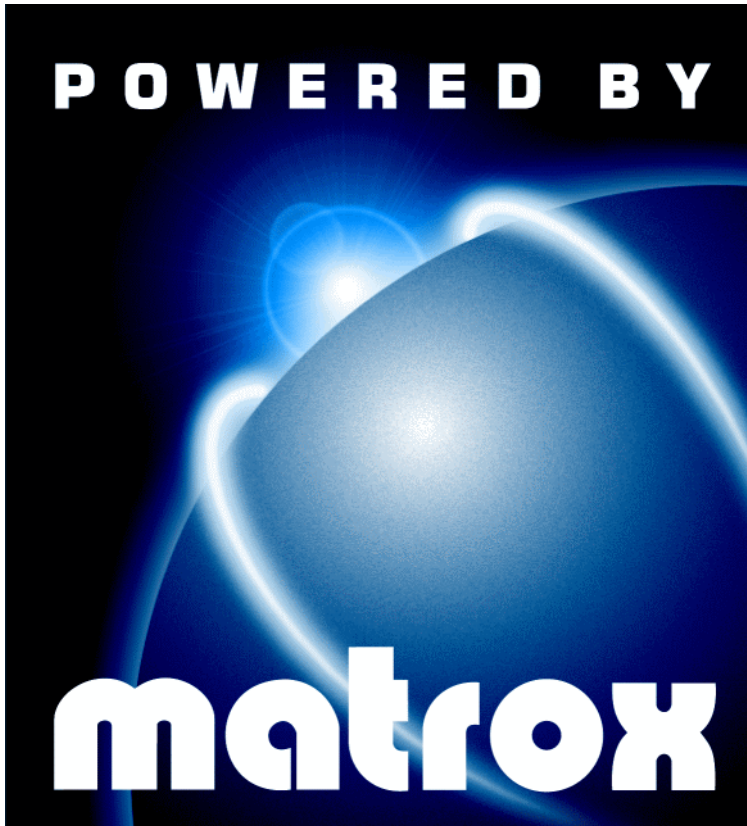


Matrox Graphics Architecture



ENGLISH

Millennium II / Mystique 220
• Installation Guide •

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Using this guide

Document conventions

This guide assumes you're familiar with basic functions like click, right-click and double-click, and that you're familiar with the basics of the operating system you're using. In addition, we use the following conventions:

- **Bold** for text that appears on-screen and subheadings.
- *Italics* for file and path names, publication titles, and new terms.
- ***Bold Italic*** for emphasis.
- **Green** for cross-references.
(When viewing online, click on green text to jump to the page being referenced.)
- Keyboard keys in square brackets, with a plus sign separating keys that you press simultaneously. For example: press [Ctrl]+[Alt]+[Del] to restart your computer.
- Arrows (“→”) to separate ordered directions.

For example:

Click the **Start** button → **Programs** folder → **MGA PowerDesk** folder;

is the same as:

- 1 Click the **Start** button.
- 2 Click the **Programs** folder.
- 3 Click the **MGA Powerdesk** folder.

Online documentation

We provide additional documentation in Help files, *readme* files, and Adobe Acrobat Portable Document Format (PDF) files. To view or print PDF files, use the **Acrobat Reader** program, which you can install from the Matrox Installation CD-ROM.

For context-sensitive Help where available, click the “**?**” icon in the title bar, then click the item you want help on. Right-click a Help topic for a pop-up menu that lets you print or copy it.

Overview

Thank you for purchasing a Matrox graphics card. Your Millennium II or Mystique 220 card is a high-performance graphics card that plugs into an expansion slot inside your personal computer. Matrox's 64-bit graphics engine gives you superior performance with Windows, digital video and 3D graphics. To further accelerate 3D programs, your Matrox card has hardware-based texture-mapping and uses bus mastering. This card supports display resolutions up to 1800 × 1440 and 1920 × 1200. You can also upgrade your Matrox card with more RAM or multimedia hardware add-ons.

Your Matrox graphics card is 100% VGA compatible and supports all VESA standards: VBE 2.0 (Super VGA modes), DPMS (energy saving), and DDC-2b (Plug-and-Play monitor).

Software supplied

- **MGA PowerDesk for Windows 95:** MGA display drivers; DirectDraw, DirectVideo and Direct3D support; **Settings, Monitor, Color, Hot Keys** and **Information** property sheets; **MGA Desktop Navigator** and **MGA QuickDesk** programs; online documentation
- **MGA PowerDesk for Windows NT 4.0:** MGA display drivers; DirectDraw and OpenGL support; **Settings, Monitor, Information, Performance** and **PowerDesk** property sheets; **MGA Desktop Navigator** and **MGA QuickDesk** programs; online documentation
- MGA AutoCAD and 3D Studio MAX drivers for Windows NT
- Fully accelerated drivers for Windows 3.1, Windows NT 3.51, OS/2 Warp 3.0 and 4.0, AutoCAD for DOS, and MicroStation for DOS
- Microsoft DirectX 3 and DirectVideo
- Adobe Acrobat Reader for Windows
- Online documentation
- Various third-party software

Installation overview

- 1 Install the hardware – see [“Hardware installation”](#), page 6.
- 2 Install the software –
 - for Windows 95 and Windows NT 4.0, see [“Software installation”](#), page 9.
 - for Windows 3.1, Windows NT 3.51, OS/2 Warp 3.0 and 4.0, AutoCAD for DOS, and MicroStation for DOS, see [“Other software”](#), page 14.

Hardware installation

WARNING: Static electricity can severely damage electronic parts. Take these precautions:

- Before touching any electronic parts, drain the static electricity from your body. You can do this by touching the internal metal frame of your computer while it's unplugged.
- Don't remove a card from the anti-static container it's shipped in until you're ready to install it. When you remove a card from your computer, place it back in its container.
- Don't let your clothes touch any electronic parts.
- When handling a card, hold it by its edges, and avoid touching its circuitry.

1 Switch to the standard VGA display driver

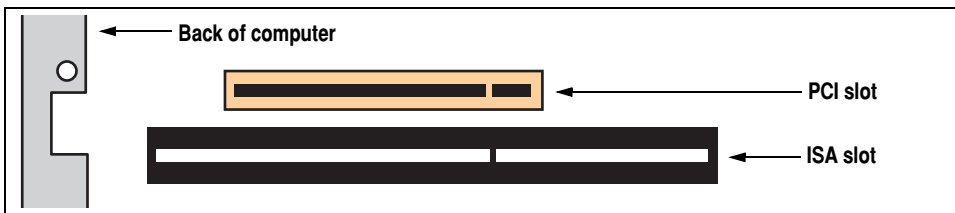
If you're running Windows 95 on your computer, this step is not necessary. If you're using another operating system (for example, Windows NT 4.0), see its documentation for how to switch to VGA mode.

2 Open your computer and remove your existing graphics card

Turn off your computer and all peripherals such as the monitor or printer. Open the computer and remove your existing graphics card. (If you have a display adapter built into your computer's motherboard, it should automatically disable itself after your Matrox card is installed.)

3 Choose a PCI expansion slot

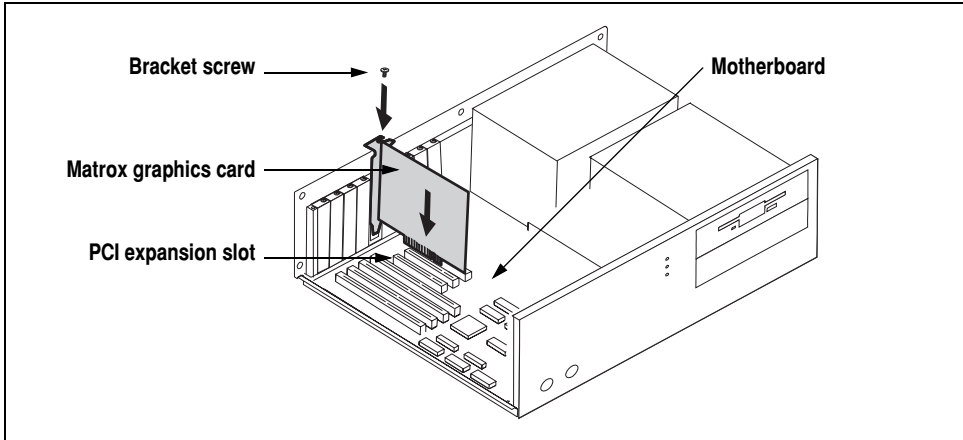
Most PCI bus computers have a combination of PCI and ISA expansion slots. PCI slots are usually made with plastic of a contrasting beige color, and are shorter than other slots in your computer. Your system manual should identify the PCI slots. Plugging your Matrox card into a non-PCI slot could damage the card, your computer, or both



PCI vs. ISA expansion slots

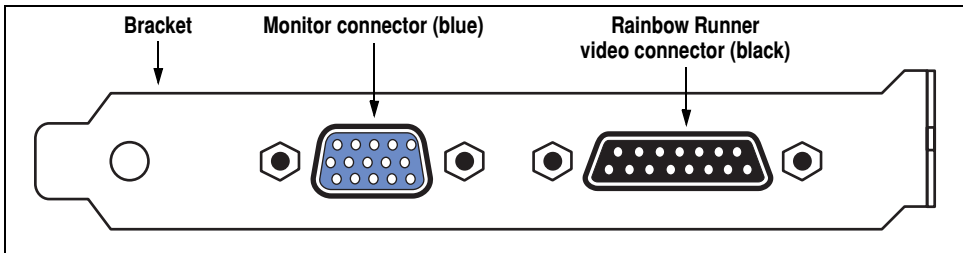
4 Insert your Matrox card

Remove the cover for the slot you intend to use. Save the screw for the mounting bracket. Position your Matrox card over the PCI expansion slot you've chosen. Push the card in firmly and evenly until it's fully seated in the slot. Replace the screw to secure the bracket of your Matrox card to the computer chassis.



5 Connect the monitor

Simply plug your monitor cable into the monitor connector on your Matrox card. Make sure the other end of the monitor cable is properly connected to your monitor. See your monitor manual for more information.



Side-view of your Matrox card

6 Restart your computer

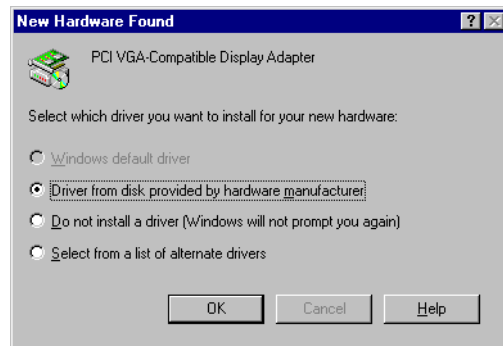
7 Install the software

- If you're using **Windows 95**, it reports that it has detected new hardware when you restart:

- a Click **“Driver from disk provided by hardware manufacturer”**, then click **OK**.
- b When Windows prompts you for the software driver location, insert the Matrox Installation CD-ROM in your CD-ROM drive. Windows automatically starts the CD-ROM setup program; click **Cancel** to continue.
- c Type **“d:\”** in the text box (where **“d”** is the drive letter of your CD-ROM drive), then click **OK**.

This installs the MGA display drivers for Windows 95, but **not** the rest of the software included on the Matrox CD-ROM.

- d To install other software included on the Matrox CD-ROM, see **“Software installation”**, page 9.
- If you're using **Windows NT 4.0**, see **“Software installation”**, page 9.
 - If you're using Windows 3.1, Windows NT 3.51, OS/2 Warp 3.0 or 4.0, AutoCAD for DOS, or MicroStation for DOS, see **“Other software”**, page 14.



Software installation

This section describes how to install Matrox software for *Windows 95* and *Windows NT 4.0*. For other operating systems, see “Other software”, page 14.

- 1 Insert the Matrox Installation CD-ROM in your CD-ROM drive – the *mgasetup* program automatically starts. This setup program works with Windows 95 and Windows NT 4.0, and detects which operating system you’re using.
- 2 Select the language you want to use, then click **Next**.
- 3 To see notes on the contents of the CD-ROM, click **View ReadMe**. To continue, click **Next**.
- 4 If this is a first-time installation, the setup program lists drivers that are not installed. To begin the software installation, click **Install**.
- 5 Choose an installation type:
 - To install the complete MGA PowerDesk (recommended), click **Typical**.
 - To customize the PowerDesk installation, click **Custom**.

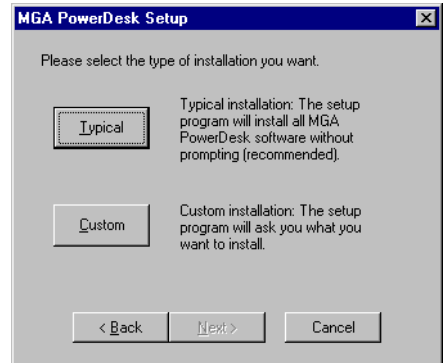
If you click **Custom**, the setup program prompts you for a destination folder and what PowerDesk options you want to install.

After you choose, the setup program automatically installs Matrox software and drivers. After this is done, leave the Matrox CD-ROM in your CD-ROM drive, then click **OK** to restart your computer and for all changes to take effect.

- 6 After you restart your computer, the CD-ROM setup program starts again. The main menu lists other software you can install from the Matrox CD-ROM. To install, select an item, click **Install**, then follow the on-screen instructions. After the installation of an item is finished, you can return to the main menu to install another. Click **Exit** when you’re done.

If this is a first-time installation, your display is using a 640 × 480 resolution with 256 colors – supported by most monitors. To adjust software monitor settings:

- for Windows 95, see “MGA PowerDesk for Windows 95”, page 10.
- for Windows NT 4.0, see “MGA PowerDesk for Windows NT 4.0”, page 12.



MGA PowerDesk for Windows 95

To access PowerDesk programs and online documentation, click the **Start** button → **Programs** folder → **MGA PowerDesk** folder.

Monitor setup

To check your monitor settings:

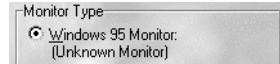
- 1 Right-click the Windows desktop background, then click the **Properties** menu item → **Monitor** tab.
- 2 **If you have a Plug-and-Play monitor:**

Make sure the **Windows 95 Monitor** button is selected. If this button is selected, the MGA display driver *automatically* uses the correct settings for your monitor.



If you don't have a Plug-and-Play monitor:

If the monitor type listed under the **Windows 95 Monitor** button is incorrect or shows **Unknown Monitor**, you should select a monitor.



To select a monitor, click the **MGA Monitor** button, select your monitor by name in the list below this button, then click **OK**. If your monitor doesn't appear in the list, you can try the Windows 95 method of monitor selection. For more information on monitor selection, see the MGA PowerDesk online guide.

Note: Many Plug-and-Play monitors do not automatically report if they're capable of 1152 × 864, or 1600 × 1200 and higher display resolutions. To use these resolutions, or higher refresh rates than those reported by the monitor, you can use the MGA monitor selection method.

WARNING: If incorrect software monitor settings are applied, *some* monitors can be permanently damaged. For more information, see your monitor manual.

Display setup

After checking your monitor's software settings, you can change your display resolution, color palette and other MGA PowerDesk settings. To access MGA display property sheets, right-click the Windows desktop background, then click the **Properties** menu item. To change your display resolution or color palette, click the **Settings** tab. For more information on changing your display settings, see the MGA PowerDesk online guide.

Software overview

MGA PowerDesk for Windows 95 includes

- **Fast** MGA display driver with:
 - DirectDraw, DirectVideo and Direct3D support for direct access to Matrox hardware.
 - Plug-and-Play (DDC-2b) and Energy Star (DPMS) support.
- **Settings** property sheet to change your display settings. Use this sheet to access MGA PowerDesk features such as:
 - Desktop mode buttons to set up a proportional, horizontal or vertical *virtual desktop*.
 - Display schemes to easily switch to a pre-defined display setting.
 - **Performance** property sheet to change MGA display driver performance settings.
 - **Utilities** property sheet to configure MGA PowerDesk options.
- **Monitor** property sheet to inform the MGA display driver of your monitor's capabilities. You can use this sheet instead of the Windows 95 method of monitor selection.
- **Color** property sheet to change your display's color balance.
- **Hot Key** property sheet to define keyboard shortcuts for:
 - CenterWINDOW to center your view area on the active window.
 - MaxVIEW to resize the active program window to the size of your current display area.
 - PanEND to move your display area to the right or bottom of your virtual desktop.
 - PanHOME to move your display area to the left or top of your virtual desktop.
 - PanLOCK to enable or disable panning.
 - PixelTOUCH to magnify part of your desktop area.
- **Information** property sheet for information on your display hardware and software.
- **MGA Desktop Navigator** program to quickly move the view area of your desktop and for quick access to the PixelTOUCH zoom, PanLOCK and CenterWINDOW features.
- **MGA QuickDesk** menu to quickly switch to a saved display scheme, to save and restore the position of your desktop icons, to open the Windows **Display Properties** dialog box, or to start **MGA Desktop Navigator**. To see this menu, click the monitor icon on the Windows 95 taskbar.
- **MGA Diagnostic** program to identify some possible display-related problems.

MGA PowerDesk for Windows NT 4.0

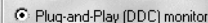
To access PowerDesk programs and online documentation, click the **Start** button → **Programs** folder → **MGA NT PowerDesk** folder.

Monitor setup

To check your monitor settings

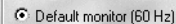
1 Right-click the Windows desktop background, then click the **MGA Display Properties** menu item → **Monitor** tab.

2 **If you have a Plug-and-Play monitor:**



Make sure the **Plug-and-Play (DDC) monitor** button is selected. If so, the MGA display driver *automatically* uses the correct settings for your monitor. If not, click this button, then click **Apply**.

If you don't have a Plug-and-Play monitor:



See if the **Default monitor (60 Hz)** button is selected. If so, use the MGA monitor selection method. For more information on MGA monitor selection, see MGA PowerDesk online guide.

Note: Many Plug-and-Play monitors do not automatically report if they're capable of 1152 × 864 or 1600 × 1200 and higher display resolutions. To use these resolutions, or higher refresh rates than those reported by the monitor, you can use the MGA monitor selection method.

WARNING: If incorrect software monitor settings are applied, *some* monitors can be permanently damaged. For more information, see your monitor manual.

Display setup

After checking your monitor's software settings, you can change your display resolution, color palette and other MGA PowerDesk settings. To access MGA display property sheets, right-click the Windows desktop background, then click the **MGA Display Properties** menu item. To change your display resolution or color palette, click the **Settings** tab. For more information on changing your display settings, see the MGA PowerDesk online guide.

Software overview

MGA PowerDesk for Windows NT 4.0 includes

- **Fast** display driver with:
 - Multi-display support to use up to 4 monitors at a time (one monitor for each Matrox card – of the same type – in your computer)
 - Accelerated DirectDraw and OpenGL support for direct access to Matrox hardware.
 - Plug-and-Play (DDC-2b) monitor support.
- **Settings** property sheet to change your display settings. This sheet provides access to MGA PowerDesk features such as:
 - Desktop mode buttons to set up a proportional, horizontal or vertical *virtual desktop*.
 - Display schemes to easily switch to a pre-defined display setting.
- **Monitor** property sheet to inform the MGA display driver of your monitor's capabilities.
- **Information** property sheet to display hardware and software version numbers and capabilities.
- **Performance** property sheet to configure advanced driver performance settings.
- **PowerDesk** property sheet with settings for:
 - PixelTOUCH to zoom in and pan on your view area.
 - CenterWINDOW to center opened windows in your view area.
 - MaxVIEW to maximize windows in your view area instead of your desktop.
 - CenterPOPUP to have new windows pop up in the center of your current view area.
- **MGA Desktop Navigator** (DeskNav) program to quickly change the view area of your desktop and give you quick access to the PixelTOUCH zoom and CenterWINDOW features. Access DeskNav through the **Start** menu → **Programs** folder → **MGA NT PowerDesk** folder.
- **MGA QuickDesk** program to quickly switch between your saved display schemes, open the **MGA Display Properties** dialog box or launch **MGA Desktop Navigator**. This program appears as a monitor icon on the Windows NT taskbar.

Other software

This section describes how to install Matrox drivers and software for Windows 3.1, Windows NT 3.51, OS/2 Warp 3.0 and 4.0, AutoCAD for DOS, and MicroStation for DOS.

Windows 3.1

Software installation

- 1 Restart Windows in VGA mode. For information on how to do this, see Windows documentation.
- 2 Insert your Matrox Installation CD-ROM in your CD-ROM drive.
- 3 In **Program Manager**, click **File** → **Run**. Type *d:\win31\setup* (where “d” is the letter of your CD-ROM drive), then click **OK** to begin the setup program.
- 4 Follow the on-screen instructions. The setup program creates a new program group called **MGA PowerDesk**.
- 5 If this is a first-time installation, and you don’t have a Plug-and-Play monitor, the **Monitor Selection** program prompts you to select a monitor from a list. This is to let Matrox drivers know what settings to use for your monitor. For more information, click **Help**.
- 6 Select a display resolution and color palette setting for Windows. (Later, you can change this setting with the **MGA Control Panel** program.)
- 7 Click **OK** to restart your computer and for changes to take effect.

For more information, double-click **Readme.Win** in the MGA PowerDesk program group.

Online guide installation

- 1 If Acrobat Reader 2.1 is not already installed on your computer, install it from the Matrox CD-ROM. From **Program Manager**, then click **File** → **Run**. Type *d:\acro21\setup* (where “d” is the letter of your CD-ROM drive), then click **OK**. Follow the on-screen instructions.
- 2 From **Program Manager**, then click **File** → **Run**. Type *d:\win31doc\setup* (where “d” is the letter of your CD-ROM drive), then click **OK**. This installs PDF files and creates icons for them in the MGA PowerDesk program group.

DCI Video for Windows 3.1 accelerator

Included with the installation of Matrox software for Windows 3.1 is an MGA Display Control Interface (DCI) driver. This driver is Microsoft/Intel-compliant and accelerates the playback of Indeo- and Cinepak-encoded AVI files and MPEG files. You need **Microsoft Video for Windows 1.1e** to take advantage of this acceleration. To install Video for Windows 1.1e, start the *vfw\setup.exe*

program on the Matrox CD-ROM. You can enable or disable the DCI driver with the **Uninstallation** program.

MGA Uninstallation

The **MGA Uninstallation** program in the PowerDesk program group lets you disable (and later re-enable) or remove all or parts of the Matrox software for Windows 3.1. If you're upgrading from Windows 3.1 to Windows 95, first uninstall Matrox software for Windows 3.1. For more information, see the online documentation.

Windows NT 3.51

Driver installation

- 1 Insert your Matrox Installation CD-ROM in your CD-ROM drive.
- 2 From **Program Manager**, double-click **Control Panel** → **Display**, then click **Change Display Type** → **Change** → **Other**.
- 3 Type *d:\winnt35* (where “*d*” is the letter of your CD-ROM drive), then click **OK**.
- 4 Select a display resolution and color palette supported by your monitor, click **Install**, then follow the on-screen instructions.
- 5 When prompted, restart your computer for changes to take effect.

If your computer doesn't restart with the display settings you selected, your Matrox graphics card may not support those settings. Double-click **Control Panel** → **Display**, then click **List All Modes**. To see if your monitor supports a display mode, select one, then click **Test**. To apply a mode, select one, then click **OK**.

To access the MGA PowerDesk features, double-click **Control Panel** → **MGA Panel**. For more information, see the online Help. See also the *winnt35/readme.nt* text file on the Matrox CD-ROM.

Monitor setup

If you have a Plug-and-Play (DDC) monitor, the Matrox display driver automatically uses correct settings for your monitor. If you don't have a DDC monitor and a monitor is not selected in Matrox software, the driver uses default settings. To let the driver know your monitor's capabilities:

- 1 Double-click **Control Panel** → **MGA Panel**, then click the **Monitor** tab.
- 2 From the monitor list, select your monitor by name, or select one whose maximum refresh rate matches your monitor's, then click **Save**.
- 3 Restart your computer for changes to take effect.

Driver installation

- 1 Restart your computer in VGA mode:
 - a During startup, press [Alt]+[F1] when “OS/2” appears in the top-left corner of your screen.
 - b From the on-screen menu, choose to restart in VGA mode.
- 2 Insert the Matrox Installation CD-ROM in your CD-ROM drive.
- 3 In **Presentation Manager (PM)**, double-click **OS/2 System**, then click **Drives**.
- 4 Double-click the icon for your CD-ROM drive, then double-click **os2** → **install.cmd**.
- 5 Enable the **Primary Display** check box, then click **OK**.
- 6 Select **MATROX MGA Millennium/Mystique Series** in the list box, then click **OK**.
- 7 Type *d:\os2* (where “d” is the letter of your CD-ROM drive), then click **Install**.
- 8 After files are copied to your computer, restart your computer for changes to take effect.

If this is a first-time installation, OS/2 restarts in the default display settings for Matrox drivers (640 × 480 display area, 256 colors). For information on the Matrox driver for OS/2, see the *os2/readme.os2* text file on the Matrox CD-ROM.

MGA Settings

To open the **MGA Settings** program, double-click its icon on the PM desktop. Use this program to change display settings like resolution, color palette, font size, EnDIVE (Enhanced Direct Interface Video Extensions), a hardware-zoom hot key, and see display information.

Monitor settings

If you have a Plug-and-Play (DDC) monitor, the Matrox display driver automatically use correct settings for your monitor. If don't have a DDC monitor and a monitor is not selected in Matrox software, the driver uses default settings. Use **MGA Settings** to select a monitor.

DOS utilities

Matrox software utilities for DOS include:

- *progbios* – to reprogram or update the Flash EPROM of your Matrox graphics card.
- *mgamon* – to select a monitor for the CAD and VESA Super VGA programs.
- *vbetsr* and *vbesetup* – for higher monitor refresh rates while using VESA Super VGA modes.

To install these utilities, start the *dosutil\install.exe* program on the Matrox CD-ROM. By default, these programs are installed in the *c:\mga\setup* directory. For more information on Matrox software utilities for DOS, see the *readme.txt* text file installed in this directory.

To use *vbetsr.com* and *vbsetup.exe*

- 1 Add lines with the path to *vbetsr* and *vbsetup* (in that order) to your *autoexec.bat* file.
- 2 If you do *not* have a Plug-and-Play (DDC) monitor, use the *mgamon* program to tell Matrox software for DOS what your monitor capabilities are.

AutoCAD & MicroStation for DOS

AutoCAD for DOS

The MGA DynaView driver for AutoCAD supports AutoCAD 12 and 13 for DOS and 3D Studio. To install, start the *acad\install.exe* program on the Matrox Installation CD-ROM. By default, the install program copies driver files to the *c:\mga\acadrv* directory on your computer.

For instructions on setting up the driver for AutoShade and 3D Studio, see the Matrox *readme.aca* file in the *mga\acadrv* directory. For more information on the AutoCAD MGA driver and on how to use the DynaView for DOS features, see the *MGA CAD Drivers Guide* (see “[MGA CAD drivers online guide](#)”).

MicroStation PC for DOS

To install the MGA driver for MicroStation 5.0 and MicroStation 95 (MicroStation 4.0 isn't supported), start the *ustat\install.exe* program on the Matrox CD-ROM. When prompted by the setup program, specify the path where your MicroStation software is installed. The setup program copies files to the *drv* subdirectory in this path.

For information on the MGA MicroStation driver, see the *MGA CAD Drivers Guide*. For more information on the driver, see also the *readme.mga* file in your MicroStation *drv* subdirectory.

MGA CAD drivers online guide

The *MGA CAD Drivers Guide* shows you how to set up and use MGA drivers for AutoCAD and MicroStation. Matrox provides this guide in five languages as Acrobat Portable Document Format (PDF) files. Use the **Acrobat Reader** program to view or print PDF files.

If you already have Acrobat Reader installed, you can use it to open the PDF files on the Matrox CD-ROM in the *cadguide* directory. If you want to install the CAD drivers guide and **Acrobat Reader for DOS**, start the *cadguide\setup.exe* program. If you want to install Acrobat Reader for DOS only, start the *cadguide\install.exe* program.

Display information

Refresh rates

| Display resolution ¹ | Horizontal refresh rate (KHz) | | Vertical refresh rate (Hz) | |
|---------------------------------|-------------------------------|---------------|----------------------------|---------------|
| | Mystique 220 | Millennium II | Mystique 220 | Millennium II |
| 640 x 480 | 31–102 | 31–102 | 60–200 | 60–200 |
| 800 x 600 | 31–114 | 38–114 | 60–200 | 60–200 |
| 1024 x 768 | 48–113 | 48–113 | 60–140 | 60–140 |
| 1152 x 864 | 54–110 | 54–110 | 60–120 | 60–120 |
| 1280 x 1024 | 64–107 | 64–107 | 60–100 | 60–100 |
| 1600 x 1200 | 75–100 | 75–113 | 60–80 | 60–90 |
| 1920 x 1080 | 68–84 | 70–94 | 60–72 | 60–80 |
| 1920 x 1200 | 75–81 | 75–95 | 60–65 | 60–76 |
| 1800 x 1440 | 89 | 89–104 | 60 | 60–70 |

1. Maximum refresh rates are when using 8- or 16-bit color palettes.
 Maximums may not be attainable at the highest display resolutions *with* a 24- or 32-bit color palette.

Maximum display resolutions – Mystique 220

| Graphics memory | Color palette | Maximum display area | Maximum 3D display area ¹ |
|-----------------|----------------------------|---------------------------|--------------------------------------|
| 2 MB | 256 colors (8-bit) | 1920 x 1080 | — |
| | 32/64 K colors (15/16-bit) | 1152 x 864 | 800 x 600 |
| | 16.8 M colors (24-bit) | 800 x 600 | — |
| | 16.8 M colors (32-bit) | 800 x 600 | — |
| 4 MB | 256 colors (8-bit) | 1800 x 1440 / 1920 x 1200 | — |
| | 32/64 K colors (15/16-bit) | 1920 x 1080 | 1152 x 864 |
| | 16.8 M colors (24-bit) | 1280 x 1024 | — |
| | 16.8 M colors (32-bit) | 1152 x 864 | 800 x 600 |
| 8 MB | 256 colors (8-bit) | 1800 x 1440 / 1920 x 1200 | — |
| | 32/64 K colors (15/16-bit) | 1800 x 1440 / 1920 x 1200 | 1920 x 1080 |
| | 16.8 M colors (24-bit) | 1920 x 1080 | — |
| | 16.8 M colors (32-bit) | 1280 x 1024 | 1152 x 864 |

1. Double-buffering, without z-buffering.

Maximum display resolutions – Millennium II

| Graphics memory | Color palette | Maximum display area | Maximum 3D display area ¹ |
|-----------------|----------------------------|---------------------------|--------------------------------------|
| 4 MB | 256 colors (8-bit) | 1800 x 1440 / 1920 x 1200 | — |
| | 32/64 K colors (15/16-bit) | 1920 x 1080 | 1152 x 864 |
| | 16.8 M colors (24-bit) | 1280 x 1024 | — |
| | 16.8 M colors (32-bit) | 1152 x 864 | 800 x 600 |
| 8 MB | 256 colors (8-bit) | 1800 x 1440 / 1920 x 1200 | — |
| | 32/64 K colors (15/16-bit) | 1800 x 1440 / 1920 x 1200 | 1920 x 1080 |
| | 16.8 M colors (24-bit) | 1920 x 1080 | — |
| | 16.8 M colors (32-bit) | 1280 x 1024 | 1152 x 864 |
| 12 MB | 256 colors (8-bit) | 1800 x 1440 / 1920 x 1200 | — |
| | 32/64 K colors (15/16-bit) | 1800 x 1440 / 1920 x 1200 | 1800 x 1440 / 1920 x 1200 |
| | 16.8 M colors (24-bit) | 1920 x 1080 | — |
| | 16.8 M colors (32-bit) | 1280 x 1024 | 1280 x 1024 |
| 16 MB | 256 colors (8-bit) | 1800 x 1440 / 1920 x 1200 | — |
| | 32/64 K colors (15/16-bit) | 1800 x 1440 / 1920 x 1200 | 1800 x 1440 / 1920 x 1200 |
| | 16.8 M colors (24-bit) | 1920 x 1080 | — |
| | 16.8 M colors (32-bit) | 1280 x 1024 | 1280 x 1024 |

1. Double-buffering, without z-buffering.

Supported VESA modes

In the table below, VESA modes supported by your Matrox graphics card are indicated by a VESA mode number. Many Super VGA DOS programs use VESA modes.

| Display resolution | 16 colors | 256 colors | 32 K colors | 64 K colors | 16.8 M colors |
|--------------------|-----------|------------|-------------|-------------|---------------|
| 640 x 400 | — | 100 | — | — | — |
| 640 x 480 | — | 101 | 110 | 111 | 112 |
| 800 x 600 | 102 | 103 | 113 | 114 | 115 |
| 1024 x 768 | — | 105 | 116 | 117 | 118 |
| 1280 x 1024 | — | 107 | 119 | 11A | — |
| 1600 x 1200 | — | 11C | 11D | 11E | — |

To use higher refresh rates while in VESA display modes, see “DOS utilities”, page 16.

Hardware information

Millennium II

- MGA-2164W graphics chip, TI 3026 external RAMDAC
- Graphics cards –
 - MIL2P/4 series: 250 MHz RAMDAC, PCI Bus, 4 MB WRAM
 - MIL2P/8 series: 250 MHz RAMDAC, PCI Bus, 8 MB WRAM
- Memory upgrades¹ –
 - MIL2/MOD4: 4 MB WRAM (for MIL2P/4 and MIL2P/8)
 - MIL2/MOD8: 8 MB WRAM (for MIL2P/4 and MIL2P/8)
 - MIL2/MOD12: 12 MB WRAM (for MIL2P/4)

Mystique 220

- MGA-1164SG graphics chip, internal RAMDAC
- Graphics cards –
 - MY220P/2 series: 220 MHz RAMDAC, 2 MB SGRAM
 - MY220P/4 series: 220 MHz RAMDAC, 4 MB SGRAM
 - MY220P/BIZ2 series: 220 MHz RAMDAC, 2 MB SGRAM
 - MY220P/BIZ4 series: 220 MHz RAMDAC, 4 MB SGRAM
- Memory upgrades¹ –
 - MYST/MOD2: 2 MB SGRAM (for MY220P/2 and /BIZ2)
 - MYST/MOD4: 4 MB SGRAM (for MY220P/4 and /BIZ4)
 - MYST/MOD6: 6 MB SGRAM (for MY220P/2 and /BIZ2)

Technical features – Millennium II & Mystique 220

- 64-bit VGA-compatible drawing engine
- Separate sync monitors only
- Supports PCI bus version 2.1 at clock speeds up to 33 MHz

Video specifications – Millennium II & Mystique 220

- The video follows the PS/2 standard, with no sync on RGB, and no blanking pedestal. Black or blank – 0.0 V; White – 0.700 V.
- There are five connections to a monitor that uses BNC (Bayonet Nut Connect) connectors – R, G, B, HSYNC (white or gray wire), and VSYNC (black wire).

1. A Matrox memory upgrade module can't be used with the Matrox Rainbow Runner Studio add-on card. This is because they each attach to the same connectors on the Matrox graphics card.

Monitor connector pinouts

| | | | | |
|--|-----|---------------------|----|---------------------|
| | 1 | Analog red output | 10 | Ground |
| | 2 | Analog green output | 11 | Not connected |
| | 3 | Analog blue output | 12 | SDA (DDC) |
| | 4 | Not connected | 13 | TTL horizontal sync |
| | 5-8 | Ground | 14 | TTL vertical sync |
| | 9 | Not connected | 15 | SCL (DDC) |

Rainbow Runner video connector pinouts

| | | | | |
|--|-----|-------------------|------|------------------|
| | 1-2 | Reserved | 6 | Y in (luminance) |
| | 3 | Y out (luminance) | 7 | C in (chroma) |
| | 4 | C out (chroma) | 8 | Composite in |
| | 5 | Composite out | 9-15 | Ground |

VGA feature connector pinouts

| | | | | |
|--|-------|-----------------------------|-------|------------------------------|
| | 1-8 | Pixel data | 18 | External sync enable* |
| | 9 | Pixel clock | 19 | External pixel clock enable* |
| | 10 | Blanking | 20 | Unused (reserved) |
| | 11 | Horizontal sync | 21-24 | Ground |
| | 12 | Vertical sync | 25 | Unused (reserved) |
| | 13-16 | Ground | | |
| | 17 | External pixel data enable* | | |

* When enabled, these signals are active low

Troubleshooting

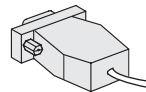
This section contains solutions to problems you may encounter with your Matrox graphics card.

Problem: Computer doesn't boot after Matrox card is installed

- **Cause** – Some computers may not properly detect the addition or change of an internal PCI card. On startup, a computer may beep differently from normal to indicate this error.
 - ☑ **Solution** – Reset your computer's CMOS. This is usually done through a switch or jumper on the motherboard of your computer. Check your system manual or contact your computer vendor for instructions on how to do this.
- **Cause** – There may be another graphics adapter in your computer. (For MGA *multi-display mode* in Windows NT, all other graphics cards in your computer must also be Matrox cards of the same type – Millennium, Millennium II *or* Mystique 220.)
 - ☑ **Solution** – If another graphics card is plugged into an expansion slot, remove it.
 - ☑ **Solution** – If a graphics adapter is built-in to your computer's motherboard, your system may have not automatically disabled it when you inserted your Matrox card. Check your system manual for instructions on how to disable your computer's built-in graphics adapter.

Problem: Wrong color balance, screen image off-center, or no picture at all

- **Cause** – Your monitor's video controls may be improperly set.
 - ☑ **Solution** – Adjust your monitor's controls (brightness, contrast and so on). For more information, see your monitor manual.
- **Cause** – The monitor connections may have been inserted improperly.
 - ☑ **Solution** – Make sure the monitor's power cable is firmly in place.
 - ☑ **Solution** – Make sure the 15-pin connector (see picture) to your Matrox graphics card is firmly in place.
 - ☑ **Solution** – If your monitor uses a 15-pin connector, make sure the connection to the monitor is firmly in place.

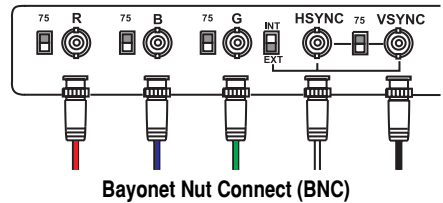


15-pin connector

- ❑ **Solution** – If your monitor uses BNC input (see picture below), make sure the Red, Green, Blue, Horizontal Sync (HSYNC – white or gray wire), and Vertical Sync (VSYNC – black wire) connections are firmly in place and plugged into the correct input.

- **Cause** – If your monitor uses BNC input (see picture), one or more connection settings may be incorrect.

- ❑ **Solution** – Set each of your monitor’s RGB input and sync switches (if available) to 75 ohms, with the sync set to “external”. These controls are usually switches on the back of your monitor.



Problem: After the startup screen, or after display settings are changed, the screen image is garbled or unusable (rolling screen images, overlapping screen images or a blank screen)

- **Cause** – The MGA display driver may be trying to use settings your monitor doesn’t support. This can happen if a monitor was never selected in the software and the display resolution was changed to one your monitor doesn’t support, or if the monitor connected to your computer was changed without it being changed in the software.

WARNING: If incorrect software monitor settings are applied, *some* monitors can be permanently damaged. For more information, see your monitor manual.

- ❑ **Solution – Windows 95:**

- 1 Press [Ctrl]+[Alt]+[Del] twice to restart your computer.
- 2 When you see “Starting Windows 95...”, press [F5] to enter “safe mode”.
After startup, MGA software detects that MGA display drivers are not active and prompts you as to whether you want to have MGA software disabled; click **No**.
- 3 Select your monitor with the Windows 95 monitor selection method.
For more information, see the MGA PowerDesk online guide.
- 4 Restart your computer.

- ❑ **Solution – Windows NT 4.0:**

- 1 Press [Ctrl]+[Alt]+[Del] → [Tab] → [Tab] → [Enter] → [↓] (down arrow) → [Enter] to restart your computer.
- 2 From the startup menu, choose a Windows NT 4.0 “VGA mode”.
After startup, MGA software prompts you that MGA display drivers are not active; click **OK** to continue.

- 3 Right-click the Windows desktop background, then click the **MGA Display Properties** menu item → **Settings** tab.
Windows may prompt you that the display settings are incorrect for the current mode; click **OK** to continue.
- 4 Move the **Display area** slider down to its lowest setting, then click **OK**.
- 5 Restart your computer normally.
- 6 Select a monitor with the **Monitor** property sheet, then you can adjust your display settings. For more information, see the MGA PowerDesk online guide.

Problem: Other device doesn't work properly after Matrox card is installed

(examples: sound card output distorted, fast modem loses data often)

- **Cause** – Some computers require that software wait for the hardware to be ready to receive new data. The Matrox display drivers are *not* normally set to do this because it slows them down slightly and it's not necessary for most computers.
 - ☑ **Solution – Windows 95:**
 - 1 Right-click the Windows desktop background, then click the **Properties** menu item → **Settings** tab → **PowerDesk** button → **Performance** tab.
 - 2 Clear the **Use automatic PCI bus retries** check box.
 - 3 Click **OK** → **OK** → **Yes** to accept the changes and restart your computer.
 - ☑ **Solution – Windows NT 4.0:**
 - 1 Right-click the Windows NT desktop background, then click the **MGA Display Properties** menu item → **Performance** tab.
 - 2 Clear the **Use automatic PCI bus retries** check box.
 - 3 Click **OK** → **Yes** to accept the changes and restart your computer.

Problem: After game for Windows 95 starts, monitor doesn't display properly

(rolling screen images, overlapping screen images or a blank screen)

- **Cause** – If your game uses a low-resolution (640 × 480 and below), full-screen display mode, your monitor may not support the refresh rate the MGA driver is using.
 - ☑ **Solution** –
 - 1 If the game is still running in full-screen mode, press [Ctrl]+[Alt]+[Del] *once* for the **Close Program** dialog box, and then click the **End Task** button.
 - 2 Right-click the Windows desktop background, then click the **Properties** menu item → **Monitor** tab → **MGA Monitor** button.
 - 3 From the MGA monitor list, select the monitor model you're using. If your monitor model does not appear in the list, select a monitor that runs at 60 Hz at 640 × 480 (for example,

Standard Monitor Types → **Vesa 1024X768 @60Hz**). For more information on MGA monitor selection, see online the MGA PowerDesk online guide.

- 4 Click **OK** to apply your selection and close the dialog box.

Problem: 3D program for Windows 95 or Windows NT 4.0 doesn't start or stops running

(program uses bus mastering)

- **Cause** – Your computer or program may not work well with bus mastering.

- ☑ **Solution** – Disable bus mastering:
(If you want to continue using bus mastering, see the other solutions.)

Windows 95 –

- 1 Right-click the Windows desktop background, then click the **Properties** menu item → **Settings** tab → **PowerDesk** button → **Performance** tab.
- 2 Clear the **Use Bus Mastering** check box.
- 3 Click **OK** → **OK** → **Yes** to accept the changes and restart your computer.

Windows NT 4.0 –

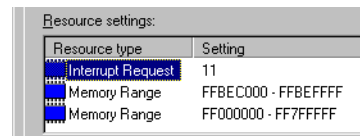
- 1 Right-click the Windows desktop background, then click the **MGA Display Properties** menu item → **Performance** tab.
- 2 Clear the **Use Bus Mastering** check box.
- 3 Click **OK** → **Yes** to accept the changes and restart your computer.

- **Cause** – Your Matrox card may be in a “slave” expansion slot on a computer that makes a distinction between bus mastering and slave slots.
 - ☑ **Solution** – Change slots. Shut down your computer, disconnect it from the power supply, remove your Matrox card and then insert it into a different PCI expansion slot. For instructions on how to safely install your Matrox card, see “[Hardware installation](#)”, page 6.

- **Cause** – Your computer may have not given an interrupt request (IRQ) to your Matrox graphics card or may have given one used by another device in your computer. This may be because your computer’s “Plug-and-Play” feature is turned off. To check the display adapter’s IRQ:

Windows 95 –

- 1 Right-click the **My Computer** icon on the Windows desktop background, then click the **Properties** menu item → **Device Manager** tab.
- 2 Click the plus sign to the left of the **Display adapters**. An “X” through an icon means the hardware has been disabled. A circled exclamation point through the icon means the hardware has a problem.



| Resource settings: | |
|--------------------|---------------------|
| Resource type | Setting |
| Interrupt Request | 11 |
| Memory Range | FFBEC000 - FFBEFFFF |
| Memory Range | FF000000 - FF7FFFFF |

3 Double-click the name of your Matrox display adapter to open a properties dialog box. The type of problem is displayed in the **General** tab → **Device Status** area. Check also the **Resource** tab → **Resource Settings** list for an **Interrupt Request**.

❑ **Solution** – Change settings in your computer’s CMOS setup utility.

If your computer has the options of enabling Plug-and-Play detection, or assigning an IRQ to a VGA adapter, make sure they’re enabled. If your computer doesn’t have these options, you may be able to manually assign an IRQ to your graphics card using the CMOS setup utility.

For more information on your computer’s CMOS setup utility, see your system manual or contact your system manufacturer.

❑ **Solution** – **Windows 95**: You may have to manually assign an IRQ to your Matrox card with the *irqset* program in the *C:\Program Files\Matrox MGA PowerDesk* folder. For instructions on how to use *irqset*, see the **Start** menu → **Programs** folder → **MGA PowerDesk** folder → **Readme** file.

■ **Cause** – Your computer’s other BIOS settings may be incorrect.

❑ **Solution** – Reset your computer’s BIOS settings to the factory defaults using the CMOS setup utility. The factory defaults are usually the “safest” settings. Check your system manual for more information.

Problem: Game for Windows 95 doesn’t start or runs slower than normal **(program uses Microsoft DirectX interface)**

■ **Cause** – An older version of DirectX may be installed. The Matrox Installation CD-ROM setup program installs DirectX as part of the MGA PowerDesk software installation, but some programs install an older version of DirectX (overwriting your version). To see what version of DirectX is installed:

1 Right-click the Windows desktop background, then click the **Properties** menu item → **Information** tab.

2 Look at the **Microsoft DirectX Version** label.

If DirectX 3.0 or later is not installed, follow the instructions below.

❑ **Solution** – Install DirectX version 3.0 or later. To install DirectX 3.0:

1 Insert the Matrox CD-ROM in your CD-ROM drive. Windows automatically starts the CD-ROM setup program; click **Cancel** to continue.

2 Click the **Start** button → **Run** menu item.

3 Type “*d:\directx3\dxsetup*”, where “*d:*” is the drive letter of your CD-ROM drive; then click **OK** to start the DirectX setup program.

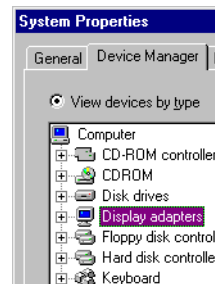
Problem: Program for Windows 95 doesn't run properly or stops running

- **Cause** – Some programs may not work properly with some MGA acceleration.
 - ☑ **Solution** – Disable specific types of software acceleration:
 - 1 Right-click the Windows desktop background, then click the **Properties** menu item → **Settings** tab → **PowerDesk** button → **Performance** tab.
 - 2 Clear one or more check boxes, starting with **Use Device Bitmaps Caching**.
For more information, see context-sensitive Help.
 - 3 Click **OK** → **OK** to accept the changes.
Depending on the feature you disabled, you may have to restart your computer for the changes to take effect.
 - ☑ **Solution** – Disable Matrox hardware acceleration:
 - 1 Right-click the **My Computer** icon on the Windows desktop background.
 - 2 Click the **Properties** menu item → **Performance** tab → **Graphics** button.
 - 3 Move the **Hardware acceleration** slider to **None**.
 - 4 Click **OK** → **OK** to restart your computer.

Note: If you identify a program that doesn't work well with MGA acceleration, please contact Matrox technical support and describe the problem. This information may help us come up with a fix or work-around in a future driver release.

Problem: After restarting my computer, Windows 95 warns that the graphics card is not configured correctly

- **Cause** – You may have a conflict because of previously installed display drivers.
 - ☑ **Solution** –
 - 1 If Windows 95 prompts you to start the **Add New Hardware Wizard**, click **Cancel**. (If you start the Wizard, it will *not* detect your graphics card.)
 - 2 Right-click the **My Computer** icon on the Windows 95 desktop.
 - 3 Click the **Properties** menu item → **Device Manager** tab.
 - 4 Click the plus sign next to **Other devices** (if it appears) and **Display adapters**.
 - 5 Delete *all* listed display adapters (click each, then click **Remove**), then click **OK**.
 - 6 Restart your computer and reinstall the MGA display drivers (see [page 8](#)).



Problem: Screen image defects appear in Windows 95

(example: mouse pointer not drawn properly)

- **Cause** – You may have a conflict because of previously installed display drivers.
 - ☒ **Solution** –
 - 1 Right-click the **My Computer** icon on the Windows desktop background, then click the **Properties** menu item → **Device Manager** tab.
 - 2 Click the plus sign next to **Other devices** (if it appears) and **Display adapters**.
 - 3 Delete any display adapter *other than* the one for your Matrox graphics card.
 - 4 Restart your computer.

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