

**CALIFORNIA™
GRAPHICS
& PERIPHERALS, INC.**

3D EMOTION

USER'S GUIDE

1.1 version

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Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

Consult the retailer or an experienced Radio/TV technician for help.

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Use only shielded cables to connect the monitor to this equipment.

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Chapter 1 - Introduction

Company Overview

Headquartered in Fremont, California, USA, California Graphics & Peripherals Inc. is a world-wide operation that draws on skills from around the world to create a global company. Specialising in bringing state of the art technology to the PC user, the company's key strengths are in the design and manufacture of motherboards and graphic accelerator cards. A synergetic relationship that enables the company to produce highly optimised products, which deliver the stunning performances required for today's demanding computer environment.

The company's European offices are in Naples, Italy with subsidiary companies in the UK and Spain that form part of its aggressive expansion program of creating local sales and technical support for customers. The Naples office also houses the company's software team that creates the company's advanced 3D drivers that bring out the best performances from their graphics cards. The Asia Pacific region is serviced out of its Taipei office in Taiwan, which is also responsible for production. Quality is the watchword of the company, which is reflected in its high levels of quality control and manufacturing. For example, by using four layer PCBs and full surface mount assembly, the company is able to provide such high quality products that they are backed by a lifetime warranty.

3D Market Overview

Graphics for the PC is one of the most rapidly advancing technology areas. It was only a few years ago that the only choice in colour displays was green and black or amber and black. Now you can have millions of colours on a PC's monitor. To obtain these colours requires a graphics card in the PC that can convert the signals from the PC into instructions for the monitor.

The three latest stages in the evolution of these graphics cards are 2D, Video and 3D. Now, every card can do excellent 2D graphics. Similarly, if you want video, then there are cards available that can display up to four separate videos simultaneously on a monitor. This leaves 3D where the technology is still evolving and cards can vary tremendously in their performance.

California Graphics specialises in providing the best 3D graphics cards for games. We understand the needs of the games player who wants full colour, fast action, and high frame rates for the best entertainment.

The 3D Emotion is our latest offering which goes a stage further by providing a real three dimensional display. Special glasses enable you to enter a new era of entertainment with depth perception and things leaping out of the screen. It's like a window onto a whole new world.

You've made the right choice by buying a 3D Emotion. Prepare to immerse yourself in the new experience of 3D Emotion...

Product Overview

- High Performance **128-bit Alliance ProMotion AT25** 2D graphics and multimedia processor
- Advanced **3Dfx Voodoo Rush** 3D texture map and pixel rendering engines with hardware triangle setup
- **6MB** single-cycle 30ns EDO DRAM
- **Composite and S-video outputs** allowing direct connection to NTSC or PAL TV monitors
- Special connector for **cordless 3D glasses**
- Chrontel's CH7002 VGA to NTSC/PAL Encoder
- MPEG1 and MMX-optimized MPEG2 (**DVD playback**) support
- 1600x1200 in 65,536 colors and 1280x1024 in true color
- **Refresh rates up to 200 Hz**
- Microsoft DirectX™ 5.0 support
- High performance drivers for Windows 95 and Windows NT4.0
- **VBE 2.0 support** for superb DOS games performance
- 35 FPS high game speed
- VESA DPMS, DDC 2B support for Plug-and-Play
- VMI connector for DVD and live video input
- CGP REALITY PRO Software
- CGP GAMES PACK (de-luxe version only)
- **Lifetime warranty**

Bundled Titles

An incredible choice of latest stunning 3D games are bundled with **3D Emotion**.


















The 3Dfx optimized versions are provided from two well-known software houses, Interplay Productions® and Eidos Interactive®.

You will be amazed just how amazing the hugely popular MDK, TOMB RAIDER, CARMAGEDDON and TERRACIDE games are when played on your new 3D Emotion.

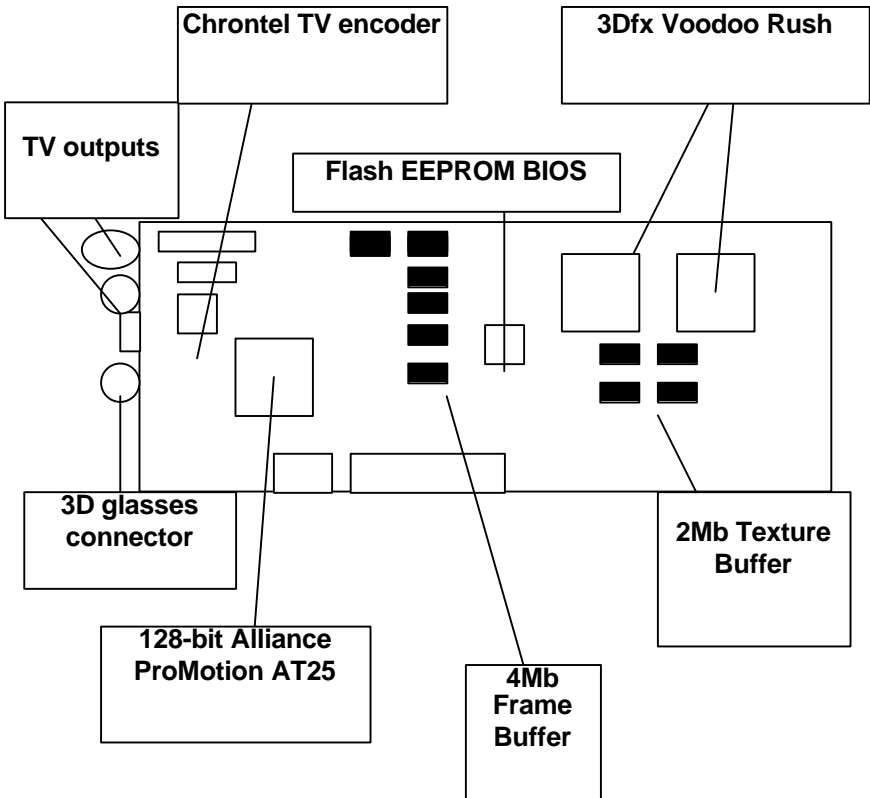
Prepare to enter stunning new worlds of the imagination!

CGP GAMES PACK

Resolution and refresh rates

Resolution	Colors	6MB	Refresh Rates max
640x480 640x480 640x480	256 65k 16M	  	200 Hz 200 Hz 200 Hz
800x600 800x600 800x600	256 65k 16M	  	160 Hz 160 Hz 120 Hz
1024x768 1024x768 1024x768	256 65k 16M	  	100 Hz 100 Hz 85 Hz
1152x864 1152x864 1152x864	256 65k 16M	  	85 Hz 75 Hz 75 Hz
1280x1024 1280x1024 1280x1024	256 65k 16M	  	85 Hz 75 Hz 60 Hz
1600x1200 1600x1200	256 65k	 	75 Hz 60 Hz

Board's layout



Chapter 2 - Hardware installation

Thank you for purchasing a California Graphics 3D EMOTION board. This guide is written for those who are familiar with the installation of PC peripherals and software applications, and as a reference for experienced users. If you are new to installing PC peripherals and software applications, follow the step-by-step instructions and figures in this manual to guide you through the installation procedure.

If you are already experienced in hardware and software installation, you may only use this guide when you need a detailed explanation about specific steps in the installation procedure. If you still have questions after using this manual, you may need to seek assistance from California Graphics or consult your dealer or computer operations guide.

System Requirements

To run the 3D Emotion you need the following equipment:

- ❑ An IBM or fully compatible Pentium-based or similar PC, which complies with the PCI local bus specification and which has a spare PCI bus slot.
- ❑ A high-resolution analogue RGB SVGA monitor (multi-sync recommended).
- ❑ A TV screen featuring a SCART or S-VHS connector (*optional*).
- ❑ Windows 95 or later, or equivalent.

Before you begin

Before you start the installation procedure, please make sure that your computer meets the computer requirements previously specified. If you are not sure whether your computer meets the minimum requirements, contact your dealer before unpacking the 3D EMOTION package.

Once you are sure your system meets the necessary requirements, prepare a clean workspace, and gather the tools you will need. For the installation of the kit components, you will need a small screwdriver and a container to hold the loose screws.

Carefully unpack the box contents. Leave the video board in its static-resistant packaging until later in the installation procedure. This protective

packaging has been specially designed to protect the card from potential damages caused by static electricity.

Checklist

Please check that your package is complete and contains the items below. If you discover damaged or missing items, please contact your dealer.

- ✓ The 3D EMOTION video card
- ✓ This User's Manual
- ✓ 1 CD labeled "CGP Software Pack"
- ✓ 4 CD Games (de-luxe version only):
 - ✓ MDK Mission Laguna Beach by Interplay Productions
 - ✓ Carmageddon by Interplay Productions
 - ✓ Terracide by Eidos Interactive
 - ✓ Tomb Raider by Eidos Interactive

Handling the 3D Emotion board

Static-sensitive electricity discharge can damage electronic components. To prevent any damage to your card, it is important to handle it very carefully. The following measures are generally sufficient to protect your equipment from static discharge.

Precautions :

- ❑ Keep the board in its anti-static bag until you are ready to install it.
- ❑ Touch a grounded metal object before you remove the board from the anti-static bag.
- ❑ Handle the board by its edges only; do not touch the printed circuit board.
- ❑ Do not place the card on top of your computer or any other metal surface.
- ❑ Make sure that the card is not accidentally touched by anyone else.
- ❑ Handle the card with care to avoid damage to the fragile electronic components mounted on the circuit board.

Note : The card is shipped in anti-static packaging to avoid static damage. When unpacking the card, be sure the person handling the board is static-protected.



You may find it helpful to have to hand the user's guide of the operating system used and any other documentation supplied with your PC and computer monitor.

Installation procedure

Switch off your computer and any hardware devices such as printers connected to your computer.

While the cables are still connected to your computer, you may want to label them in order to reconnect them properly once the installation process is finished.

Disconnect your monitor cable from your computer. Some cables may be attached to their connectors by small screws. Make sure to unscrew any secured cables before attempting to disconnect the cable from the back of the computer.

Remove the computer's cover. You may need to refer to the documentation supplied with your computer for instructions on how to do this. Keep the screws as you will need them later to secure the card.

If this is the first time you have opened up your computer, take a moment to familiarise yourself with the layout of the inside of the computer.

Remove any existing graphics adapters that may be in the system or disable your built-in graphics controller. Refer to the documentation supplied with your computer for instructions on how to disable a built-in graphics controller.

Locate an empty PCI expansion slot where you wish to install your video card.

With your finger follow the expansion slot to the end closest to the outside of the computer. You will find there is a metal or plastic cover on the expansion slot where the edge of the card will eventually be attached. The slot cover will be attached by at least one screw. Unscrew the expansion slot cover and place the screws and slot cover in a container so as not to lose them.

Touch the bare metal chassis of your computer with the back of your hand to discharge any static that may have built up on you or your clothes.

Align the 3D Emotion with the slot you have chosen. Firmly press the card into the slot. You will need to use some pressure to push the card into position, but do not use excessive force. The PCI connectors should be on the bottom edge of the card that will be inserted into the PC expansion slot.

Once in the slot, secure the video card using the screws removed previously.

Replace the cover of your computer.

Connect your monitor cable to the 3D Emotion card. All cables connected to 3D Emotion should be properly shielded and comply with radio frequency interface standards.

Switch on your computer and your monitor.



For TV viewing, turn off your PC and connect an RCA/SCART cable between the S-VHS or composite output on the 3D Emotion card and the SCART connector on your TV. Then turn on the TV and select the AV channel. The 3D Emotion find automatically the TV devices, no manual settings are needed.

Chapter 3 - Drivers Installation

Windows 95 (Standard edition and OSR2 release)

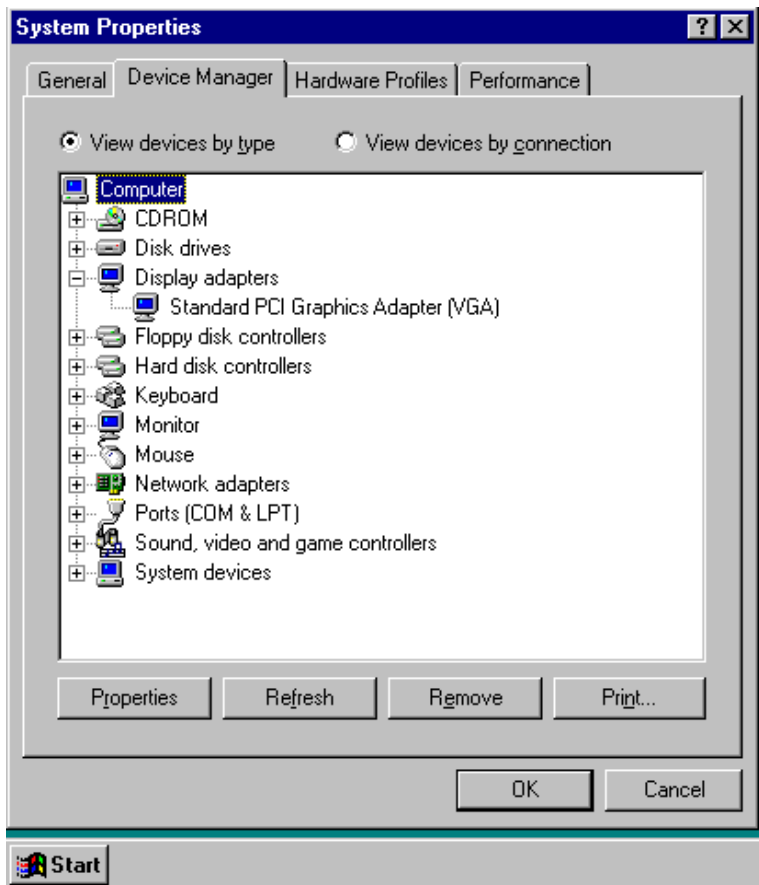
(Driver Version 4.10.00.2059)

Requirements:

- Windows 95
- PC with a Pentium or similar processor and a free PCI slot
- 16MB of RAM minimum

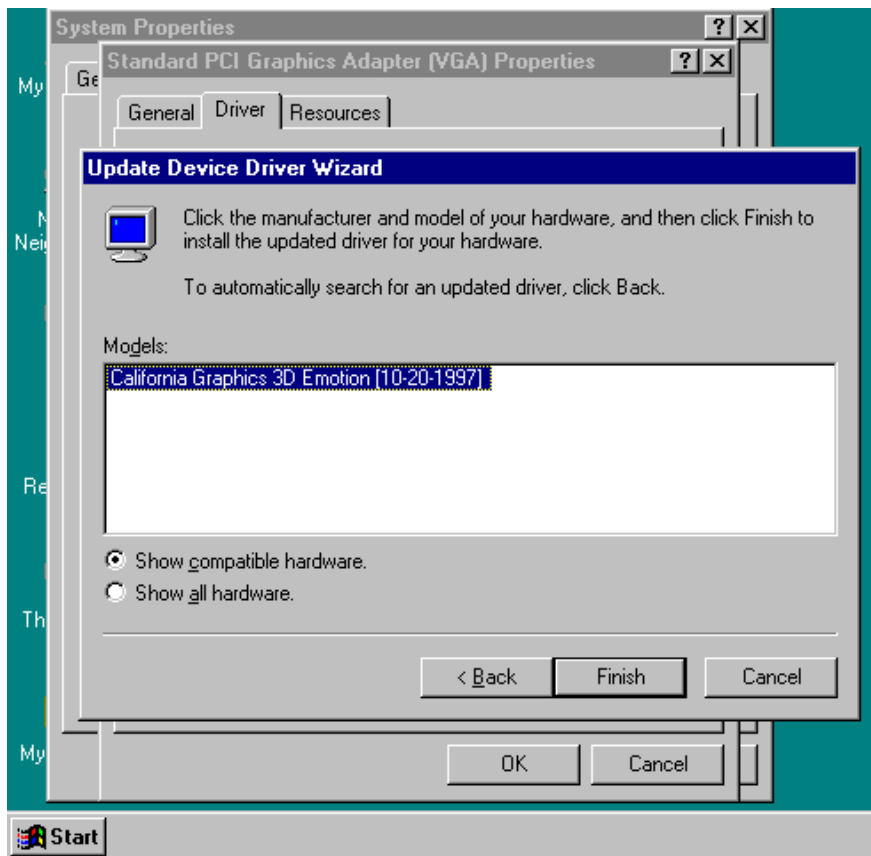
First Time Installation

1. Start Windows 95
2. Once Windows 95 starts you may be notified that no video device exists, click Cancel if this message appears



- Windows 95 will detect a new VGA Compatible Display, you need to:
 - Windows 95 Standard Release users: Select "Use Driver from Manufacturer" and click OK
 - Windows 95 OEM SR2 users: Click the Next Button on the Detection Dialog Box

4. You may then be prompted to enter the path to the drivers. Insert the CD labeled "CGP Software Pack" provided with your 3D Emotion board and type: d:\drivers\3dem-win95. Click OK.
5. When asked to choose a device, select "California Graphics 3D Emotion"



6. Windows will copy the drivers. Reboot the system when prompted

7. After reboot, verify that Windows 95 runs. If Windows 95 hangs, power the system off and verify that the 3D Emotion is installed correctly and is functioning.
8. Install DirectX 5.0 from CD



Once you have installed the correct display drivers, you have to install Microsoft Direct X 5.0 even if you had already installed it.

Upgrade Existing AT25/Voodoo Rush Drivers:

- 1) Start Windows 95
- 2) Click Start, Control Panel. Double-click on Display.
- 3) Click the settings tab
- 4) Click Change Display Type
- 5) Under Adapter Type, click Change
- 6) Click Have Disk
- 7) Insert the CD labeled "CGP Software Pack"
- 8) You will be prompted as follows:

-Windows 95 Standard Release users: Enter the path to the drivers:
d:\drivers\3dem-win95

-Windows 95 OEM SR2 users: Click the Next Button, no updated drivers will be found. Click on "Other Location" then enter the path to the drivers:
d:\drivers\3dem-win95

- 9) When asked to choose a device, select "California Graphics 3D Emotion"
- 10) Windows will copy the drivers. Reboot the system when prompted

11) Install DirectX 5.0 from CD



Running 640x480, 16 Color Win95 will use SUPERVGA.DRV or VGA.DRV. No Voodoo Rush features will be used. Switch to a different resolution or color depth.

Windows NT 4.0 Video Drivers Installation

(Driver Version 4.00.1008)

1. If you are installing Windows NT 4.0 for the first time, the system will detect the 3D Emotion as a «VGA compatible display adapter».
2. If Windows NT 4.0 is already installed, boot your system and enter Windows NT (VGA mode) from the Boot Manager. When the system boots up, the following message will appear: «The currently selected display resolution is invalid». Click «OK» to enter the «Display Properties» screen.
3. In the "Settings" screen, click on the "Display Type..." button.
4. From the "Display Type" screen, and in the "Adapter Type" section, click on the "Change..." button.
5. In the "Change Display" screen, click on the "Have Disk..." button.
6. Insert the disk labeled "CGP Software Pack) and enter the path to the driver: d:\drivers\3dem-winnt4. Click on the "OK" button.
7. Select «3D Emotion» and click «OK».
8. From "Third-party Drivers", click on the "Yes" button to proceed.
9. If a message appears stating the driver is already installed on the system, and asks if you want to use the current or new drivers, be sure to select the "New" button.
10. If prompted for the driver diskette a second time, click on the "Continue" button.
11. When the message "The drivers were successfully installed" is displayed, remove the display driver diskette, then click on the "OK" button.
12. Back at the "Display Type" window, click on the "Close" button.
13. Back at the "Display Properties" window, click on the "Close" button.
14. When you see the "System Settings Change" window, asking if you wish to restart your computer, click on the "Yes" window to reboot now.
15. When Windows NT starts (not in VGA mode), the system will inform you that a new graphics driver has been installed. When prompted, click «OK» to enter the Display Property Screen» and follow the usual procedures to select the desired video mode. (Refer to Microsoft NT User's Guide).



If installing Windows NT 4.0 with the 3D Emotion device currently installed in the system, proceed through the Windows NT installation as normal. The installation program will prompt you to choose a display mode. Choose the "Cancel" button from the "Display Settings" screen to ignore this step for now. The installation will now finish. Once Windows NT has started for the first time, proceed to follow the steps outlined above to install the driver for your 3D Emotion device.

Display properties (Windows 95)

Once installed the correct drivers and reboot, the system will add three new sections to the Display Properties of the Control Panel:

- ◆ Voodoo Rush + AT25
- ◆ Monitor Control
- ◆ TV Features

Voodoo Rush + AT25

This section allows to quickly get all the general information about the 3D Emotion in the system.

Get here info about:



- Current Driver version (e.g. 4.10.00 – build 2059)
- Working resolution, colors and refresh rates
- Running Glide version (e.g. 2.43.00)
- Current BIOS version (e.g. 4.35.00 - build 11)
- Current Gamma and Chroma settings (see at page 25)

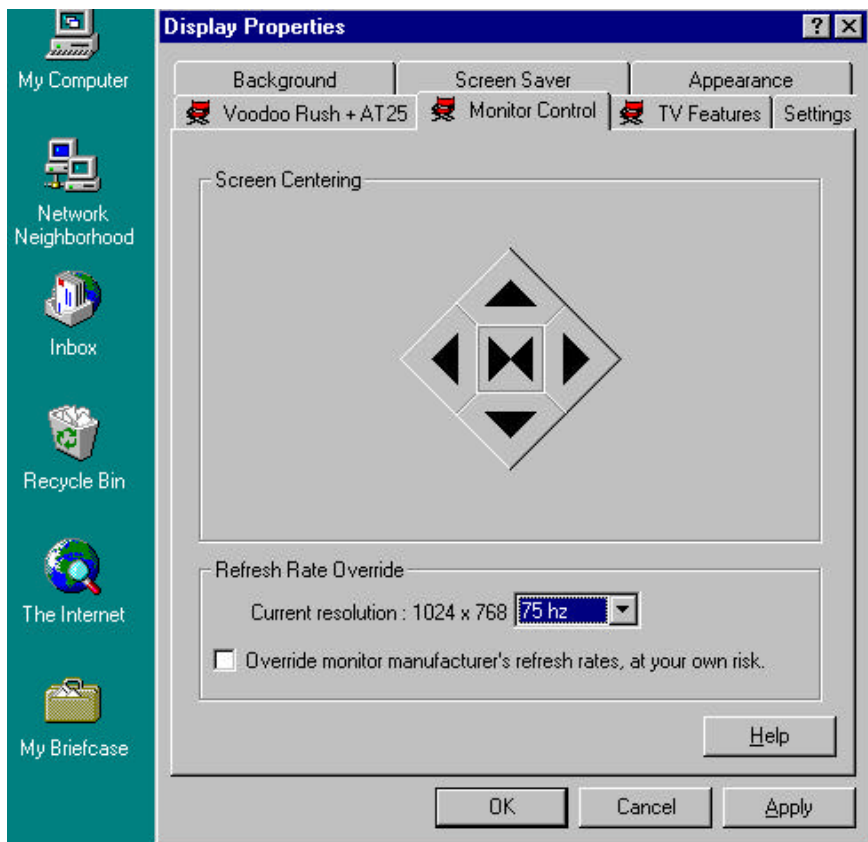
Performance:

- *Allow PCI retries*
May fix sound problems when playing video clips
- *Force all full screen 3D modes to 60Hz*
Can increase frame rates and game performances

*Note: Memory size displays 4.0Mb. This value is for frame buffer memory. Don't worry about this.

Monitor Control

This section enables you to change the refresh rate value and to move the screen.



Screen centering: give the possibility to move the monitor screen area in order to better display the desktop. This would be very useful if you often change the resolution or the refresh rate.

Refresh rate override: check the current resolution and allows to change the refresh rate.

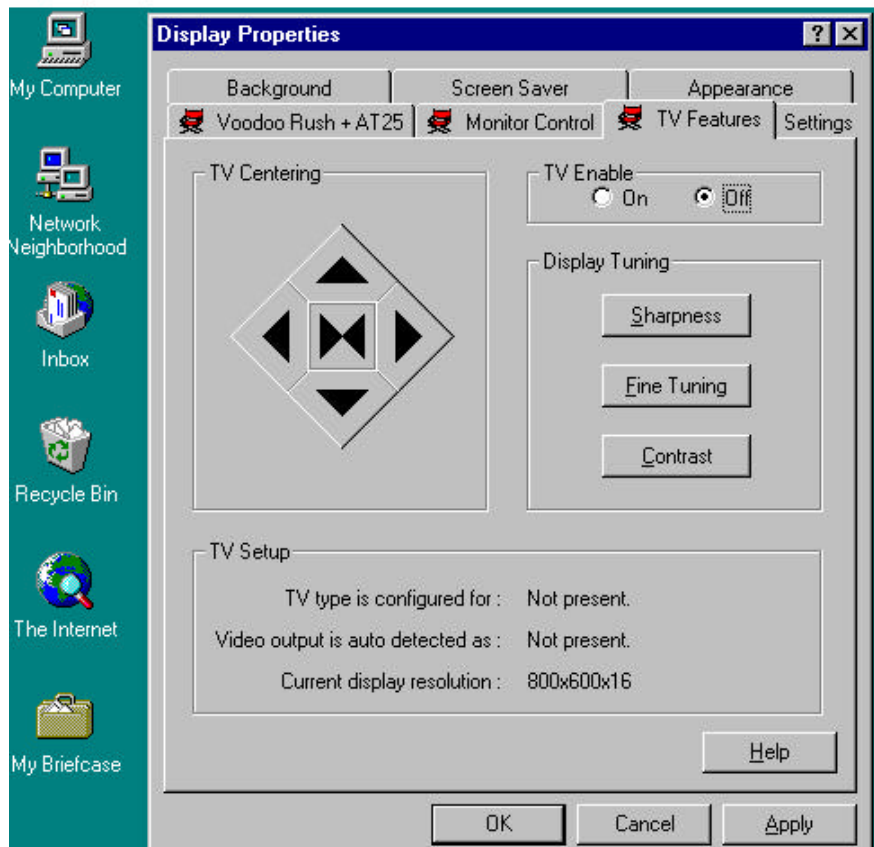
Override monitor manufacturer's refresh rates, at your own risk: the system does not check the Monitor-supported refresh rates and allows you to select higher values.



**Check our web site
<http://www.calgraph.com> and download the
latest drivers version available.**

TV Features

This section enables you to control the TV adjustments and to move the screen.



TV CENTERING: give the possibility to move the TV screen area in order to better display the desktop.

TV ENABLE: set to on only if you have the TV connected

DISPLAY TUNING:

- **SHARPNESS**
EDGE SHARPNESS BOOST: improve the edge's visualization; default is low
ENHANCED TEXT: improve the types displaying; default is off
- **FINE TUNING:** perform small visual adjustments; default is low
- **CONTRAST:** increase or decrease the contrast; default is a bit lower than the middle of the range.

*Note: when TV is on, the monitor's screen size become a little bit smaller. To restore the original setting, set TV ENABLE to off and change the refresh rate



Common TV usually support resolutions up to 800x600. Don't increase this value if you are using the simultaneous viewing option, or the TV will stop working.

Gamma/Contrast

Gamma correction is a technique used to correct for the non-linear characteristics of display devices and the human eye.

Once installed the correct drivers, in the taskbar will appear a small multi-colored icon.

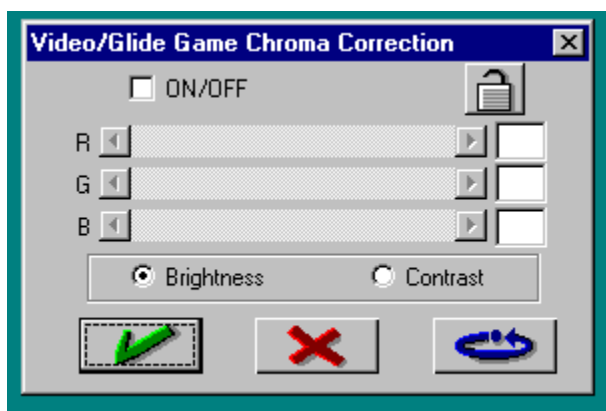


This icon give the access to two options:

- *Desktop/Direct 3D Game Gamma Correction:* allows to modify the Brightness and the Contrast values, when running a Direct 3D game in a window or simply for desktop. Close the padlock on the top-right to change all the three R, G and B values simultaneously.



- *Video/Glide Game Contrast Correction:* allows to modify the Brightness and the Contrast values, when running a video in a window or a Glide game. Close the padlock on the top-right to change all the three R, G and B values simultaneously.



Chapter 4 - Software Tools

CGP Reality Pro

Introduction

The CGP Reality Pro provides an advanced, easy-to-use set of Windows 95, performance enhancing utilities that enable the user to quickly and easily control and customize the display.

It also provides sophisticated set-up routines for all aspects of the usage of the graphics cards.

The CGP Reality Pro features advanced monitor adjustment tools for changing resolution and color depth on the fly, linking a particular application with a specific video mode and many other properties.

Key to this new suite of software is the navigation interface of a rotating cube. Each surface is divided into a number of squares, each with an icon, that control various functions and is activated by clicking on the relevant icon.

It comes with stunning three-dimensional effects and is upgradeable through plug-ins, to enhance the software's capabilities.



Installation

1. Insert the CD labeled "CGP Software Pack" (run *Setup.exe* if you have disabled the *Autorun* option)
2. Select «*Install CGP Reality Pro*» .



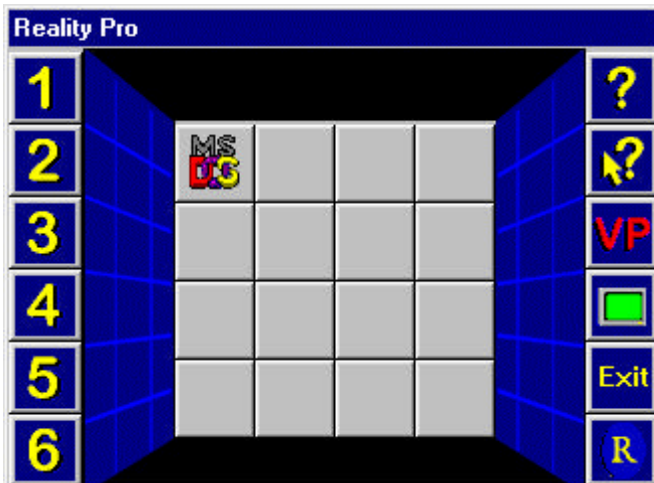
3. Choose the target directory (e.g. c:\Program Files\California Graphics Reality Pro).
4. Once finished, start the program in the Reality Pro folder from the Startup menu.
5. To Uninstall the program, select «*Uninstal*» in the Reality Pro folder from Startup menu.

Reality Pro Console

The Reality Pro Console (R.P.C.) is the Reality Pro's headquarters, i.e. the main interface to handle all the software functions.

The R.P.C. allows you to manage the Reality Objects as well as quickly control display properties, such as screen size, color depth and refresh rate.

Graphically, the R.P.C. features two toolbars, one on the right and another one on the left. Between them is displayed one of the face of the cube -- the heart of CGP Reality Pro. Obviously, this cube has six faces, each with sixteen buttons.



The six faces of the Cube are switchable using the left toolbar. Click on one of the 1 to 6 buttons and the Cube starts to rotate and, at the end, displays the face selected. Each of the ninety-six buttons available (i.e. 6 faces x 16 buttons gives a total of 96) allows you to create an Object Reality.

The right toolbar allows you to handle the following functions:

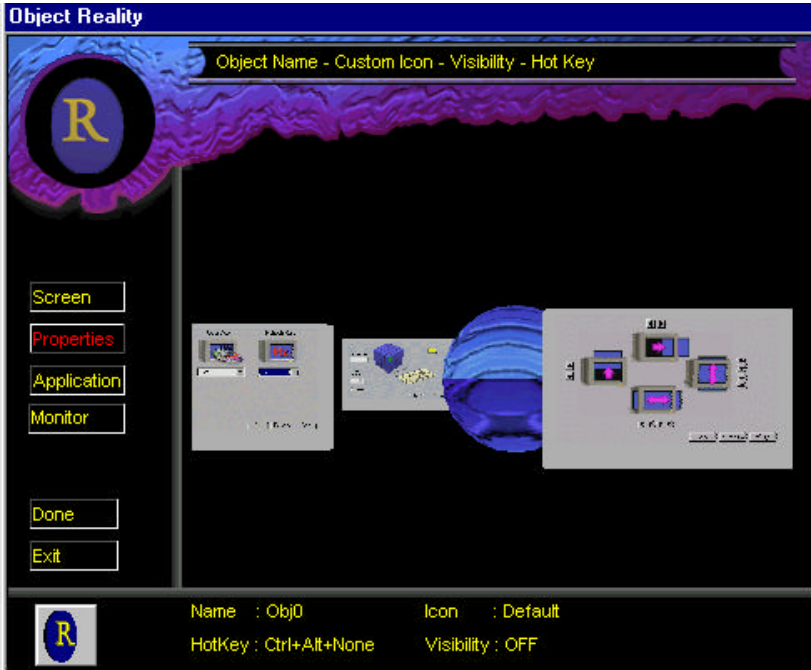
- ◆ *Help* (starts Help-on-line)
- ◆ *Context-sensitive Help* (starts a specific Help-on-line chapter)
- ◆ *Video Properties - VP* (starts W95 Display Properties)
- ◆ *Current display settings* (small green icon, displays current settings into a tool tip)
- ◆ *Exit* (quit the program)
- ◆ *About* (provides general info about software release and maker)

To create an O.R., left-click any empty button of the face selected. A menu is showed, where the only option enabled is *Create*.

The following section describes step by step how to create an Object Reality.

Reality Pro Desk

The Reality Pro Desk (R.P.D) allows you to create an Object Reality (O.R.).



A customized O.R. can be created by assigning to it some specified properties.

An Object Reality (O.R.) could be:

- ◆ a program
- ◆ a file
- ◆ a display setting (e.g. : screen size and color depth)
- ◆ a mix of any previous items

The O.R. properties basically consists of the following:

1. Screen - set the resolution, color depth and refresh rate
2. Properties - name, visibility, hotkey for O.R.
3. Application - link an application to run with O.R.

Screen

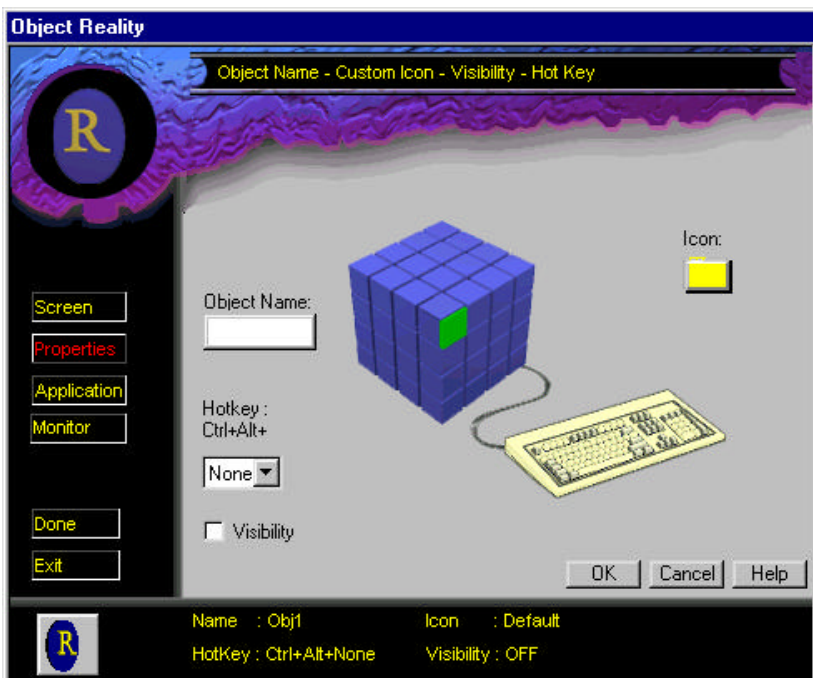
This window allows you to link the Object Reality to run some display properties.



You can assign a specific resolution, color depth, refresh rate and Font size. Fonts size could be *Small*, *Large* or *No selection* (don't change default values).

Properties

This window allows to specify a name, an icon, an hotkey and the visibility for an Object Reality.



You can assign a name and a small icon, that will be helpful to identify the customized O.R. Therefore, it is possible to execute the O.R. using the keyboard, pressing simultaneously CTRL and ALT and the selected key. The Reality Pro Console must be active in order to use the hotkey. Be careful, do not use a key already used for another O.R., or the software will display an error message.

If you check the *Visibility* box, the current O.R. will appear on all the six faces. Unchecking this box, the O.R. will be on one face only.



Assigning a hotkey will make it easier to execute an Object Reality stored on a different Cube's face. You simply open the Console window and press the keys. In this way, you do not have to wait for Cube rotation.

Application

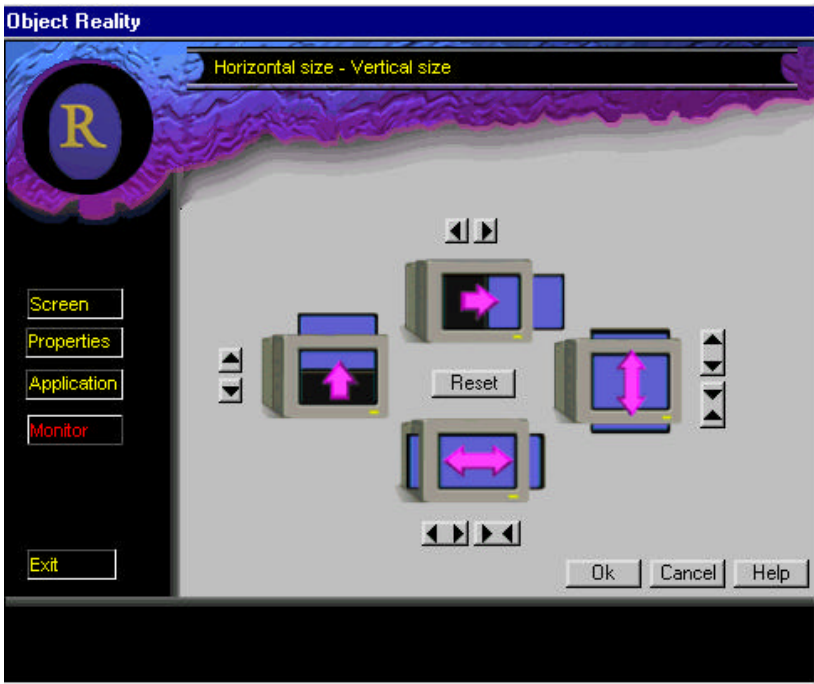
This window allows you to link an O.R. to run a specific application and some related properties.



You can link the O.R. to running an application stored in the hard disk. Click the small yellow folder icon to select the .exe path. Choose how to run the selected application by selecting *Normal*, *Minimized* or *Maximized* from *Run State* option, if you'd like to start the application as default, in the task bar or in full-screen mode.

Monitor

This window allows you to modify and move the desktop area on the screen.



You can re-size and move your screen display as required. The *reset* button allows you to cancel any changes and restore previous values. This option is very helpful if you frequently change resolution and/or refresh rate, as it saves you from having to keep adjusting the settings to optimize performance.

How to create an O.R. – an example

Let us suppose that we want to create an O.R. named «Browser», visible on all the six faces, executable simply by pressing CTRL+ALT+F12, that will allow us to start full screen Internet Explorer at 800x600,65k colors, at 72Hz refresh rate.

First step: left-click an empty button on one of the six Cube's faces and select *Create*. It will display the *Reality Pro Desk* window dialog.

Second step: click *Screen* and set 800x600 resolution, 65k colors and 72Hz refresh rate. Click *OK*.

Third step: click *Properties* and type 'Browser' into *Object Name* box, check the *Visibility* box and select the F12 key into *Hotkey* box. Click *OK*.

Fourth step: click *Application* and search for the Internet Explorer path, select *Maximized* into *Run State* box. Click *OK* and then *Done*.

The Object Reality labeled *Browser* has now been created.

Once the O.R. settings are created, a customized icon will be displayed on the button selected. Left-click this icon and a menu is showed, where the options enabled are *Execute* (to run the O.R.), *Modify* (to modify the O.R. properties) and *Delete* (to erase the O.R.).



It would be very helpful to link an application to your favourite resolution/refresh rate. So, for example, you can run a word editor at 800x600/256colors, and a graphics editor at 1024x768/16mil. colors.

Technical Appendix

Alliance ProMotion AT25

The ProMotion-AT25 is a high-performance integrated 2D and video accelerator. It incorporates an advanced rendering engine with a powerful Windows graphical user interface accelerator engine, unique motion video acceleration hardware and a high-precision DAC and clock generator - all in a single integrated 208-pin PQFP

package. The AT25 is fully pin-compatible with previous generation ProMotion-6422 and AT24 controllers.

The chip's **128-bit** internal architecture and ultra high performance memory interface give the AT25 a superior performance for a low-cost mainstream Windows accelerator. Hardware gamma correction and a full 256x24-bit CLUT ensure optimum color quality. The ProMotion-AT25 acts as the central media hub in a feature rich multimedia subsystem.

AT25's video input port implements a superset of the Video Module Interface (VMI) standard. The AT25 supports glueless 8/16-bit connection to live video decoders such as 7110 & 7111 with filtered downscaling, and an 8/16-bit host port connects to ISA or Motorola style devices, including audio, MPEG, and video-conferencing codecs. A hardware scaler with bi-linear filter and full line buffer smoothly scales playback or capture windows from native size up to full screen at full speed.

The ProMotion-AT25 also drives a proprietary 'THP' upgrade port jointly developed with 3Dfx Interactive, Inc., for high-performance seamless upgradability to arcade-quality 3D hardware acceleration.

3Dfx Voodoo Rush

The 3Dfx Interactive Voodoo Rush accelerator provides the highest performance 3D solution with full PC compatibility for multimedia graphics acceleration and works in conjunction with the ProMotion-AT 25 accelerator. This unique architecture allows the **3D Emotion** to give full, simultaneous access to the multimedia features of the 2D chip and the advanced 3D functions of this chip.

The Voodoo Rush provides real-time shading, texturing, and lighting of triangle data. Its features include 3Dfx's high-resolution depth-buffering with Gouraud shading, true perspective texture mapping using multiple-level-of-detail filtering, texture anti-aliasing, sub-pixel correction, alpha blending and dithering. Special effects such as fog and multi-pass texturing are also supported.

The Voodoo Rush uses a triangle-based graphics engine as the basis for both object rendering and texture mapping. It derives the parameters needed for its triangle engine internally. This frees the CPU from calculating these parameters and eliminates the need to transfer them over the PCI bus. The Voodoo Rush chip set has the ability to generate a wide range of special effects by combining textures. Texture compositing is accomplished by combining the texels from two different texture maps. Simulated lighting and special effects such as spotlights can be created through texture compositing.

Memory architecture

The Voodoo Rush uses the standard VUMA (Vesa Unified Memory Architecture) interface to connect to the ProMotion-AT 25 2D graphics accelerator.

The graphics accelerator provides ordinary DOS and Windows functionality, while passing 3D rendering commands to Voodoo Rush through a shared-memory command buffer. Voodoo Rush then renders the commands directly to the shared frame buffer memory.

This shared-memory approach gives a simpler and more affordable interface, and reduces the total amount of display memory required. In a Voodoo Rush system, 3D games can be played full-screen or in a window, unlike stand-alone 3D subsystems that generally allow only full-screen game play.

