

# **miroHISCORE<sup>2</sup> 3D**

## **USER'S GUIDE**

## **miroHISCORE<sup>2</sup> 3D**

### **User's Guide**

Version 1.0/GB April 1998

700720

© miroMEDIA GmbH 1998

All rights reserved.

No part of this manual may be reproduced or transferred to other media without explicit written permission from miroMEDIA GmbH, Braunschweig, Germany.

miro® is a registered trademark of miro Computer Products AG.

Pentium™ is a trademark of Intel Corp.

VGA™ is a trademark of International Business Machines Corp.

Windows® is a registered trademark of Microsoft Corp.

All other brands or product names are trademarks or registered trademarks of their respective holders.

miroMEDIA GmbH has written this manual to the best of its knowledge, but does not guarantee that the programs/systems will fulfil the desires of the user.

No warranty is made as to the specifications of features.

miroMEDIA GmbH retains the right to make alterations to the content of the manual without the obligation to inform third parties.

All tenders, sales, supply and manufacturing contracts from miroMEDIA GmbH, including consultancy, installation and other contractual performance are subject exclusively to the General Sales and Delivery Terms of miroMEDIA GmbH.

# Contents

|                                                     |           |
|-----------------------------------------------------|-----------|
| <b>1 Introduction</b>                               | <b>7</b>  |
| 1.1 Features                                        | 7         |
| 1.2 Scope of delivery                               | 7         |
| 1.3 Safety notes                                    | 7         |
| <b>2 Installing the hardware</b>                    | <b>8</b>  |
| 2.1 Inserting the miroHISCORE <sup>2</sup> 3D       | 8         |
| 2.2 Connecting the monitor                          | 9         |
| 2.3 Installing a second miroHISCORE <sup>2</sup> 3D | 9         |
| <b>3 Installing the software</b>                    | <b>10</b> |
| 3.1 Switching on the computer system                | 10        |
| 3.2 Win95 Plug & Play driver installation           | 10        |
| 3.2.1 Windows 95a Plug & Play installation          | 10        |
| 3.2.2 Windows 95b Plug & Play installation          | 10        |
| 3.3 Starting Setup.exe                              | 11        |
| 3.4 Installing DirectX-5                            | 11        |
| <b>4 Configuring the miroHISCORE<sup>2</sup> 3D</b> | <b>12</b> |
| <b>5 Connecting a computer and a TV set</b>         | <b>14</b> |
| <b>Glossary</b>                                     | <b>15</b> |



## KONFORMITÄTSERKLÄRUNG DECLARATION OF CONFORMITY

Geräteart:                      Grafikkarte  
Type of equipment:        Graphics board

Produkt / Product:        **miroHISCORE<sup>2</sup> 3D**

Das bezeichnete Produkt stimmt mit den Vorschriften folgender EU- Richtlinie(n) überein:  
The aforementioned product complies with the following European Council Directive(s):

|                   |                                                                                                                                                                                                                                                             |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>89/336/EWG</b> | Richtlinie des Rates zur Angleichung der Rechtsvorschriften der Mitgliedstaaten über die elektromagnetische Verträglichkeit<br>Council Directive 89/336/EEC on the approximation of the laws of the Member States relating to electromagnetic compatibility |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Zur vollständigen Einhaltung dieser Richtlinie(n) wurden folgende Normen herangezogen:  
To fully comply with this(these) Directive(s), the following standards have been used:

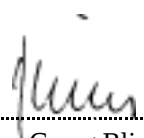
|                         |             |
|-------------------------|-------------|
| <b>EN55022 Class B:</b> | <b>1994</b> |
| <b>EN50082-1:</b>       | <b>1992</b> |

Dieser Erklärung liegt zugrunde: Prüfbericht(e) des EMV-Prüflabors  
This certification is based on:                      Test report(s) generated by EMI-test laboratory

Aussteller / Holder of certificate:        **miroMEDIA GmbH**  
                                                         **Carl-Miele-Str. 4**  
                                                         **D - 38112 Braunschweig**

.....**Braunschweig, 22.04.1998**.....  
(Ort / Place)                      (Datum / Date)

.....  
  
.....  
**René Hoffmann**  
(Leiter Entwicklung/Section Manager R&D)

.....  
  
.....  
**Georg Blinn**  
(Vorstand / Board of Management)

## FCC COMPLIANCE STATEMENT

### Information to the User

**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/T.V. technician for help.

The use of a non-shielded interface cable with the referenced device is prohibited.

Change or modifications not expressly approved by

**miroMEDIA GmbH**  
**Carl-Miele-Straße 4**  
**D-38112 Braunschweig**

could void the authority to operate the equipment.



# 1 Introduction

## 1.1 Features

The miroHISCORE<sup>2</sup> 3D is a PCI expansion board that you can operate together with your currently installed VGA board. It is based on the Voodoo<sup>2</sup> chipset from 3Dfx.

The miroHISCORE<sup>2</sup> 3D above all offers you:

- precise detailed 3D displays and
- extensive game support.

## 1.2 Scope of delivery

Before beginning installation, please make sure that your miroHISCORE<sup>2</sup> 3D system is complete. It consists of the following components <sup>1</sup>:

- miroHISCORE<sup>2</sup> 3D board <sup>2</sup>,
- CD with drivers and tools for the miroHISCORE<sup>2</sup> 3D,
- user manual,
- VGA loop-through cable and (SLI cable).

Please contact your dealer if parts should be missing.

## 1.3 Safety notes

In the interests of your own safety and to ensure perfect functioning of your new product and your computer system, please pay attention to the following notes:

Computer modules are sensitive to electrostatic charges. You can avoid this risk by:

- dissipating the electric charge from your own body before touching modules with your hands or tools and
- leaving the miroHISCORE<sup>2</sup> 3D in its electrostatic packaging until you begin installation.

Before opening the computer, you should always remove the mains plug to make sure that it is completely deenergized.

Any changes or additions that could no longer be included in the printed documentation are described in the README file(s) on the CD ROM included with the product.

---

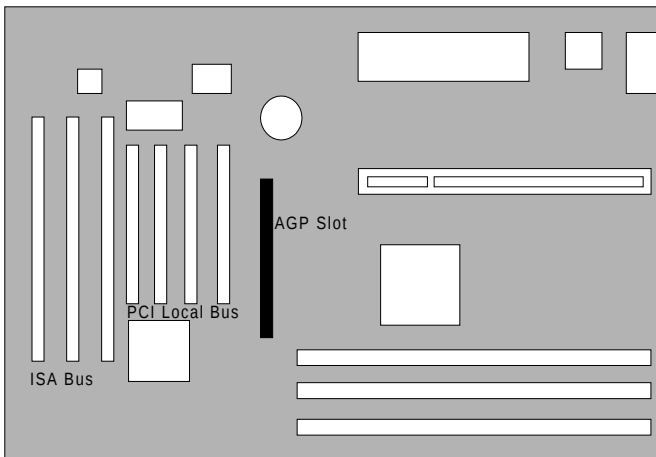
<sup>1</sup> Depending on the delivered variant, the scope of delivery may deviate from this list.

<sup>2</sup> Please refer to the label on the board for the exact model designation and the serial number.

## 2 Installing the hardware

### 2.1 Inserting the miroHISCORE<sup>2</sup> 3D

Please follow the steps below to install the board in your computer:



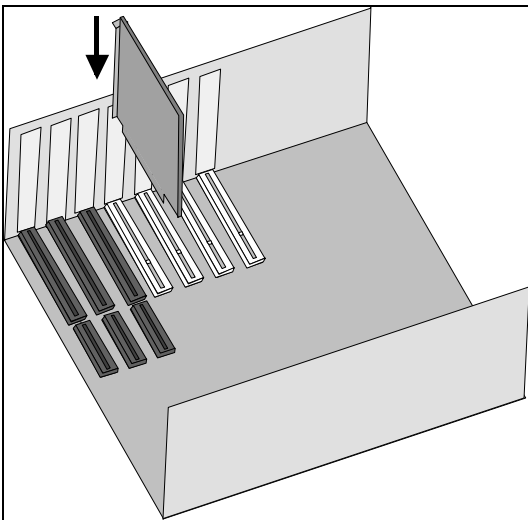
**Figure 1** Choosing a PCI slot

1. Switch off your computer and all connected peripheral devices, above all the monitor.
2. Isolate the computer from the power mains and disconnect cables connecting the computer and monitor.
3. Undo the securing screws of your computer's housing cover. Remove the cover.

4. Choose an empty PCI slot (Figure 1).

In most PCs there are two kinds of expansion slots: PCI and ISA. PCI slots are made of white plastic and are shorter than ISA slots.

5. Remove the slot cover on the rear of the computer by undoing the securing screws.



**Figure 2** Inserting the board

6. Align your miroHISCORE<sup>2</sup> 3D board over a free PCI expansion slot and carefully insert the board in the PCI slot.

The miroHISCORE<sup>2</sup> 3D can be inserted easily in the slot. If the board cannot be inserted easily, please do not apply any force. Instead, carefully pull the board out again and try again.

7. Screw down the miroHISCORE<sup>2</sup> 3D slot plate firmly. Use the slot cover securing screws.
8. Fit the cover again and firmly screw down the securing screws.

9. Connect the monitor to the miroHISCORE<sup>2</sup> 3D (see 2.2).
10. Connect the computer back to the power mains.

## 2.2 Connecting the monitor

Proceed as follows to connect the monitor to your miroHISCORE<sup>2</sup> 3D board:

1. Connect your miroHISCORE<sup>2</sup> 3D board to the graphics board that is already installed.

Take the VGA loop-through cable from your miroHISCORE<sup>2</sup> 3D system and carefully connect the 9-pole mini-DIN connector to the terminal marked VGA-IN on the miroHISCORE<sup>2</sup> 3D board.

Connect the other end of the VGA loop-through cable to your graphics board's VGA output.

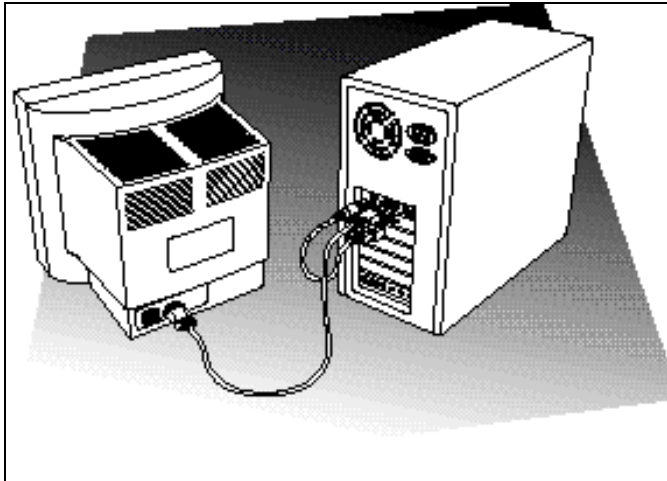


Figure 3 Connecting the monitor

2. Connect your monitor to the miroHISCORE<sup>2</sup> 3D board.

Take your VGA connecting cable and connect one end to your miro board's VGA output.

Join the other end of the cable to your monitor's signal input.

3. Connect your monitor to the power supply.

## 2.3 Installing a second miroHISCORE<sup>2</sup> 3D

You optionally have the possibility of integrating a second miroHISCORE<sup>2</sup> 3D in your computer system and of connecting it to the first board. In this case, the task of calculating the individual frame lines can then be shared by the two graphics boards, thus achieving higher speeds and better resolutions (image quality).

Proceed as follows to combine two miroHISCORE<sup>2</sup> 3D graphics boards:

1. Install the second miroHISCORE<sup>2</sup> 3D in your computer system. Orientate yourself to section 2.1.
2. Join the two boards by means of the included SLI cable.<sup>3</sup>

---

<sup>3</sup> SLI is an abbreviation for Scanline Interleave.

## 3 Installing the software

You begin installing the driver software once you have installed the miroHISCORE<sup>2</sup> 3D board in your computer and connected it to the monitor.

### 3.1 Switching on the computer system

Switch on your computer system and insert the CD containing the drivers and tools for the miroHISCORE<sup>2</sup> 3D in the CD ROM drive.

While booting up, Windows 95 should detect that a new hardware component has been installed. Otherwise, please continue installing the software as described in Section 3.3.

### 3.2 Win95 Plug & Play driver installation

A distinction must be made between the Windows 95a and Windows95b (OSR2) versions. Pay attention to the dialog box that appears on your screen and continue either with step 3.2.1 or 3.2.2.

#### 3.2.1 Windows 95a Plug & Play installation

Carry out the following steps if the dialog box shown in Figure 4 appears:



1. Select „Driver from disk provided by hardware manufacturer“ and click „OK“.
2. Select „Browse“.
3. Switch to the „Win95“ directory on the CD containing the drivers and tools for the miroHISCORE<sup>2</sup> 3D and click „OK“.

The drivers are now copied. Windows 95 then prompts you to restart your computer. Please follow this instruction.

**Figure 4** Dialog box for Windows 95a

#### 3.2.2 Windows 95b Plug & Play installation

Proceed as follows if the dialog box shown in Figure 5 appears:

1. Make sure that the CD containing the drivers and tools for the miroHISCORE<sup>2</sup> 3D is in the CD ROM drive.
2. Click „Continue“.

Windows 95 will now look for drivers. Carry out the following steps if this is not successful:



Figure 5 Dialog box for Windows 95b

1. Click „Other location“.
2. Enter the path „Win95“ or click „Browse“ to then open the „Win95“ directory on the driver CD.
3. Then click „OK“.

Windows 95 might prompt you again to specify the drivers. In this case, enter the path again.

The drivers are now copied. Windows 95 will then prompt you to restart your computer. Please follow this instruction.

### 3.3 Starting Setup.exe

Now start the setup to install the drivers and tools for the miroHISCORE<sup>2</sup> 3D. The setup program is on the CD that contains the drivers for the miroHISCORE<sup>2</sup> 3D.

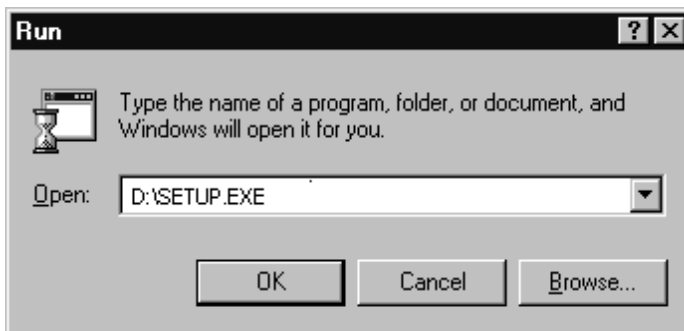


Figure 6 Starting setup.exe

1. Click „Start“ on the Windows 95 desktop.
2. Select „Run“.
3. Enter „D:\Setup.exe“. D stands for your CD ROM drive letter.
4. Click „OK“.

### 3.4 Installing DirectX-5

DirectX-5 must be installed on your PC for you to be able to use the functions of the miroHISCORE<sup>2</sup> 3D. If this is not the case, start installation now.

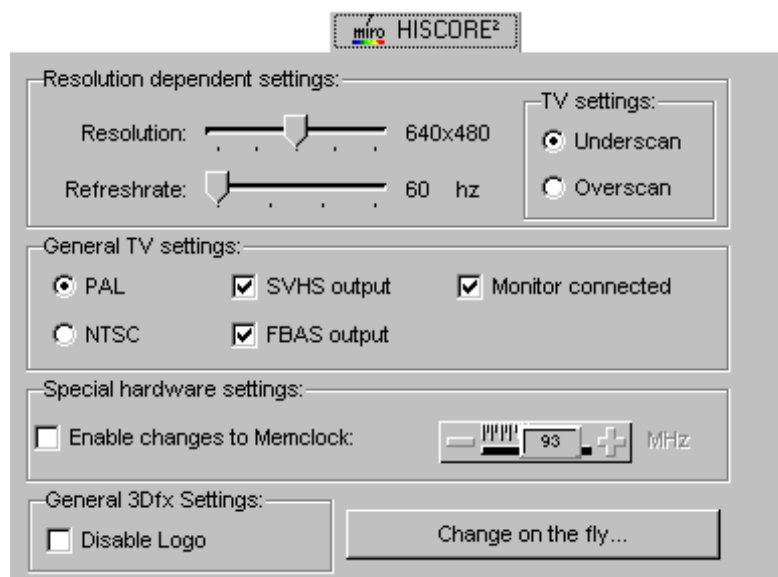
1. Click „Start“ and select „Run“.
2. Enter „D:\DIRECTX5\ENGLISH\DX5ENG.EXE“. D stands for your CD ROM drive letter. Click „OK“.

## 4 Configuring the miroHISCORE<sup>2</sup> 3D

After having installed the drivers for the miroHISCORE<sup>2</sup> 3D by means of the setup program, you can now select or modify various settings by way of the „HISCORE<sup>2</sup>“ and „Games“ tabs. Proceed as follows:

1. In „Settings“, select the „Control Panel“ menu item.
2. Double click „Display“ and select the „miroHISCORE<sup>2</sup>“ tab (Figure 7).

Now make the various entries in the menu:



**Figure 7 HISCORE<sup>2</sup> tab**

1. Select the resolution and refresh rate under „Resolution dependent settings“.
2. Whether you connect a monitor to your PC or view the desktop on a TV set, in both cases you must click the corresponding box under „General TV settings“. If you want to connect your computer to a TV set, please also pay attention to the choice of the signal that the miroHISCORE<sup>2</sup> is to

send to your TV set. For details, please read the section entitled „Connecting a computer and a TV set“. Find out what color TV standard your TV set or your video recorder processes (see also Table 1).

3. Under „TV settings“, choose between the „Underscan“ and „Overscan“ options. If you select „Underscan“, the first and last lines of your TV image will only be displayed as half lines. You can avoid this by selecting „Overscan“.
4. Check whether the „Enable changes to Memclock“ setting is activated. You are advised not to alter the storage cycle.
5. Check whether the „Disable Logo“ setting is activated. With this setting you can suppress display of a 3Dfx logo that might appear when you start a game.

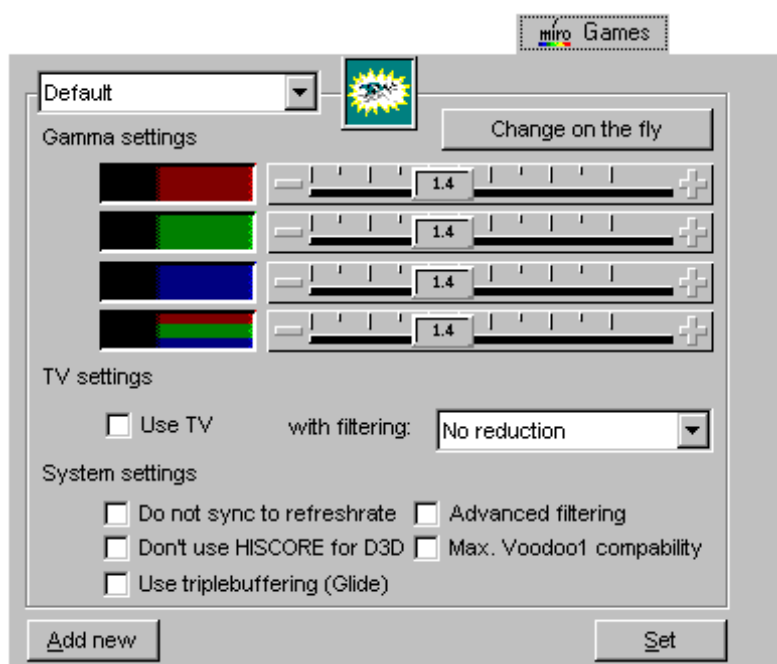
| Standard | Explanations                                                                                                      |
|----------|-------------------------------------------------------------------------------------------------------------------|
| PAL      | German color TV standard with 625 lines and 50 frames per second                                                  |
| NTSC     | Color TV standard with 525 lines and 60 frames per second, mainly used in the USA and Japan                       |
| SVHS     | Super-VHS, enhanced version of the VHS system with a higher image quality (resolution)                            |
| FBAS     | Color video signal, composed of the chromacity signal, the image content, the blanking signal and the Sync signal |

**Table 1 General TV settings**

If you select Change on the fly“, you can directly observe the effects of various settings on the monitor.

On the „Games“ tab, you have a possibility of creating game profiles. Besides the basic configuration of the miroHISCORE<sup>2</sup> 3D, which serves as the default for all applications, you can define special settings for individual computer games. They always take effect when you start the affiliated game, and have no influence on other applications.

Proceed as follows if your wish to create a game profile:



1. Select the „Spiele“ „Games“ tab in the „Display properties“ menu.
2. Click the arrow in the „Default“ box and select again.
3. Then define Gamma, TV and system settings. Pay attention to the explanations in Table 2.

**Figure 8 Games tab**

| Setting                                  | Explanations                                                                                                                |
|------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| <b>Gamma settings</b>                    | Change the red, green and blue components in your color video signal here.                                                  |
| <b>TV settings</b>                       |                                                                                                                             |
| Use TV                                   | Click this box if you wish to use your TV set as an output device for a special application.                                |
| With filtering                           | With filtering, you can reduce possible flickering of the TV image.                                                         |
| <b>System settings</b>                   |                                                                                                                             |
| Do not sync to refreshrate               | This will improve the performance of the game, but you may get tearing effects instead.                                     |
| Don't use HISCORE for D3D                | Here, you can deactivate the miroHISCORE <sup>2</sup> 3D to use a different 3D graphics board.                              |
| Use triplebuffering (glide)              | You can use the triple buffer to increase the frame rate, but this uses up lots of memory.                                  |
| Advanced filtering (trilinear filtering) | When using D3D and glide, trilinear filtering improves display quality.                                                     |
| Voodoo1 compability                      | The texture memory is limited to 2 Mbytes. This enables compability of the board with applications for the Voodoo1 chipset. |
|                                          |                                                                                                                             |
| Change on the fly                        | Here, your settings are implemented immediately and you can observe them directly.                                          |
| Add new                                  | Click this box if you wish to add a new game profile.                                                                       |
| Set                                      | You can import the last visible profile created.                                                                            |

**Table 2 Creating a game profile**

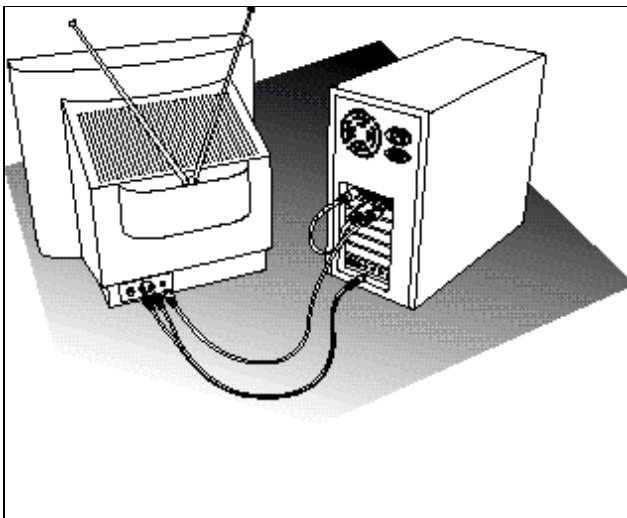
## 5 Connecting a computer and a TV set

You can now connect the miroHISCORE<sup>2</sup> 3D to your TV set to use a larger screen size.

The cables you need for this purpose are obtainable through specialist electronics dealers. These are:

- one composite(cinch) TV cable or one S-Video cable and
- one audio cable for connecting your PC to the TV set.

Please first check whether your TV set has an S-Video connection terminal. In this case, use and S-Video cable to achieve better image quality. For this check, you may have to consult your TV set's operating instructions.



**Figure 9** Connecting a TV set and PC

Please proceed as follows to connect the miroHISCORE<sup>2</sup> 3D to your TV set:

1. Take a composite video or S-Video cable and connect it to the corresponding connection terminal on your HISCORE<sup>2</sup> 3D.
2. Connect the other end of your composite video or S-Video cable to your TV set's Video In terminal.
3. Connect the audio cable to your sound card's Line Out terminal.
4. Connect the other end of the audio cable to your TV set's Audio In terminal.

# Glossary

|                        |                                                                                                                                                                                                                                                                                                                                                                 |
|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Address</b>         | 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.                                                                    |
| <b>ANSI</b>            | American National Standards Institute. ANSI character set: used by Microsoft Windows and Windows applications. The character assignation only differs slightly from the assignation of the ASCII character set.                                                                                                                                                 |
| <b>ASCII</b>           | <b>A</b> merican <b>S</b> tandards <b>C</b> ommittee of <b>I</b> nformation <b>I</b> nterchange. ASCII character set: standard character set used by IBM and compatible computers. The ASCII character set consists of 256 characters, the first 128 of which are standardized.                                                                                 |
| <b>AVI</b>             | Abbreviation for <b>A</b> udio <b>V</b> ideo <b>I</b> nterleaved, standard format for digital video.                                                                                                                                                                                                                                                            |
| <b>BIOS</b>            | <b>B</b> asic <b>I</b> nput <b>O</b> utput <b>S</b> 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.). |
| <b>Bit</b>             | <b>B</b> inary <b>D</b> 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. To display a character (letter, number etc.), 8 bits = 1 byte are required.                                                                                               |
| <b>Bus</b>             | In a computer, the bus provides 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 (1 byte) at a time.                                                                                 |
| <b>Byte</b>            | 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).                                                                                                                        |
| <b>CD-ROM</b>          | CD-ROMs are mass storage media for digital data, such as digital video. CD-ROMs can only be read.                                                                                                                                                                                                                                                               |
| <b>Clock frequency</b> | Rate at which individual commands are processed in a processor. The higher the clock frequency, the quicker the commands are processed.                                                                                                                                                                                                                         |
| <b>Color depth</b>     | 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 $2^{24}=16,777,216$ (→ True Color) colors are available.                                                                                           |
| <b>Composite video</b> | Composite video encodes all image information in one signal.                                                                                                                                                                                                                                                                                                    |
| <b>Data rate</b>       | Data per second, e.g. amount of data which a mass storage medium (hard disk or CD-ROM) saves/plays back per second or the amount of data of a video sequence per second.                                                                                                                                                                                        |
| <b>Digital video</b>   | Digital video stores information bit by bit in a file (in contrast to analog storage media).                                                                                                                                                                                                                                                                    |
| <b>Direct3D</b>        | A software interface developed by Microsoft for 3D games and other 3D applications under Windows 95. Enables Direct3D-capable applications to access 3D hardware efficiently.                                                                                                                                                                                   |
| <b>DirectDraw</b>      | Software interface developed by Microsoft for Windows 95 which enables applications to access the graphics hardware.                                                                                                                                                                                                                                            |
| <b>DirectVideo</b>     | Successor of Video for Windows for Windows95. Has been expanded by Microsoft and will be designated by ActiveMovie in future.                                                                                                                                                                                                                                   |

|                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>DirectX</b>                 | Direct (X) Extensions is a collection of several system extensions developed by Microsoft for Windows 95 (among others DirectDraw, Direct3D), to enable video and games acceleration.                                                                                                                                                                                                                                                                                                                                             |
| <b>Dithering</b>               | By using color patterns the number of the colors to be perceived by the eye is artificially increased. In this way, smoother color transitions are provided for the volume model.                                                                                                                                                                                                                                                                                                                                                 |
| <b>DOS</b>                     | The <b>Disk Operating System</b> is an old operating system for PCs ( <b>P</b> ersonal <b>C</b> omputers). MS-DOS is the DOS that is supplied by Microsoft.                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Driver</b>                  | 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.                                                                                                                                                                                                                                                           |
| <b>DVD</b>                     | <b>D</b> igital <b>V</b> ersatile <b>D</b> isk. Newest mass storage media for audio and digital video with a storage capacity of up to 4,6 G. To be able to play back DVDs, a DVD drive is required.                                                                                                                                                                                                                                                                                                                              |
| <b>FBAS</b>                    | Color video signal, composed of the chromacity signal, the image content, the blanking signal and the Sync signal.                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Filtering</b>               | Individual frequency components of a signal are registered and attenuated or amplified depending on requirements. Flickering of a color TV image, for example, can be reduced or suppressed by filtering.                                                                                                                                                                                                                                                                                                                         |
| <b>Fixed-frequency monitor</b> | Monitor operating at a very small frequency range.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Gamma correction</b>        | The concentrations of the color components Red, Green and Blue on a monitor can be modified individually or together.                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Glide</b>                   | This software interface was defined by 3Dfx. It serves to ensure standard communication between 3D applications and the PC's hardware.                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>Graphics board</b>          | 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.<br><br>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 available (the higher the resolution) the more detailed characters and graphics can be displayed. |
| <b>Hardware</b>                | The hardware includes all computer components which are "hard", such as the monitor, the hard disk, the keyboard, the mouse and the printer.                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Hidden Lines</b>            | Displaying a 3D model as a surface model; only the lines which are covered are not shown.                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Horizontal scan rate</b>    | 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.                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Interface</b>               | 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.                                                                                                                                                                                             |
| <b>Interlaced</b>              | Image refreshing technique: the screen is subdivided into lines. When refreshing the image first all even lines and then all odd lines are refreshed.                                                                                                                                                                                                                                                                                                                                                                             |
| <b>ISA bus</b>                 | <b>I</b> nternational <b>S</b> tandard <b>A</b> rchitecture. 16-bit bus which transfers 8 MByte of data per second at a clock frequency of 8 MHz.                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>KB</b>                      | 1 KB (Kilobyte) is equal to 1024 bytes. Here "K" (kilo) is always equal to "1024".                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>MB</b>                      | 1 MB (Megabyte) equals 1024 KB.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

|                               |                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>MPEG</b>                   | Abbreviation for <b>M</b> otion <b>P</b> ictures <b>E</b> xperts <b>G</b> roup. Standard for the compression of moving images.                                                                                                                                                                                                                                                                                       |
| <b>Multifrequency monitor</b> | A multifrequency monitor adapts itself automatically to different frequencies supplied by the graphics board and can display different resolutions.                                                                                                                                                                                                                                                                  |
| <b>Non-interlaced</b>         | Image refresh method, where the complete image is generated without skipping lines. A non-interlaced image flickers much less than an interlaced image.                                                                                                                                                                                                                                                              |
| <b>NTSC</b>                   | Color TV standard with 525 lines and 60 frames per second, mainly used in the USA and Japan.                                                                                                                                                                                                                                                                                                                         |
| <b>Operating system</b>       | 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.                                                                                                                                                                                                                                 |
| <b>PAL</b>                    | German color TV standard with 625 lines and 50 frames per second.                                                                                                                                                                                                                                                                                                                                                    |
| <b>Parallel Projection</b>    | With this type of representation the vanishing point for parallel edges of an object is located in the infinity.                                                                                                                                                                                                                                                                                                     |
| <b>PCI Local Bus</b>          | <b>P</b> eripheral <b>C</b> omponent <b>I</b> nterconnect. Local Bus concept by Intel: 32-bit bus, a PCI bus can transfer 132 MByte per second (max.) at a  clock frequency of 33 MHz.                                                                                                                                            |
| <b>Perspective Projection</b> | With this type of representation parallel lines of an object meet at one point (vanishing point) in the distance. Objects near the viewer appear larger than objects                                                                                                                                                                                                                                                 |
| <b>Pixel</b>                  | Picture element. Pixels are the smallest elements of a monitor.                                                                                                                                                                                                                                                                                                                                                      |
| <b>Pixel frequency</b>        | Rate at which the pixels appear on the screen.                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Plug &amp; Play</b>        | This term designates particularly easy installation of hardware components as enabled under Windows 95.                                                                                                                                                                                                                                                                                                              |
| <b>Projection</b>             | Displaying an object of a higher dimension (e. g. three-dimensional) using a lower dimension (two dimensions).                                                                                                                                                                                                                                                                                                       |
| <b>RAM</b>                    | <b>R</b> andom <b>A</b> ccess <b>M</b> 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.                                                                   |
| <b>Refresh rate</b>           | Also vertical scan rate. Number of image refreshes per second measured in Hertz (Hz). The higher the vertical scan rate the less flicker.                                                                                                                                                                                                                                                                            |
| <b>Rendering</b>              | Calculating and displaying a realistic surface of a volume model.                                                                                                                                                                                                                                                                                                                                                    |
| <b>Resolution</b>             | 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.                                                                                                                                                                                 |
| <b>RGB</b>                    | Abbreviation for <b>R</b> ed, <b>G</b> reen and <b>B</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.                                                                                                                                                                     |
| <b>ROM</b>                    | <b>R</b> ead <b>O</b> nly <b>M</b> 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. |
| <b>Rotation</b>               | The objects rotates around an axis.                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Scaling</b>                | Adaptation of an image to a different size.                                                                                                                                                                                                                                                                                                                                                                          |

|                            |                                                                                                                                                                                                                                                                                                |
|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Serial interface</b>    | Also RS232. The serial interface transfers data through a data line bit by bit. 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). |
| <b>Shading</b>             | Transition from the wireframe representation to the volume representation.                                                                                                                                                                                                                     |
| <b>Software</b>            | General term for all programs a computer can run (system programs, application programs, drivers etc.) and files                                                                                                                                                                               |
| <b>SVHS</b>                | Super-VHS is an enhanced version of the VHS system which offers a higher image quality (resolution).                                                                                                                                                                                           |
| <b>S-Video</b>             | With S-Video signals the brightness (luminance) and the color information (chrominance) are transferred separately                                                                                                                                                                             |
| <b>Trilinear filtering</b> | Trilinear filtering improves display quality when using D3D and Glide. It is also referred to as 3D filtering.                                                                                                                                                                                 |
| <b>TrueColor</b>           | 16.7 million colors can be displayed at a time.                                                                                                                                                                                                                                                |
| <b>Vertical scan rate</b>  | → Refresh rate                                                                                                                                                                                                                                                                                 |
| <b>VGA</b>                 | <b>V</b> ideo <b>G</b> raphics <b>A</b> rray (IBM), graphics board which displays 256 colors in the graphics mode.                                                                                                                                                                             |
| <b>Video decoder</b>       | Converts analog signals into digital information.                                                                                                                                                                                                                                              |
| <b>Video encoder</b>       | Converts digital information into analog signals.                                                                                                                                                                                                                                              |
| <b>Video for Windows</b>   | Video for Windows is a Microsoft Windows system extension which allows to record, to store and to play back video sequences from hard disk.                                                                                                                                                    |
| <b>Video-CD</b>            | CD-ROM standard with MPEG videos you can play back using a CD-ROM drive and an MPEG decoder board.                                                                                                                                                                                             |
| <b>Volume Model</b>        | Surfaces are displayed with filled interiors.                                                                                                                                                                                                                                                  |
| <b>Windows</b>             | <i>The most common operating system for PCs (Personal Computers). There are different versions in existence: Windows 3.1x, Windows 95 and Windows NT</i>                                                                                                                                       |
| <b>Wireframe Model</b>     | Display of a three-dimensional object where only the edges are visible.                                                                                                                                                                                                                        |
| <b>Z-Buffer</b>            | This memory allows the 3D hardware to identify covered 3D objects more easily.                                                                                                                                                                                                                 |