro•win High speed drivers for CAD; Install disk # 1/1*.
Depending on your disk drive, enter **a:install** or **b:install**.
Follow the instructions given by the installation program.
If necessary, configure installed drivers.
 - ↳ *miro•plus (OS/2 drivers)*
The miro•plus disks are needed.
Insert *miro•plus High speed drivers for OS/2; Install disk # 1/1*.
Install drivers and/or tools.

1. Overview

Features

Thank you for purchasing a miroVIDEO graphics board.

The powerful miroVIDEO graphics board has all capabilities regarding accelerated digital video playback.

q **Graphics acceleration**

The miroVIDEO graphics board is equipped with S3 graphics processors to improve the performance of applications running under Windows. miroVIDEO 20SD is equipped with the Vision868; miroVIDEO 20SV and miro40SV ergo use the Vision986 graphics processor.

q **Multimedia acceleration**

The video processor integrated on the chip permits an optimal video playback quality. The graphics processor scales the video up to full-screen sizes without causing jerky playback. When enlarging video the pixels are not just multiplied but the additional pixels are calculated (interpolation), this technique achieves a very good image quality even at high resolutions. When reducing the video size, pixels are not just left out but mean values are calculated.

q **Supported standard formats**

The miroVIDEO boards support all common AVI standards and MPEG, the industry-standard for image compression on CD-ROMs.

q **Color space conversion/dithering**

The video processor converts the YUV format to the RGB format and, if necessary, adapts the color depths for video modes with a lower color depth than 24 bits applying a method called dithering. This process takes load of the CPU.

q **Video memory**

The miroVIDEO 20SD board has 2 MB DRAM, miroVIDEO 20SV has 2MB VRAM and miroVIDEO 40SV ergo is equipped with 4 MB VRAM.

q **Fast bus systems**

There is a **V**(esa) **L**(ocal) bus version and a **P**(eripheral) **C**(omponent) **I**(nterconnect) version of the board.

q **Power Management**

miroVIDEO supports VESA DPMS Power Management for today's monitors with Power Management. Therefore, monitors can turn themselves off after a preset time interval to prolong their life and save energy.

System requirements

To install miroVIDEO, your computer system has to meet the following requirements:

Computer

- for VL bus: a 386, 486, Pentium computer or compatible with a VL Local Bus slot
- for PCI bus: a 486 or Pentium computer or compatible with a PCI Local Bus slot.

Please note: The system configuration described above gives the minimum requirements. If you use the miroVIDEO system mainly to play back video, faster processors, larger hard disks and more memory increase the performance and efficiency.

Monitor

Standard VGA monitor; to receive all the benefits from miroVIDEO, you need a high-resolution multifrequency monitor. miro offers suitable monitors.

Software

Windows 3.1 minimum;
Windows 3.11 (Windows for Workgroups) is recommended.

Existing VGA

Before the installation, however, any existing VGA board or motherboard VGA has to be removed from the computer or disabled.

Package contents

Before beginning the miroVIDEO installation, please check to make sure your miroVIDEO package is complete:

- Graphics board*
- Disk set including
 - miro Windows drivers, miroWINTOOLS
 - CAD drivers
 - Runtime version of Video for Windows 1.1d
 - OS/2 driver
- Software for decompressing and playing back MPEG videos
- CD-ROM with demo videos
- Documentation.



Graphics boards are sensitive to static charge. To avoid damage that may occur by static charge, leave the graphics board in its antistatic packaging until installation. Keep the packaging for possible future transportation.

* For model and serial number of your miro graphics board, refer to the label on the graphics board.

2. Hardware installation

Installing miro graphics board

The only tool you need for the installation is a screwdriver. Proceed as follows:

- Turn off your computer and all peripheral devices. Disconnect the computer from the power supply and all necessary components.
- Loosen the screws of the computer's cover and remove it.
- Discharge yourself of static charge by touching the power unit casing.
- Depending on your graphics board select a free VL or PCI slot. Remove the slot's cover at the back of the computer. Save the screws of the cover.
- Depending on the bus type, carefully insert the graphics board into the VL or PCI slot by holding the board at the top and gently pushing both ends into the slot at the same time. Press onto the upper edge of the board to make sure it is firmly seated in the slot.



Don't force the board into the slot! You run the risk of bending the contacts. If the board does not fit easily, pull it back out, and try again.

- Fasten the board's bracket at the back of the computer using the screws you saved from the shield.
- Put the cover back on the computer and reconnect the peripheral devices.
- Connect the monitor with the 15-pin D-type socket. If you are in doubt about how to connect your monitor, please refer to the monitor documentation.
- Reconnect the computer and the monitor to the power supply.

3. How to go on?

After you have installed your graphics board, you can proceed with the installation of the Video for Windows 1.1d Runtime version.

Installing Video for Windows

To install Video for Windows, proceed as follows:

- If you have not done so already, start Windows.
- Insert the *Video for Windows Runtime disk # 1/1*.
- In the *Program Manager* open the *File* menu and select the *Run...* command.
- Depending on your disk drive, enter **a:setup<↵>** or **b:setup<↵>**.
- Follow the instructions on the screen.



AVI drivers

To play back digital video AVI drivers are required. The supplied Video for Windows Runtime disk contains these drivers.

DCI

Video for Windows 1.1d supports the new Microsoft Windows DCI technology (**D**isplay **C**ontrol **I**nterface). DCI allows the video software to directly access the miroVIDEO hardware and to accelerate the image refresh considerably. The GDI (**G**raphics **D**evice **I**nterface) which was responsible for the image refresh up to this time is omitted.

The appropriate DCI driver for your miro graphics board is copied to your hard disk during the software installation.

After having installed Video for Windows, you can use the new Media Player for playing back digital video sequences.

Installing the miro software

After having installed Video for Windows you can install and, if necessary, configure the miroVIDEO 12PD system software and the required application drivers.

For a detailed description of the installation, the miro drivers and the miro tools, refer to the corresponding software manuals.

Complete functionality

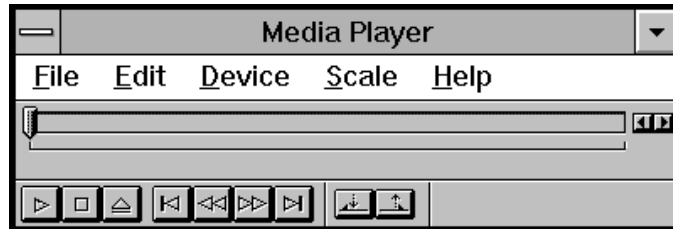
After having installed the software you can use all miroVIDEO 12PD video features:

- digital video with up to 25 frames/second
- digital video in TrueColor at 800 x 600 pixels (2 MB video memory)
- digital video with 32768 colors at 1024 x 768 pixels
- continuous scaling of digital video
- enlargement without frame loss.

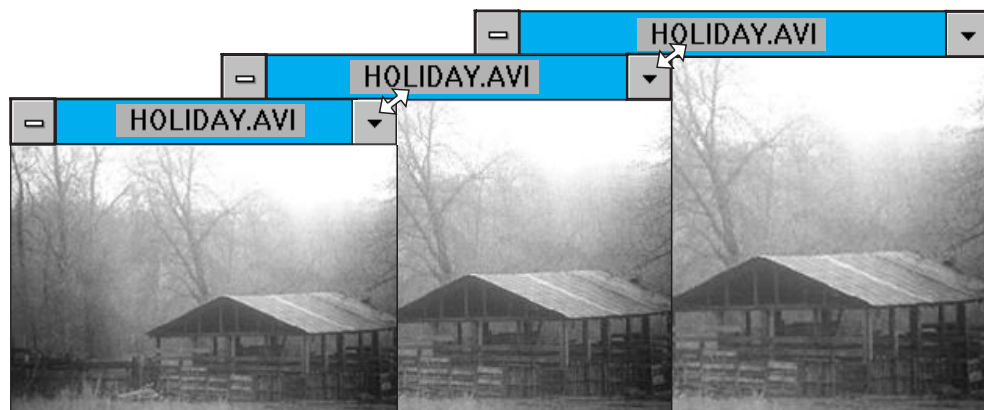
Playing back digital video sequences



- To play back digital video sequences, open the Media Player in the Video for Windows window and select the *Open...* command in the *File* menu.



miroVIDEO allows you to scale video sequences to any size up to 1024 x 768 pixels*.



Continuous scaling

* depends on the memory equipment of your graphics board and the chosen resolution/color depth

4. Technical data

Bus system

- miroVIDEO 20SD/SV/40SV ergo for VESA Local Bus:
VESA Local Bus
- miroVIDEO 20SD/SV/40SV ergo for PCI Local Bus:
PCI Local Bus

Compatibility

- VGA register-compatible

Graphics processor

miroVIDEO 20SD:

- S3 Vision868 for VESA Local Bus up to 50 MHz clock frequency
- S3 Vision868 for PCI Local Bus up to 33 MHz clock frequency

miroVIDEO 20SV/40SV ergo:

- S3 Vision968 for VESA Local Bus up to 50 MHz clock frequency
- S3 Vision968 for PCI Local Bus up to 33 MHz clock frequency

Video memory

miroVIDEO 20SD	miroVIDEO 20SV	miroVIDEO 40SV ergo
2 MB DRAM	2MB VRAM	4 MB VRAM

Power supply

- +5 V, max. 1 A
- +12 V, max. 0,01 A

Video timings

	miroVIDEO 20SD	miroVIDEO 20SV	miroVIDEO 40SV ergo
Horizontal scan frequency	31 kHz - 85 kHz*	31 kHz - 85 kHz*	31 kHz - 107 kHz*
Vertical scan frequency	50 Hz - 100 Hz, non-interlaced*	50 Hz - 100 Hz, non-interlaced*	50 Hz - 100 Hz, non-interlaced*
Pixel frequency	25 MHz - 135 MHz*	25 MHz - 135 MHz*	25 MHz - 220 MHz*

*=depending on operating mode

Video modes

miroVIDEO 20SD:

Bits per pixel	Resolution	miroC21107	100 kHz Mf	miroC2193	miroC2185	miroC2085	miroC1782	82 kHz Mf	78 kHz Mf	71 kHz Mf	MAG MX 17S	64 kHz Mf	56 kHz Mf	48 kHz Mf	35 kHz Mf	31 kHz VGA	TV
8 (256 colors)	1408 x 1024	70	70	70	70	70	70	70	70	66	60	60	-	-	-	-	-
	1280 x 1024	75	75	75	75	75	75	75	72	66	60	60	-	-	-	-	-
	1152 x 864	75	75	75	90	90	90	90	75	75	70	70	-	-	-	-	-
	1024 x 768	100	100	100	100	100	100	100	75	75	75	75	70	60	-	-	-
	800 x 600	100	100	100	100	100	100	100	100	100	100	100	75	75	56	-	-
	768 x 576	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50
	640 x 480	100	100	100	100	100	100	100	100	100	100	100	100	75	60	60	50
16 (65,536)	1152 x 864	75	75	75	75	75	70	70	75	75	70	70	-	-	-	-	-
	1024 x 768	90	90	90	90	90	90	90	75	75	75	75	70	60	-	-	-
	800 x 600	100	100	100	100	100	100	100	100	100	100	100	75	75	56	-	-
	768 x 576	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50
	640 x 480	100	100	100	100	100	100	100	100	100	100	100	100	75	60	60	50
32 (16.7 mill.)	800 x 600	75	75	75	75	75	75	75	75	75	75	75	75	75	56	-	-
	768 x 576	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50
	640 x 480	100	100	100	100	100	100	100	100	100	100	100	100	75	60	60	50

Mf=Multifrequency monitor

Maximum vertical refresh rate (Hz)

miroVIDEO 20SV:

Bits per pixel	Resolution	miroC21107	100 kHz Mf	miroC2193	miroC2185	miroC2085	miroC1782	82 kHz Mf	78 kHz Mf	71 kHz Mf	MAG MX 17S	64 kHz Mf	56 kHz Mf	48 kHz Mf	35 kHz Mf	31 kHz VGA	TV
8 (256 colors)	1408 x 1024	70	70	70	70	70	70	70	70	66	60	60	-	-	-	-	-
	1280 x 1024	75	75	75	75	75	75	75	72	66	60	60	-	-	-	-	-
	1152 x 864	75	75	75	90	90	90	90	75	75	70	70	-	-	-	-	-
	1024 x 768	100	100	100	100	100	100	100	75	75	75	75	70	60	-	-	-
	800 x 600	100	100	100	100	100	100	100	100	100	100	100	75	75	56	-	-
	768 x 576	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50
	640 x 480	100	100	100	100	100	100	100	100	100	100	100	100	75	60	60	50
16 (65,536)	1152 x 864	75	75	75	75	75	70	70	75	75	70	70	-	-	-	-	-
	1024 x 768	100	100	100	100	100	100	100	75	75	75	75	70	60	-	-	-
	800 x 600	100	100	100	100	100	100	100	100	100	100	100	75	75	56	-	-
	768 x 576	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50
	640 x 480	100	100	100	100	100	100	100	100	100	100	100	100	75	60	60	50
32 (16.7 mill.)	800 x 600	75	90	75	75	75	75	75	75	75	75	75	75	75	56	-	-
	768 x 576	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50
	640 x 480	100	100	100	100	100	100	100	100	100	100	100	100	75	60	60	50

Mf=Multifrequency monitor

Maximum vertical refresh rate (Hz)

miroVIDEO 40SV ergo:

		miroC21107	100 kHz Mf	miroC2193	miroC2185	miroC2085	miroC1762	82 kHz Mf	78 kHz Mf	71 kHz Mf	MAG-MX 17S	64 kHz Mf	58 kHz Mf	48 kHz Mf	35 kHz Mf	31 kHz VGA	TV
Bits per pixel	Resolution																
8 (256 colors)	1600 x 1280	75	75	75	64	64	-	-	-	-	-	-	-	-	-	-	-
	1408 x 1024	100	75	75	75	75	75	70	70	66	60	60	-	-	-	-	-
	1280 x 1024	100	75	75	75	75	75	70	72	66	60	60	-	-	-	-	-
	1152 x 864	100	100	100	90	90	90	90	75	75	70	70	-	-	-	-	-
	1024 x 768	100	100	100	100	100	100	100	75	75	75	75	70	60	-	-	-
	800 x 600	100	100	100	100	100	100	100	100	100	100	100	75	75	56	-	-
	768 x 576	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50
	640 x 480	60	100	100	100	100	100	100	100	100	100	100	100	75	60	60	50
16 (65,536)	1600 x 1280	75	75	75	64	64	-	-	-	-	-	-	-	-	-	-	-
	1408 x 1024	70	75	75	75	75	75	70	70	66	60	60	-	-	-	-	-
	1280 x 1024	100	75	75	75	75	75	70	72	66	60	60	-	-	-	-	-
	1152 x 864	100	100	100	90	90	90	90	75	75	70	70	-	-	-	-	-
	1024 x 768	100	100	100	100	100	100	100	75	75	75	75	70	60	-	-	-
	800 x 600	100	100	100	100	100	100	100	100	100	100	100	75	75	56	-	-
	768 x 576	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50
	640 x 480	60	100	100	100	100	100	100	100	100	100	100	100	75	60	60	50
32 (16.7 mill.)	1152 x 864	80	75	80	80	80	80	70	75	75	70	70	-	-	-	-	-
	1024 x 768	100	100	100	100	100	100	100	75	75	75	75	70	60	-	-	-
	800 x 600	100	100	100	100	100	100	100	100	100	100	100	75	75	56	-	-
	768 x 576	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50
	640 x 480	60	100	100	100	100	100	100	100	100	100	100	100	75	60	60	50

Mf=Multifrequency monitor

Maximum vertical refresh rate

Options

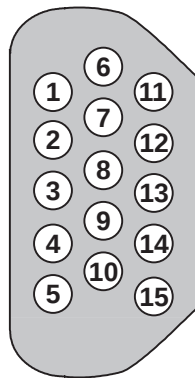
Monitor; shielded monitor

Appendix

15-pin D-type video port

The miroVIDEO graphics boards are equipped with a 15-pin D-type connector to which the video cable attaches. The other end of the video cable connects to the monitor.

The following illustration and the table show the video output and the corresponding pin allocation:



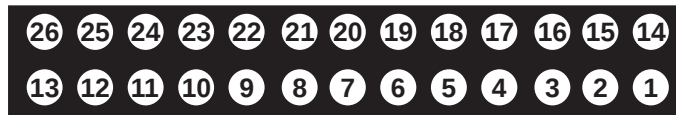
15-pin D-type connector

Pin No.	Pin Allocation
1	Red
2	Green
3	Blue
4	Free
5	Ground (analog)
6	Ground (red)
7	Ground (green)
8	Ground (blue)
9	Free
10	Ground (sync.)
11	Free
12	Free
13	HSync
14	VSynC
15	Free

VESA standard feature connector

The miroVIDEO graphics boards can be used together with a video overlay board. For this purpose you need the VESA standard feature connector.

The following table provides a pin allocation overview.



VESA standard feature connector

Pin No.	Pin Allocation
1	Pixel data P0
2	Pixel data P1
3	Pixel data P2
4	Pixel data P3
5	Pixel data P4
6	Pixel data P5
7	Pixel data P6
8	Pixel data P7
9	Clock
10	Reserved
11	HSync
12	VSynC
13	Ground
14	Ground
15	Ground
16	Ground
17	Enabling signal
18	Enabling signal
19	Enabling signal
20	Free
21	Ground
22	Ground
23	Ground
24	Ground
25	Free
26	Free



The pin allocation of the VESA standard feature connector has been adjusted for all miroVIDEO *PCI boards*, so that these boards can be connected 1:1 to another graphics board via a flat ribbon cable.

miroVIDEO address range

For the miroVIDEO graphics board to run without problems you have to avoid address conflicts. Make sure that the addresses used by miroVIDEO are not also assigned to other components of your computer system.

– **I/O address range**

The following table shows the I/O address areas that can be selected and used by miroVIDEO.

0E2E8h	
042E8h	04AE8h
082E8h	08AE8h
092E8h	09AE8h
0A2E8h	0AAE8h
0B2E8h	0BAE8h
046E8h	04EE8h
086E8h	08EE8h
096E8h	09EE8h
0A6E8h	0AAE8h
0B6E8h	0BEE8h

– **Additional VGA addresses**

In addition the following addresses are used:

VGA video memory	VGA BIOS
0A0000h - 0BFFFFh	0C0000h - 0C7FFFh

Return the product with the warranty card and proof of purchase (receipt with date and serial number) as well as a detailed description of what is wrong with the product. This helps our Service Department to repair and return the product to you as quickly as possible.

Initial installation

If you experience problems with your new miro product during the first week after delivery, contact your authorized miro distributor immediately. He will be able to answer your questions because he regularly participates in miro Seminars to be always up to date about our products and other important information.



Contact your authorized distributor if you have a question about miro products. Please have all the necessary information ready before you call so the distributor can answer your questions as precisely as possible, i. e. hardware configuration (extension cards and addresses) and software configuration (memory manager, version of the software you are using, etc.).

For more detailed information about our products and our Support and Service, please check our miro Support Mailbox.

Glossary

This glossary contains the most important concepts from the field of computer hard- and software and video. Cross-references are marked by this symbol .

Address	All memory positions in a computer have numbers (addresses). Through these addresses each memory position can be addressed. Some addresses are reserved for certain  hardware components and must not be used. If two hardware components use the same address, there is an address conflict.
ANSI	American National Standards Institute. ANSI character set ( Font): used by Microsoft Windows and Windows applications. The character assignment only differs slightly from the assignment of the  ASCII character set.
ASCII	American Standards Committee of Information Interchange. ASCII character set ( Font): standard character set used by IBM and compatible computers. The ASCII character set consists of 256 characters, the first 128 of which are standardized.
AUTO-EXEC.BAT	A special DOS  batch file which is processed automatically after the computer has been started. The file contains among other things commands which load the country-specific keyboard driver ( Driver), set the time or load programs automatically.
AVI	Abbreviation for A udio V ideo I nterleaved, standard format for digital video ( Video for Windows).
Batch file	A  DOS file where a sequence of commands is processed one after the other.
BIOS	B asic I nterface O utput S ystem. Number of basic input and output commands stored in a  ROM, PROM or EPROM. The  operating system uses these commands. The basic task of the BIOS is to control the data input and output. After starting the system the ROM BIOS performs some tests (checking the  interfaces, the disk drives, etc.).
Bit	B inary D igit. Smallest information unit in a computer. One bit can take on two states: «0» and «1», two bits can take on $2^2=4$ states and three bits $2^3=8$, etc. In a computer those states are realized by «0 V» (no current = 0) and «5 V» (current = 1). To display a character (letter, number etc.), 8 bits = 1  byte are required.
Bus	In a computer, busses provide for the communication between the  processor and the installed hardware (hard disk, graphics board, etc.). Depending on the bus width, the bus transfers a different amount of information. An 8-bit bus can transfer 8  bits (=  byte = one character) at a time.
Byte	One byte consists of eight  bits. One byte represents exactly one character (letter, number etc.). The characters are binary-coded with «zero» (0) and «one» (1). The character «E» has the  ASCII code «01000101» or «45h» (hexadecimal).

CGA	Color G raphics A dapter (IBM). Graphics board which displays four colors in the graphics mode.
Clock frequency	Rate at which individual commands are processed in a processor. The higher the  clock frequency, the quicker the commands are processed.
CLUT	Color L ook U p T able. Color table which contains all indexed color values.
CODEC	Acronym for C ompressor/ D ecompressor, compresses (packs) and decompresses (unpacks) image data.
Color depth	Number of  bits containing color information for each  pixel. A color depth of 1 bit displays only black and white ($2^1=2$ colors). At a color depth of 8 bits $2^8=256$ colors are available and at 24 bits $2^{24}=16,777,216$ ( TrueColor) colors are available.
CONFIG.SYS	A  DOS configuration file which is processed automatically when the system starts. The CONFIG.SYS file includes  drivers which control the output to the monitor and the keyboard and the mouse.
Digital video	Digital video stores information bit by bit in a file (in contrast to analog storage media).
DIP switch	D ual I nternal P ackage switch. A row of small switches designed to make certain hardware presettings.
Dithering	Method to avoid extreme color contrasts, which occur with a reduced number of colors.
DOS	D isk O perating S ystem. The most common  operating system for PCs (P ersonal C omputer). MS DOS is the M icrosoft version of DOS.
Driver	Programs which integrate the hardware (e.g. driver for a CD-ROM drive) in the computer and which adapt the software to the hardware (e.g. driver for a graphical user interface, such as Microsoft Windows). The software then uses the features of the graphics board.
EGA	E nhanced G raphics A dapter (IBM), graphics board which displays 16 colors in the graphics mode.
EISA bus	E xtended I ndustry S tandard A rchitecture. 32-bit bus: The EISA bus can transfer an amount of data of 33  MB per second at a  clock frequency of 8.33 MHz.
Fixed-frequency monitor	Monitor operating at a very small frequency range ( multifrequency monitor).
Font	Character set in a certain type, size and style, e.g. Times New Roman 11, normal; Times New Roman 11, italics; Times New Roman 11, bold; Times New Roman 11, bold, italics.
Graphics board	Graphics boards are the «link» between the computer and the monitor. Without a graphics board no image appears on the screen. Graphics boards operate in two modes: the text mode and the graphics mode. In the text mode only  ASCII characters are displayed. The ASCII character set includes some simple «graphical» characters to display simple graphics. The graphics mode uses individual  pixels. The more pixels are available (the higher the  resolution) the more detailed characters and graphics can be displayed.

Hardware	The hardware includes all computer components which are «hard», such as the monitor, the hard disk, the keyboard, the mouse and the printer.
HGC	H ercules G raphics C ard, monochrome (black and white) graphics board.
Horizontal scan rate	Number of horizontal scans of the electron beam per second required to create a new line. The higher the  resolution the higher the required horizontal scan rate.
Interface	Link between two parts of a system or between two systems where information, pulses and signals are adapted in a way that the receiving part can understand the sending part. For example, signals which the computer sends to the printer have to be adapted by an interface so that the printer «understands» what it has to print.
Interlaced	Image refreshing technique: the screen is subdivided into lines. When refreshing the image first all even lines and then all odd lines are refreshed.
ISA bus	I nternational S tandard A rchitecture. 16-bit bus which transfers 8  MB of data per second at a  clock frequency of 8 MHz.
Jumper	Jumpers can set up or interrupt electrical leads. To establish electrical leads with a jumper, the jumper has to be mounted, to interrupt the lead the jumper has to be removed.
KB	1 KB (Kilobyte) is equal to 1024  bytes. Here «K» (kilo) is always equal to «1024».
MB	1 MB (Megabyte) equals 1024  KB.
MDA	M onochrome D isplay A dapter. Monochrome (black and white) graphics board.
Multifrequency monitor	A multifrequency monitor adapts itself automatically to different frequencies supplied by the graphics board ( fixed-frequency monitor) and can display different  resolutions.
Non-interlaced	Image refresh method, where the complete image is generated without skipping lines. A non-interlaced image flickers much less than an  interlaced image.
Operating system	The operating system provides for the communication between  hardware,  software and the user. The tasks of the operating system are among others the file and the program management.
Parallel interface	The parallel or Centronics  interface transfers data through an 8-bit data line. This means that 8  bits (1  byte) can be transferred at a time. The transfer through the parallel interface is considerably faster than the transfer through the  serial interface, over long distances the parallel data transfer is, however, more susceptible to interference. Parallel interfaces are designated by LPT and a number (e.g. LPT1).
PCI Local Bus	P eripheral C omponent I nterconnect. Local Bus concept by Intel: 32-bit bus, a PCI bus can transfer 132 MB per second (max.) at a  clock frequency of 33 MHz.
Pixel	Picture element. Pixels are the smallest elements of a monitor image ( resolution).

Pixel frequency	Rate at which the pixels appear on the screen.
RAM	R andom A ccess M emory. A RAM is a read-write memory component from which data can be read and to which data can be written any time. The computer memory is equipped with RAM components. The memory is a so-called «volatile» memory meaning that the memory contents are removed as soon as the computer is switched off.
Refresh rate	Also vertical scan rate. Number of image refreshes per second measured in Hertz (Hz). The higher the vertical scan rate the less flicker.
Resolution	Number of  horizontal and vertical pixels. 1408 x 1024 means that 1408 pixels are displayed horizontally and 1024 pixels are displayed on the monitor vertically. The higher the resolution the more details the monitor can display.
RGB	Abbreviation for R ed, G reen and B lue, the basic colors of additive color mixing. RGB describes the method used in computer technology where image information is transferred by dividing it into the three basic colors.
ROM	R ead O nly M emory. A ROM is a memory component which can only be read but which cannot be modified. The ROM's contents remain in the component also after the computer has been switched off. All functions which have to be available immediately after switching the computer on, e.g. the data for the system test, the character output on the screen, etc. are stored in ROM components. There are also PROMs (P rogrammable R OM) EPROMs (E rasable P ROM) and EEPROMs (E lectric E PROM).
Scaling	Adaptation of an image to a different size.
Serial interface	Also RS232. The serial interface transfers data through a data line bit by bit (all  bits of a  byte one after the other). The serial data transfer is considerably slower than the transfer through the  parallel interface but it is less susceptible to interference. Serial interfaces are designated by COM and a number (e.g. COM1).
Software	General term for all programs a computer can run (system programs, application programs,  drivers etc.) and files.
TrueColor	16,7 million colors can be displayed at a time ( color depth).
VESA	V ideo E lectronic S tandards A ssociation. Committee founded in 1988 in the USA which establishes common standards for the computer technology.
VESA Local Bus	Bus concept defined by the  VESA committee: 32-bit bus operating at a  clock frequency of up to 50 MHz. At a clock frequency of 33 MHz the VL bus transfers up to 132  MB per second (max.).
VGA	V ideo G raphics A rray (IBM), graphics board which displays 256 colors in the graphics mode.
Video for Windows	Video for Windows is a Microsoft Windows system extension which allows to record, to store and to play back video sequences from hard disk ( digital video).
YUV	Color model where Y delivers the brightness information and U and V the color information.

FCC Compliance Statement

FCC Warning Statement

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Caution

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Label Warning

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

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