

Matrox Corona-II

Installation and Hardware Reference

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Contents

<i>Chapter 1: Introduction</i>	9
Matrox Corona-II	10
Acquisition features	11
Display features	12
Data transfer	13
Software	14
What you need to get started.	15
Inspecting the Matrox Corona-II package	16
Standard package.	16
Optional parts	16
Handling components.	17
Installation overview	18

<i>Chapter 2: Hardware installation</i>	21
Installing Matrox Corona-II	22
Choosing your display configuration	25
Attaching digital add-ons to Matrox Corona-II	26
Installing the piggyback DVI flat panel module	26
Installing the companion digital-input board	28
Connecting to external devices	31
Outputting to external video devices	32
Attaching a video input.	33
Connecting to the power supply	34

Chapter 3: Installing software	37
Installing the software	38
Matrox Intellicam	38

Chapter 4: Matrox Display Properties and Matrox PowerDesk	39
Overview	40
Configuring your display	41
Specifying your monitor	41
Additional information	43
Matrox Uninstall Program	43

Chapter 5: Using multiple Matrox Corona-II boards	45
Using multiple Matrox Corona-II boards	46
Installing multiple boards	46
Grabbing simultaneously from different boards	47
Number of cameras per board	48
PCI bandwidth requirements	48

Chapter 6: Matrox Corona-II hardware reference	49
Matrox Corona-II hardware reference	50
Acquisition section	51
Analog inputs	52
Low-pass filters	52
A/D converters	53
Lookup tables	54
Color space converter	54

PSG . . . . .	.55
Video source detector . . . . .	.55
Horizontal lock detector . . . . .	.55
Phase-locked loop . . . . .	.55
General synchronization . . . . .	.56
Trigger . . . . .	.56
Exposures . . . . .	.58
User bits . . . . .	.58
UART and RS-232 serial port . . . . .	.58
Event interrupts . . . . .	.58
Using the auxiliary power supply . . . . .	.58
Display section . . . . .	.59
Video encoder and TV output . . . . .	.60
Data interfaces . . . . .	.61
Matrox Video Interface ASIC . . . . .	.61
PCI interface . . . . .	.61

Appendix A: Troubleshooting 63

Troubleshooting . . . . .	.64
Common problems and solutions . . . . .	.64
Installation problems . . . . .	.64
PCI system compatibility problems . . . . .	.66
Grabbing problems . . . . .	.66
Video display problems . . . . .	.66
Problems during application development . . . . .	.68
Contacting Matrox . . . . .	.69

Appendix B: Technical information 71

Board summary 72

 Global information. 72

 Technical features 72

 Default settings 74

Board input and output connectors 74

 Video input/output connector 75

 Video output connector 78

 DVI-D connector 78

 Digital interface connector. 79

 Video input connector on the companion
 digital-input board. 83

 Camera power supply selection 86

 Camera power supply connector 88

 DIP switch. 88

Specifications. 89

 Environmental. 89

 Electrical. 89

**Appendix C: Listing of Matrox Corona-II
board revisions 93**

Matrox Corona-II revisions 94

**Appendix D: Migrating from Matrox Corona
to Matrox Corona-II 95**

Cable differences 96

Appendix E: Glossary 97

Index

Regulatory Compliance

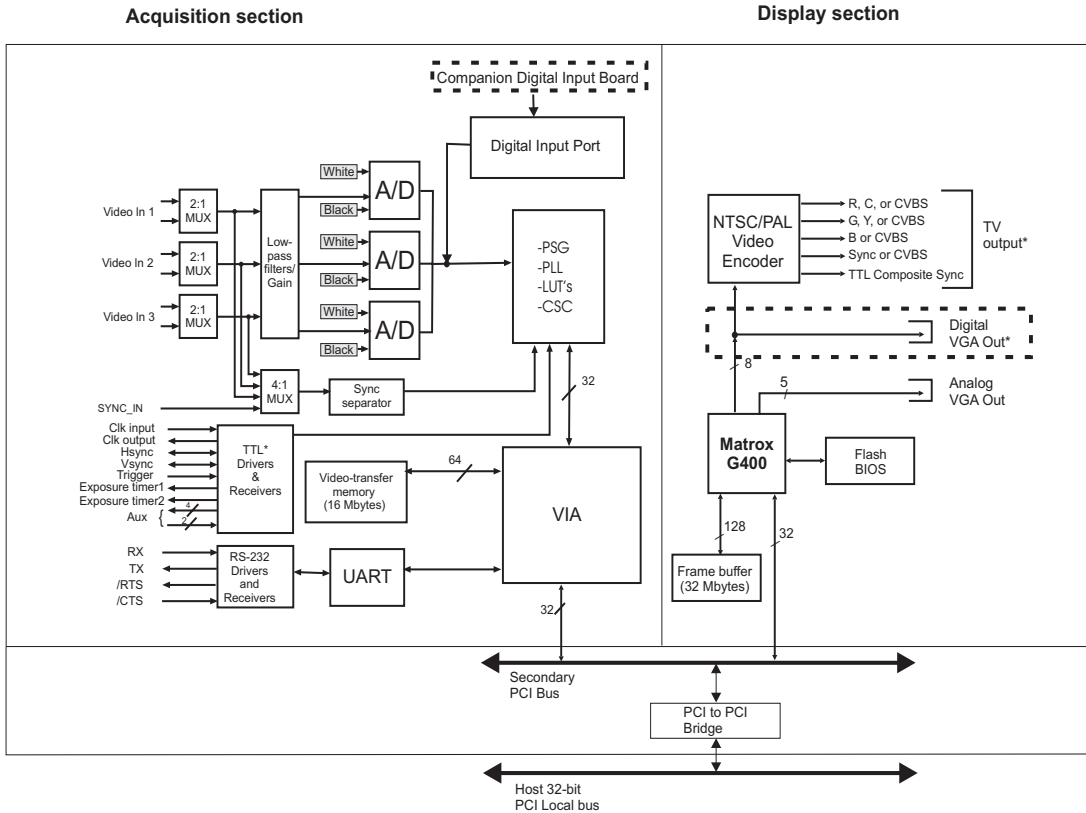
Product support

Chapter 1: Introduction

This chapter outlines the key features of Matrox Corona-II.

Matrox Corona-II

Matrox Corona-II is a PCI frame grabber, capable of acquiring images from standard and non-standard area scan monochrome and component RGB cameras. You can use the Matrox Imaging Library (MIL) or any of its derivatives to program your Matrox Corona-II.



 Optional

* Note that the TV output and Digital VGA Outputs cannot be used at the same time

Acquisition features

Matrox Corona-II can acquire from different types of analog, standard and non-standard, monochrome and component RGB video sources. In addition, when using the optional companion digital-input board, Matrox Corona-II can acquire either RS-422 or LVDS digital video, depending on which version of companion board is purchased.

When grabbing monochrome analog video, Matrox Corona-II can digitize at 8 or 10 bits per pixel.

To grab analog data, Matrox Corona-II features six software-selectable input channels, which allow you to switch between two component RGB or six monochrome cameras. Matrox Corona-II also supports simultaneous acquisition from up to three gen-locked RS-170/CCIR monochrome cameras.

❖ If acquiring 10-bit monochrome data, use the R or G channels.

The optional companion digital-input board is designed to receive 8, 10, 12, 14, or 16-bit monochrome data, 8 or 10-bit dual-tap (dual-output) data, or 24-bit (8,8,8) RGB data.

Matrox Corona-II has an integrated RGB-to-YUV color space converter that converts 24-bit RGB video data to YUV16.

Matrox Corona-II has a configurable lookup table (LUT). When grabbing analog or digital video, the LUT can be configured as a triple 256 x 8-bit or dual 1024 x 16-bit LUT. This allows you to map up to 3 x 8-bit or 2 x 10-bit input through the LUT. For all other inputs (12, 14, or 16-bit digital data), the LUT is not available.

Matrox Corona-II accepts a trigger input for monoshot acquisition and can operate in either asynchronous reset mode or next valid frame/field mode. It also provides two exposure signals, and it can receive and generate synchronization signals and a pixel clock.

Matrox Corona-II also includes a strap-selectable power output (5 V or 12 V) for single-cable camera connections.

▲ **Caution**

The total current drawn by all the cameras must not exceed 1.0 Amp.

Display features

Matrox Corona-II features the Matrox MGA-G400 controller, and a 32-Mbyte frame buffer to store data for display. The Matrox MGA-G400 uses a 32-bit wide, master PCI Host interface, and includes two independent CRT controllers. Matrox Corona-II uses the primary CRT controller to drive the main VGA output. Using the optional piggyback DVI flat-panel module, the primary CRT controller can drive an LCD monitor (DVI compliant) as the primary display for Matrox Corona-II. On the other hand, the secondary CRT controller can drive a video encoder for independent output (auxiliary display) to a secondary device such as a TV or VCR.

32-Mbyte frame buffer

Controlled by the MGA-G400 chip, Matrox Corona-II's 32-Mbyte frame buffer is used to store both graphics and video data. The graphics controller is capable of non-destructive overlay. This means that the MGA-G400 controller can display non-destructive graphic annotations on top of live video.

Matrox Corona-II can deliver a true color image display with a 32-bit color overlay, for a completely true color display at up to 1280x1024 resolution with a maximum vertical refresh rate of 75 Hz; note that this is dependent on your monitor.

❖ Note that when in an extended desktop configuration under Windows NT 4.0, DirectDraw is not supported. When DirectDraw is not available, MIL will compensate using the Host CPU.

NTSC/PAL/RGB Video Encoder

Driven by the secondary CRT controller, the video encoder provides an additional video output with overlay, from Matrox Corona-II to external video devices (for example, TVs or VCRs). The video encoder can be programmed to output either component RGB video or both composite and Y/C (NTSC/PAL) video in square pixel resolution.

Data transfer

When capturing standard and non-standard video, Matrox Corona-II uses bus master PCI transfers to send data to the Host memory.

Host interface

Matrox Corona-II is equipped with the Matrox Video Interface ASIC (VIA). Matrox VIA acts as a video-to-PCI bridge that has a 32-bit wide, master/slave PCI Host interface. When in bus master mode, Matrox VIA can perform transfers without requiring continuous Host intervention.

Matrox VIA uses 16 Mbytes of video transfer memory to prevent loss of data during long PCI latencies.

Matrox VIA resides on the secondary PCI bus. This secondary PCI bus can be used as a direct path to display.

The primary PCI bus (Host bus) and the secondary PCI bus are capable of 132 Mbytes/sec peak transfer rates.

Additional features

Matrox Corona-II has an RS-232 serial interface (UART) for remote programming of an intelligent camera, motion control unit, or program logic controller (PLC).

Software

To operate Matrox Corona-II, you can purchase one or more of the Matrox Imaging software products that support the Matrox Corona-II board. These are the Matrox Imaging Library (MIL) and its following derivatives: MIL-Lite, ActiveMIL, and ActiveMIL-Lite, and Matrox Inspector. All Matrox Imaging software is supported under Windows.

❖ Note that, although other software products might be available to operate Matrox Corona-II, the discussion throughout this manual is based in terms of Matrox Imaging software products.

MIL

MIL is a development library which provides an extensive list of commands used to capture, process, analyze, transfer, display, and archive images. Processing and analysis operations such as: spatial filtering, morphology, measurements, blob analysis, optical character recognition (OCR), pattern matching, matrix/bar code reading, and calibration can be performed by MIL.

MIL-Lite

MIL-Lite is a subset of MIL. It includes all the MIL commands for image acquisition, transfer, display control, and archiving.

ActiveMIL

ActiveMIL is a set of ActiveX controls that are based on MIL. ActiveMIL was designed for rapid application development (RAD) tools, such as Microsoft's Visual Basic. ActiveMIL is included with MIL.

ActiveMIL-Lite

ActiveMIL-Lite is a subset of ActiveMIL. It includes all the ActiveX controls for image acquisition, transfer, display control, and archiving. ActiveMIL-Lite is included with MIL-Lite.

Matrox Inspector

Matrox Inspector is an interactive Windows application for image capture, processing, analysis, and archiving.

Developers can use Matrox Inspector as a prototyping tool to quickly build proof-of-concept demonstrations for their machine vision, image analysis, and medical imaging system.

Matrox Intellicam is an interactive Windows program that allows for fast camera interfacing and provides interactive access to **all** the acquisition features of your Matrox board. Matrox Intellicam also has the ability to create custom digitizer configuration format (DCF) files, which MIL and its derivatives use to interface to specific non-standard video sources. Intellicam is included with both MIL and MIL-Lite.

What you need to get started

To begin using Matrox Corona-II, you need the following:

- A computer with a PCI bus and an Intel Pentium processor (or equivalent) or better.
- Microsoft Windows if using Matrox Imaging software (consult the Matrox Imaging software package for specific supported environments and computer memory/storage requirements).
- To attain full Matrox Corona-II functionality, we recommend systems that use newer PCI chipsets, such as the Intel 440BX, 810, 815E, 820, 840, or 850. These chipsets are recommended because they generally offer better performance in terms of data transfer rates.
- A computer with an empty, full-length 32-bit PCI expansion slot (bus master capable). If the optional Matrox Corona-II piggyback DVI flat-panel module is installed, the board will require 2 slots. Another slot (ISA or PCI) is required if you plan to install the companion digital-input board.
- A CD drive, and a hard disk or network drive on which to install the Matrox Corona-II software.

Inspecting the Matrox Corona-II package

When you unpack your Matrox Corona-II package, you should check its contents. Note that optional parts will only be included if ordered. If something is missing or damaged, contact your Matrox representative.

Standard package

If you ordered Matrox Corona-II, you should receive the following items:

- The Matrox Corona-II board, with a PCI board retainer attached.
- The *Matrox Corona-II Installation and Hardware Reference* manual (this document).
- A 4-pin power cable.

Optional parts

You might have also ordered one or more of the following:

- MIL-32/CD, which includes ActiveMIL; MIL-LITE/CD, which includes ActiveMIL-Lite. Both the MIL and MIL-Lite CDs include Matrox Intellicam.
- Inspector-32/CD.
- COR2-44-TO-13, a 6-foot (1.8 m) input cable with a high density 44-pin male connector on one end and 13 BNC-type connectors on the other.
- ❖ For customers using the old Corona DBHD44-TO-8BNC cable, refer to Appendix D for the pinout differences.
- COR2-44-TO-13/O, a 6-foot input cable with a high density DB-44 male connector on one end and both 13 BNC-type connectors and open-ended wires on the other end.
- An ISA/PCI-based, RS-422/LVDS companion digital-input board for Matrox Corona-II (COR-DIG-BRD/R or COR-DIG-BRD/L). A ribbon cable and backplane is shipped with the board to connect it to Matrox Corona-II's digital interface connector. A PCI bracket is also included to install

the board is a PCI slot.

- The COR2-DVI-MOD optional piggyback DVI flat-panel module for Matrox Corona-II, which allows a DVI-D compliant digital flat panel monitor to be used as the primary display. A double-slot PCI bracket is also included.
- DBHD80-TO-OPEN, a 10-foot (3.05 m), open-ended, digital-input cable with a SCSI-2 like, 80-pin male connector that connects to the companion digital-input board (requires customization).

Handling components

The electronic circuits in your computer and the circuits on Matrox Corona-II are sensitive to static electricity and surges. Improper handling can seriously damage the circuits.

- Drain static electricity from your body by touching a metal fixture (or ground) before you touch any electronic component.
- Avoid letting your clothes come in contact with the circuit boards or components.

▲ *Caution*

Before you add or remove devices from your system, always **turn off** the power to your computer and all its peripherals.

Installation overview

The installation procedure consists of the following steps:

1. Complete the hardware installation as described in Chapter 2. If you have any problems, refer to Appendix A.
2. Complete the software installation as described in Chapter 3.
3. Familiarize yourself with the MGA PowerDesk by reading Chapter 4.

More information

For information on using multiple Matrox Corona-II boards, refer to Chapter 5, and for hardware information, refer to Chapter 6.

For technical specifications and connector pinout descriptions, see Appendix B.

A revision history for the Matrox Corona-II board is available in Appendix C.

For information regarding the migration to Matrox Corona-II from Matrox Corona, see Appendix D.

Conventions

Note that in this manual, the term Host refers to your computer.

Also note that we refer to and give examples specific to MIL-Lite in this manual. However, anything that can be accomplished with MIL-Lite can also be accomplished with MIL, ActiveMIL, and Matrox Inspector.¹

Need help?

Appendix A offers solutions to potential problems. If your Matrox Corona-II installation questions are not answered in this manual, contact your local Matrox representative, Matrox sales, or Matrox Customer Support group; refer to *Product Support* section at the back of this manual for email addresses and phone numbers of Matrox offices. Or for up-to-the minute release and customer support information, visit our web site:

<http://www.matrox.com/imaging>

1. Most items can be accomplished with Matrox Inspector.

In the unlikely event of a failure, the warranty and *Product Assistance Request Form* at the back of this manual outline return conditions and procedures.

Chapter 2: Hardware installation

This chapter explains how to install the Matrox Corona-II board in your computer.

Installing Matrox Corona-II

Before you install your board, some precautionary measures must be taken. Turn off the power to the computer and its peripherals, and drain static electricity from your body (by touching a metal part of the computer chassis). Next, proceed with the following steps to install your board.

Steps for installation

1. Remove the cover from your computer using the instructions from your computer manual.
2. Check that you have an empty PCI (32-bit) slot that can accept a full length board. If you do not have an empty slot, remove a PCI board from your system to make room for your Matrox Corona-II board and take note of the slot number you choose.

Connectors of an AGP slot



Connectors of PCI slots



or



Connectors of ISA slots



▲ *Caution*

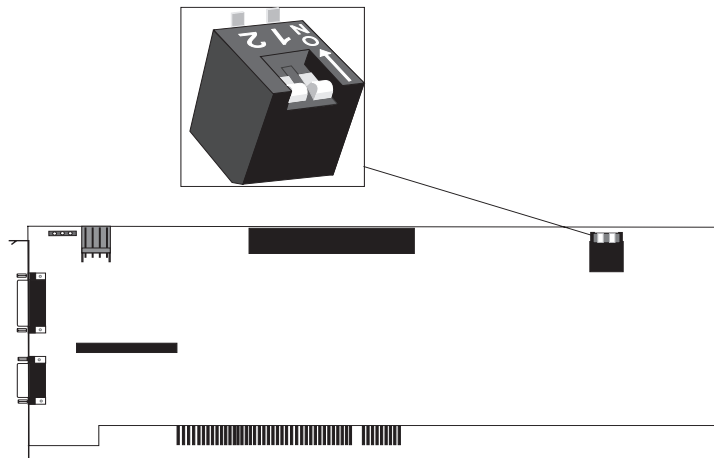
Some computers have a large, black-ridged heat sink that prevents long boards from using most PCI board slots. Your Matrox Corona-II **must not** touch this heat sink. Therefore, choose a slot where the board completely avoids it.

3. If present, remove the blank metal plate located at the back of the selected slot. Keep the removed screw; you will need it to fasten the Matrox Corona-II board.

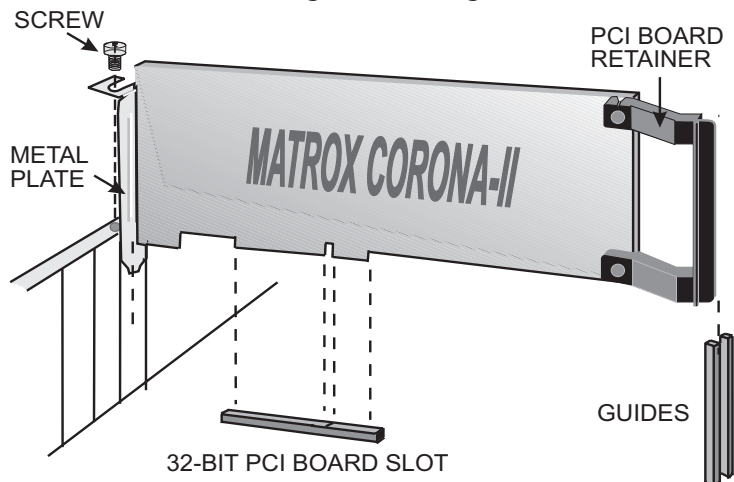
If you are installing the DVI flat panel module, an additional PCI or ISA slot must be kept free and an additional metal plate must be removed.

If you are installing the companion digital-input board, an additional PCI or ISA slot must be kept free and an additional metal plate must be removed.

4. If required, install the piggyback DVI flat panel module. For details, see the *Installing the piggyback DVI flat panel module* subsection of the *Attaching digital add-ons to Matrox Corona-II* section.
5. Before you install your board, ensure that the DIP switch is set properly. The default settings are as follows:



6. Lower the board gently into the slot, sliding the PCI board retainer between the guides (see figure).



7. Once the board is perfectly aligned, press the board firmly but carefully into the slot.
8. Anchor the board by replacing the screw that you removed.
9. If required, install the companion digital-input board. For details, see the *Installing the companion digital-input board* subsection of the *Attaching digital add-ons to Matrox Corona-II*.
10. Replace the cover of your computer.
11. Attach your monitor(s) and input video sources. For details, see the *Connecting to external devices* section.
12. Turn on your computer.

Under Windows 2000, when you boot your computer, Windows' Plug-and-Play system will detect a new Multimedia Video Device and you will be asked to assign it a driver. At this point, you should click on **Cancel** because the driver will be installed during the installation of MIL or one of its derivatives.

Choosing your display configuration

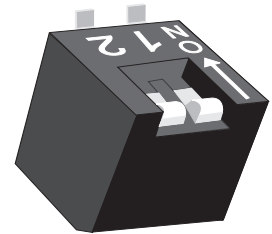
Matrox Corona-II has an on-board graphics controller. If you want this graphics controller to display the Windows desktop, set DIP switch position 2 to **off**. Any graphics controller that should not also display the Windows desktop should have its output disabled. If you have an active built-in graphics controller on your motherboard, your computer's BIOS will automatically disable its output when DIP switch position 2 of Matrox Corona-II is set to **off**.

DIP switch settings

- 1: * Not used for Rev.1 and all future revisions of the board.
- 2: Off = Enable the Matrox Corona-II graphics controller's ability to display the operating system (default)
- On = Disable the Matrox Corona-II graphic controller's ability to display the operating system

* For Rev.0 boards, Dip switch setting 1 was as follows:

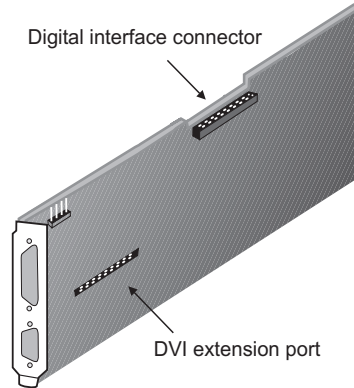
- Off = BIOS loaded into memory (default)
- On = BIOS unloaded



You can also use Matrox Corona-II's graphics controller to display on an auxiliary screen. To do so, set DIP switch position 2 to **on**.

Attaching digital add-ons to Matrox Corona-II

Matrox Corona-II has 2 digital interface receptacles, which allow you to receive and display digital image data.



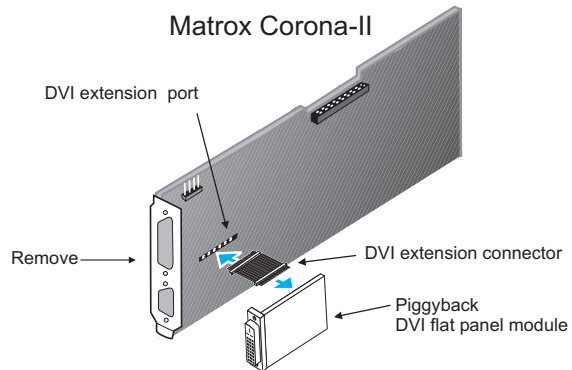
- **DVI extension port.** A port used for connecting the piggyback DVI flat panel module to Matrox Corona-II through the DVI extension connector.
- **Digital interface connector.** A 70-pin connector to which you can attach the companion digital-input board using a backplane.

Installing the piggyback DVI flat panel module

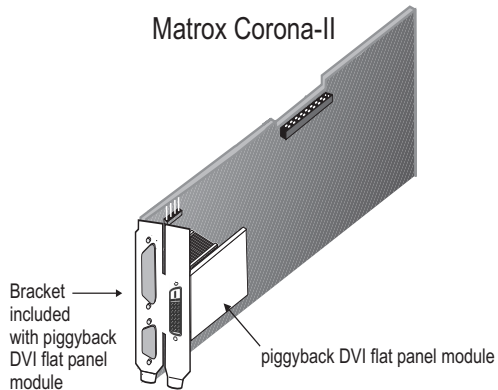
To install the piggyback DVI-compliant flat panel module, do the following:

1. Remove your Matrox Corona-II from your computer if it is already installed.
2. Remove the PCI bracket by unscrewing the 4 hexagonal nuts from your Matrox Corona-II.

3. Attach one end of the DVI extension connector to your Matrox Corona-II via the DVI extension port located on the Matrox Corona-II. Then, attach the piggyback DVI flat panel module to the other end of the DVI extension connector, as shown below:



4. Attach the bracket included with your piggyback DVI flat panel module, as shown below. Use the 4 hexagonal nuts from the Matrox Corona-II, plus the 2 hexagonal nuts included with your add-on module.



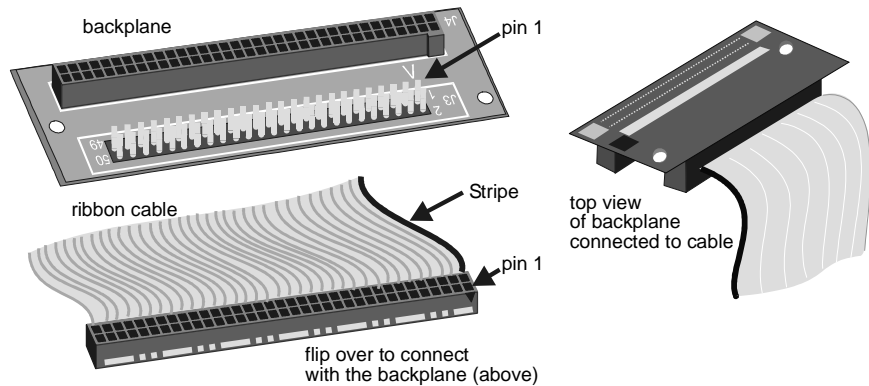
5. Reinsert your Matrox Corona-II, as described earlier in this chapter.

Installing the companion digital-input board

To install the Matrox Corona-II companion digital-input board:

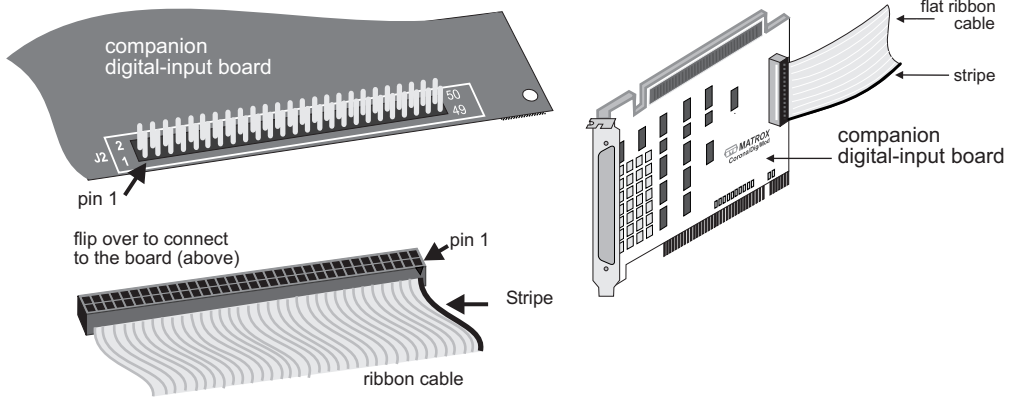
1. Attach the ribbon cable to the backplane. Note that although either end of the cable is physically capable of being attached to the backplane, pin 1 of the cable connector **must** align with pin 1 of the backplane pins. A small triangular notch denotes pin 1 on the cable's connector, whereas a white V points to pin 1 on the backplane (the pin is also labeled "1").

When properly connected, the stripe on the ribbon cable should be aligned with the pin 1 side of the backplane.



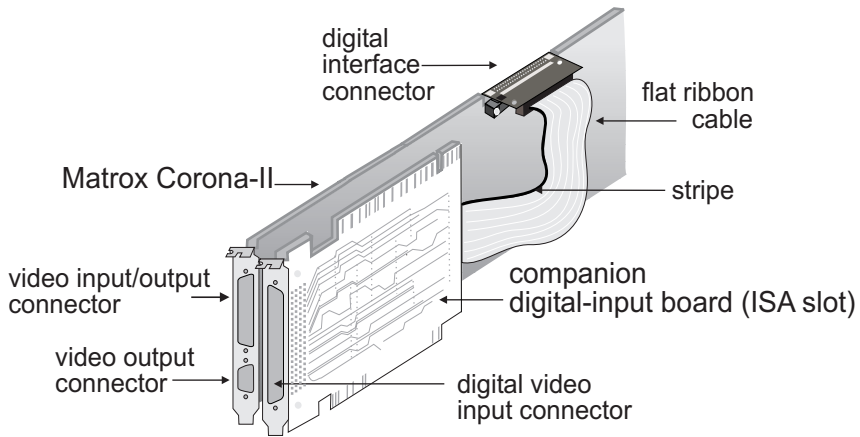
2. Attach the other end of the ribbon cable to the connector on the companion digital-input board. Note that pin 1 on the cable connector **must** align with pin 1 of the board's connector. A small triangular notch denotes pin 1 on the cable's connector, whereas the label "1" denotes the pin on the board's connector.

When properly connected, the stripe on the ribbon cable should be aligned with the pin 1 side of the board connector.

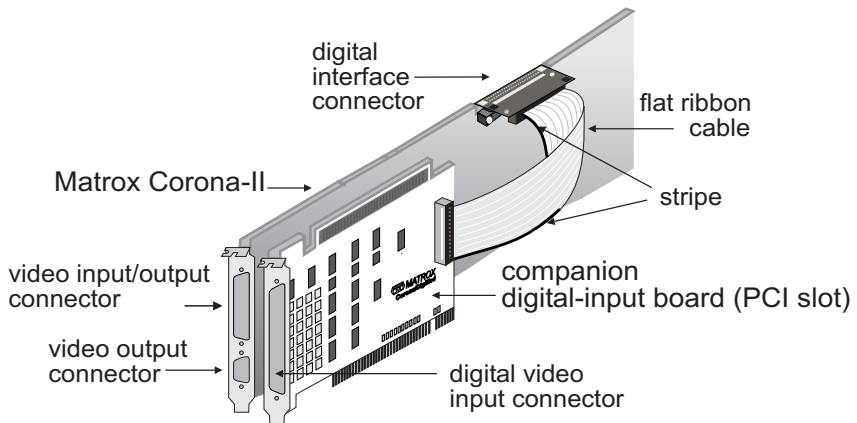


3. Install the actual board in either an ISA or PCI slot, following the procedure detailed for a Matrox Corona-II board.
 - ❖ Note that the board is factory-assembled to be used in an ISA slot (attached to an AT bracket). To install the companion digital-input board in a PCI slot, replace the “AT” marked bracket on the board with the “PCI” marked bracket included with the board (the board will appear “upside-down” when compared to the ISA position).
4. Carefully attach the backplane (connected to the ribbon cable) to Matrox Corona-II’s 70-pin digital interface backplane connector. Take care not to crimp or inhibit the ribbon cable.

A board installed in an ISA slot should look like this:

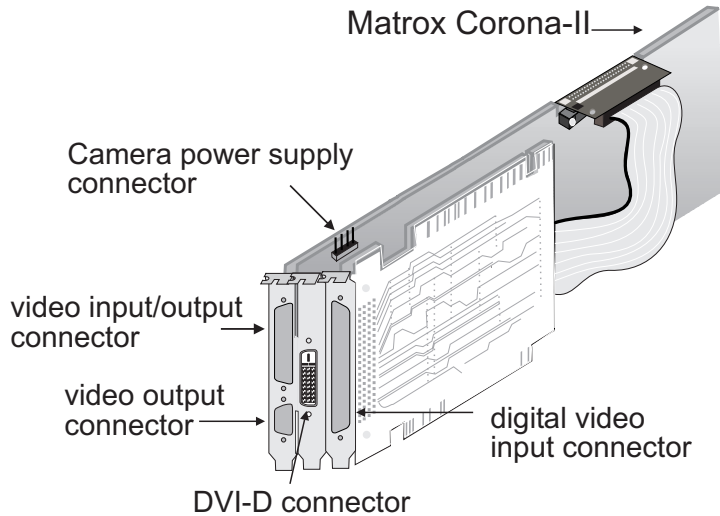


A board installed in a PCI slot should look like this:



Connecting to external devices

Matrox Corona-II has 4 external device interface connectors located on its brackets, as well as a power supply connector. These 5 connectors are shown below (with the companion digital input board installed in an ISA slot).



- **Video input/output connector.** A standard high density 44-pin D-type (DB-44) connector, used to receive analog video and send/receive synchronization signals. This connector is also used for the TV (encoder) output.
- **Video output connector.** A 15-pin D-type (DB-15) connector, used to send analog video and digital synchronization signals to the monitor. The output is compatible with analog VGA and high-resolution monitors.
- **Digital video input connector.** An 80-pin (DBHD80) input connector located on the companion digital-input board used to receive digital video.
- **DVI-D connector.** A 24-pin D-type connector, used for connecting to a DVI-D-compliant digital flat panel monitor.

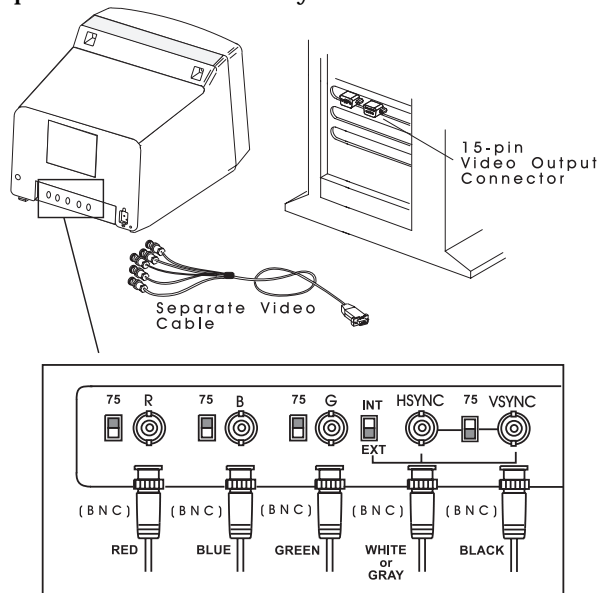
- **Camera power supply connector.** A power supply connector that can route power from the computer to a camera (via the DB-44). Use the 4-pin power cable to connect this connector to your computer's internal power supply.

Outputting to external video devices

Connecting a monitor

Matrox Corona-II works with a VGA and high-resolution analog monitors. To display the standard video output of Matrox Corona-II:

1. If your monitor has impedance switches, set the switches for the red, green, and blue inputs to 75 ohms, as shown in the illustration below. Set the switches for the synchronization inputs according to your monitor's manual. In most cases, these switches should be set to high impedance and external sync mode.



2. Connect the monitor to Matrox Corona-II's 15-pin female video-output connector (DB-15). If your monitor has a DB-15 connector, use the standard DB-15 to DB-15 cable that is usually provided with your monitor. If your monitor has 5 BNC-type connectors, use the standard DB-15 to 5-BNC cable that is usually supplied with such monitors.

Outputting to a DVI flat panel monitor

To output to a DVI-compliant digital flat panel monitor, attach your DVI-D output cable to the 24-pin D-type connector on the piggyback DVI flat panel module.

Refer to Appendix B for a description of the signals offered through the 24-pin D-type connector.

Connecting external devices to the TV (encoder) output

Matrox Corona-II's encoder can encode image data and send it to NTSC/PAL or RGB external video devices, through the video input/output connector. To connect these devices to this connector, use the optional COR2-44-TO-13 cable. Four of the cable's thirteen BNC connectors are used for encoder's output. The wires of the cable are listed in the following table.

❖ Consult the document provided with your cable for the color coding of the wires.

BNC#	Signals	Output
9	RED_C_OUT	Encoded Video Output (C or red).
12	GREEN_Y_OUT	Encoded Video Output (Y or green).
11	BLUE_COMP_OUT	Encoded Video Output (CVBS or blue).
10	COMP_OUT	Encoded Video Output (CVBS)

Attaching a video input

Matrox Corona-II supports a wide variety of analog and digital video sources.

Analog video input

Attach analog video sources to Matrox Corona-II's video input/output connector, using the optional COR2-44-TO-13 cable. Six of the cable's thirteen BNC connectors are used for video input (seven with separate composite sync input).

The COR2-44-TO-13 cable wires are listed in the following table:

BNC#	Signals	Expected input
1	VID1_IN1	Analog Video Input 1 (CVBS or red).
2	VID1_IN2	Analog Video Input 2 (CVBS or green).
3	VID1_IN3	Analog Video Input 3 (CVBS or blue).
7	SYNC_IN	Analog Composite Sync Input (CVBS or sync).
13	OPTOTRIG	Opto-isolated external trigger input.
4	VID2_IN1	Analog Video Input 4 (CVBS or red2).
5	VID2_IN2	Analog Video Input 5 (CVBS or green2).
6	VID2_IN3	Analog Video Input 6 (CVBS or blue2).

Refer to Appendix B for additional signals offered through the DB-44 video input/output connector.

Digital video input

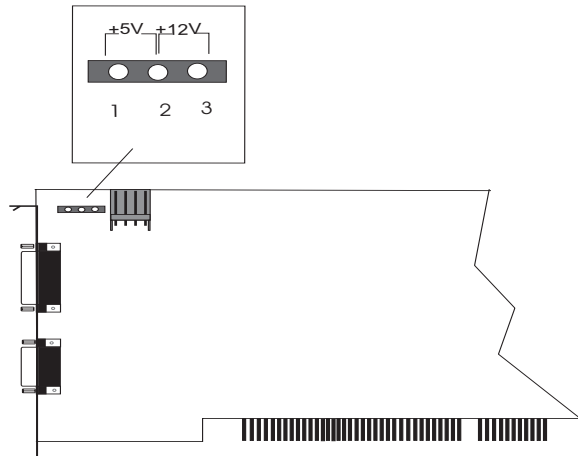
Attach RS-422/LVDS digital sources to the video input connector of the companion digital-input board using the DBHD80-TO-OPEN cable. Check the cable's description (included in the cable's packaging) to determine how you connect it to your camera.

Connecting to the power supply

To use Matrox Corona-II as your acquisition board and your power supply for your camera:

1. Use the 4-pin power cable to connect the Matrox Corona-II camera supply connector to the power supply in the computer.

2. Ensure that the jumper is across the appropriate Matrox Corona-II camera power supply selection pins, for the required voltage (5 V or 12 V).



3. Use the COR2-44-TO-13/O cable (instead of the COR2-44-TO-13 cable) to connect your camera's video output and power supply input to the video input connector. Note that the total current drawn by all the cameras must not exceed 1.0 A.

Chapter 3: Installing software

This chapter explains how to install the Matrox Corona-II software.

Installing the software

Once the Matrox Corona-II board is installed, read the documentation of your Matrox software package for installation and licensing information. In general, you will have to place the installation CD of the package in the appropriate drive; the *setup.exe* program will run automatically. In some cases, installation of a hardware key is required.

Matrox display drivers

To take advantage of Matrox Corona-II's special display features, install the Matrox MGA driver included on the CD. This will create a new Windows group called *Matrox PowerDesk*. The Matrox PowerDesk includes utilities, such as the Matrox Display Properties utility, which allow you to control your display settings. The Matrox PowerDesk group, as well as the Matrox Display Properties utility, are described in Chapter 4.

- ❖ If you already have another version of the Matrox display driver installed on your system, we recommend that you uninstall it and install the version on your software CD.

After installation, read any *readme* file(s) recommended by the installation program.

Matrox Intellicam

MIL-Lite uses digitizer configuration format (DCF) files to configure the camera interface on Matrox digitizers. The DCF defines among other things video timing signals and the video data format. Matrox Intellicam can be used to create or customize a digitizer configuration format (DCF) file, if the supplied files do not include one that matches your video source.


For more information about Matrox Intellicam, refer to the *Matrox Intellicam User Guide*.

Chapter 4: Matrox Display Properties and Matrox PowerDesk

This chapter provides information about the Matrox Display dialog box, as well as the Matrox PowerDesk group.

Overview

This chapter discusses how to configure your display settings to take advantage of Matrox Corona-II's special display features.

The display section of Matrox Corona-II is powered by the Matrox G400 graphics display controller. Matrox Corona-II uses the Matrox display drivers to drive the display section. When installing the drivers, the Matrox PowerDesk tools are also installed, which permit you to configure the display settings on your Matrox Corona-II. Chapter 3 explains how to install software for your Matrox Corona-II board. The drivers have been installed correctly if you see the Matrox QuickDesk icon () in your Windows taskbar.

The display resolution, display mode, and desktop size are set using the Matrox Display Properties utility, one of the Matrox PowerDesk tools.

❖ If you have a different version of the Matrox Display Properties utility or Matrox PowerDesk, some information might be different; for the most up-to-date information, refer to the on-line help of these products.

Configuring your display

You can customize your display settings with the Matrox Display Properties utility. To launch this utility under:

- **Windows 98/2000/Me.** Select **Properties** from the Windows desktop context-menu. The **Display Properties** dialog box is presented. Select the **Settings** property page and then click on the **Advanced** button.
- **Windows NT 4.0.** Select **Programs** from the **Start** menu. From the presented submenu, select **Matrox PowerDesk NT**, and then **Matrox Display Properties**.

Specifying your monitor

Before configuring your display settings, it is recommended that you specify your monitor. By default, the Matrox display drivers assume that you have a 60 Hz monitor. If your monitor is capable of higher refresh rates, you can customize your monitor.

- ❖ If incorrect software monitor settings are applied, some monitors can be permanently damaged. For more information, see your monitor's manual.

Windows 98/2000/Me

Under Windows 98/2000/Me, when using a Plug-and-Play (DDC) monitor, Windows should automatically use the correct settings for your monitor.

To install a monitor other than a Plug-and-Play (DDC) monitor or to customize or verify your Windows monitor settings:

1. Click on the **Monitor** property page of the Matrox Display Properties utility.
2. If the monitor name listed does not match your monitor, click on the **Properties** button and select the **Driver** property page.
3. To install the proper device driver for your monitor, click on the **Update Driver** button and follow the on-screen instructions.

Under Windows NT, when using a Plug-and-Play (DDC) monitor, Windows should automatically use the correct settings for your monitor. To make sure that the correct monitor is selected in Windows:

1. Click on the **Monitor** property page of the Matrox Display Properties utility.
2. Make sure the Plug-and-Play (DDC) monitor option is selected. If so, the Matrox display driver automatically uses the correct settings for your monitor. If not, select the Plug-and-Play (DDC) monitor option, and then click on **Apply**.

If you want to customize your Windows monitor settings, click on the **Settings** property page and follow on-screen instructions.

If you want to install a monitor other than a Plug-and-Play (DDC) monitor, click on the **Monitor** property page. Select the Matrox monitor option and follow on-screen instructions.

Another consideration

When configuring your display, if you are using BNC connectors with a Plug-and-Play monitor, the Plug-and-Play feature of your monitor cannot be used. To use the Plug-and-Play feature of your monitor, use the 15-pin connector at the back of your monitor instead of the BNC connectors.

Additional information

Additional information regarding the Matrox Display Properties utility and other Matrox PowerDesk tools, is available in the on-line help for those products, as well as the following resources:

Windows 98/2000/Me

- Select **Properties** from the Windows desktop's context-menu. The **Display Properties** dialog box is presented. Select the **Information** property page and then click on **View Readme File** button.

Windows NT 4.0

- Select **Programs** from the **Start** menu. From the presented submenu, select **Matrox PowerDesk NT** and then select one of the following:
 - **Matrox PowerDesk Guide.**
 - **ReadMe file.**
 - Select **Matrox Display Properties** and then **Information.**

Matrox Uninstall Program

The Matrox Uninstall Program allows you to disable or remove all or part of the Matrox PowerDesk software. When you use this program, all the files you choose to uninstall are **deleted** from your hard disk, and all entries pertaining to these files are removed from your Windows registry.

To use the Matrox Uninstall Program, click on **Matrox PowerDesk Uninstall** from the Matrox PowerDesk group. In the Matrox Uninstall Program dialog, you can choose to do a complete or a partial uninstallation of Matrox PowerDesk.

Chapter 5: Using multiple Matrox Corona-II boards

This chapter explains how multiple Matrox Corona-II boards can be supported in a single computer.

Using multiple Matrox Corona-II boards

This section describes how multiple Matrox Corona-II boards can be supported in a single computer.

When Matrox Corona-II boards are in extended desktop configuration, the display of grabbed images from each board will be live or pseudo-live, depending on the position of the windows. Typically, there will be a switch to pseudo-live when the display window falls between two monitors.

Installing multiple boards

Install each additional Matrox Corona-II board in the same way you installed the first (refer to Chapter 2). In other words, place each additional board in an empty PCI slot, taking care that it avoids the CPU heat sink. You can theoretically have as many as 11 Matrox Corona-II boards installed in your computer at one time; this number is, however, limited by the number of empty slots in your computer and, for simultaneous grabs, by the available bandwidth of your computer.

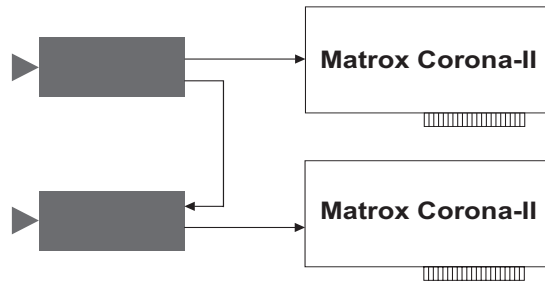
To use Matrox Corona-II boards in an extended desktop configuration, you must set their DIP switch position 2 to **off**. For more information about selecting your display configuration, refer to Chapter 2.

Using MIL-Lite, you have to allocate a MIL system for each board and allocate the resources of each MIL system.

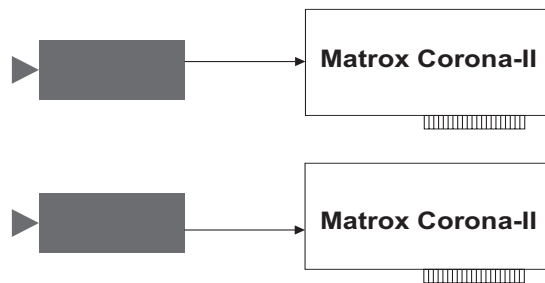
Grabbing simultaneously from different boards

You can simultaneously grab images from cameras attached to different Matrox Corona-II boards. To grab at exactly the same time, the cameras must be genlocked (synchronized) and their camera definition formats must be the same.

The number of boards from which you can simultaneously grab is determined by the available PCI-bandwidth of your computer. This is discussed later in the chapter.



Grabbing from two genlocked cameras



Grabbing from two non-synchronous cameras (with different formats)

Number of cameras per board

The number of cameras that can be attached per board depends on the camera type.

The RGB digitization section can switch between two component RGB cameras or between six independent monochrome cameras. The synchronization signal can be on any component of the RGB input or can be received on the external sync channel (SYNC_IN).

Also, the RGB digitization section can accept simultaneous input from three genlocked monochrome cameras. The inputs are stored in separate color bands of the same buffer; the buffer can be in planar format. Up to two, two-channel monochrome cameras (dual tap), can also be connected.

The MIL-Lite *MdigChannel()* command can be used to switch between channels.

PCI bandwidth requirements

Sustained PCI-transfers to memory require the use of a high performance PCI core-logic chipset, such as the Intel 840 or 850 (refer to section *What you need to get started* in Chapter 1 for a list of recommended chipsets). If a high performance chipset is used, you should not have any PCI bandwidth limitations when transferring a full-sized image from a Matrox Corona-II in real-time. However, when using multiple Matrox Corona-II boards and transferring more than one image simultaneously, you might encounter PCI bandwidth limitations. In this case, you might have to reduce the image size to avoid reaching the upper limits of the overall available bandwidth.

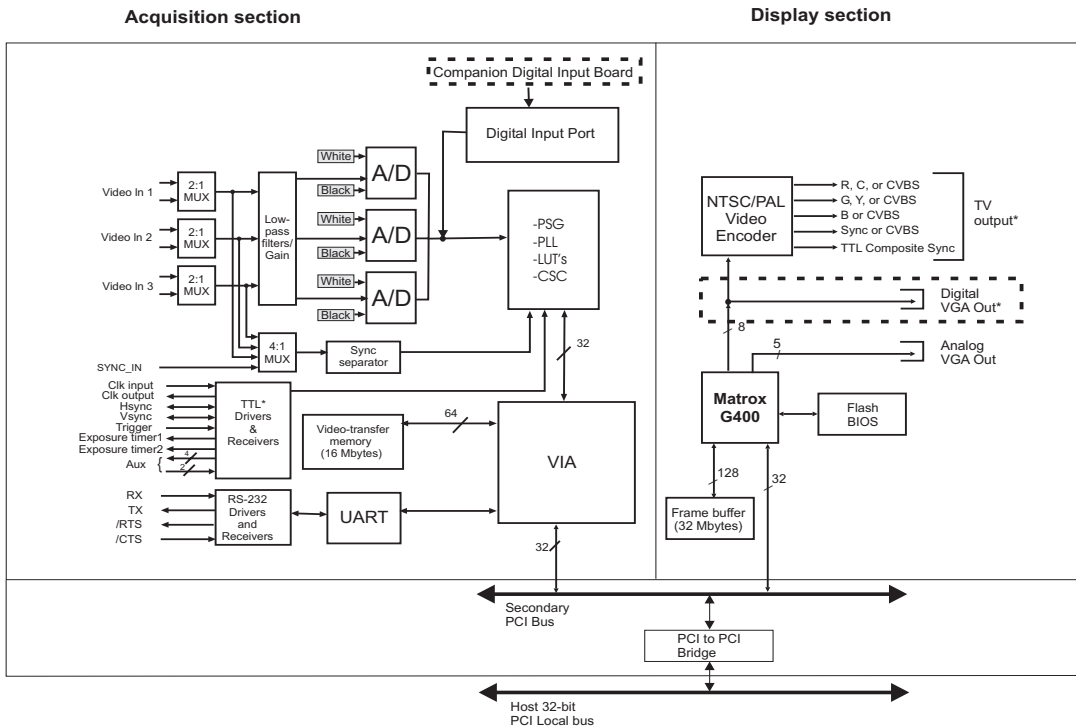
Chapter 6: Matrox Corona-II hardware reference

This chapter explains the hardware architecture of Matrox Corona-II, as well as the available features and modes of operation.

Matrox Corona-II hardware reference

This chapter provides information on the hardware architecture of Matrox Corona-II, as well as the features and operating modes supported by the board.

The chapter is divided into three sections. The first section describes the Matrox Corona-II hardware that is associated with the acquisition of images, while the second section describes the hardware related to the display of images. The third section discusses the data interfaces, and how to transfer images to Host memory. For a summary of the information given in this chapter and detailed specifications of connectors and pinouts, refer to Appendix B.

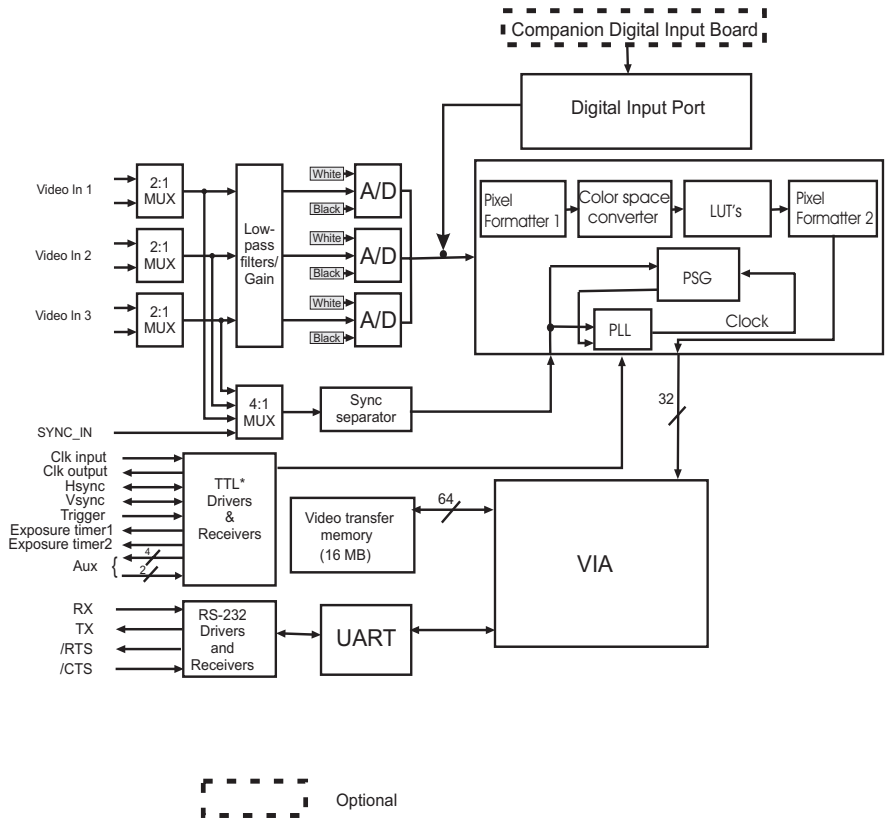


Optional

* Note that the TV output and Digital VGA Outputs cannot be used at the same time

Acquisition section

The acquisition section of Matrox Corona-II provides two different methods of capturing images. It can acquire monochrome or RGB analog video from standard and non-standard cameras. In addition, it can capture digital video using the Matrox Corona-II optional companion digital-input board.



The video timing parameters (including those for progressive scan) supported by the Matrox Corona-II board are as follows:

	Max
Number of pixels / line (including sync and blanking)	4096*
Number of lines / frame (including sync and blanking)	4096*
Sampling rate (with external clock input, or in line-locking mode)	32 MSPS

Note that the maximum number of pixels per line that MIL supports is:

$$\frac{\text{Pixels}}{\text{Line}} \times \text{Number of Lines} \leq 16 \text{ Mbytes}$$

Analog inputs

Matrox Corona-II has six independent analog channels. Using these channels, you can switch between two RGB or six monochrome cameras, where the channels can be selected with the MIL-Lite *MdigChannel()* function.

Low-pass filters

The input low-pass filtering stage is used to limit high frequency noise and aliasing effects at the input of the triple A/D converter. The filters used on Matrox Corona-II are 4th order Butterworth filters. Each channel can be configured to use one of 4 different low-pass filters (3 cut-off frequencies and one all pass), which are selected using the MIL-Lite *MdigControl()* function with the `M_INPUT_FILTER` control type as follows:

Cut-Off Frequency	Description	MIL control values
8 MHz		<code>M_FILTER0</code>
10 MHz	Default (selected on power-up)	<code>M_FILTER1</code>
12.5 MHz		<code>M_FILTER2</code>
Infinity	All pass	<code>M_FILTER_BYPASS</code>

Gain

Matrox Corona-II has adjustable gains. They allow you to optimize the video input signal range.

You can change the gain value using the MIL-Lite *MdigControl()* function. The supported gain factors are as follows:

Input video signal amplitude (excluding sync)	Total input video signal amplitude (including sync)	Required gain setting	MIL
0.0 V up to 0.5 V	0.0 - 0.7 Vpp	4	M_GAIN3
0.5 V up to 0.7 V	0.7 - 1.0 Vpp	2.8 (default)	M_GAIN2
0.7 V up to 1.0 V	1.0 - 1.4 Vpp	2	M_GAIN1
1.0 V up to 1.5 V	1.4 - 2.1 Vpp	1.3	M_GAIN0
1.5 V up to 2.0 V	2.1 - 2.9 Vpp	1	M_GAIN4

A/D converters

Three A/D converters with external reference generation and sync slicing are used for 8 or 10-bit digitization. Also, when digitizing RGB data, the A/D converters will output 24-bit RGB data. The converters can operate at up to 32 MSPS.

❖ For best conversion results, use the red or green channel for 10-bit digitization.

In addition, the converters' black and white reference levels can be adjusted individually. The black and white reference levels can be adjusted between 0.6 V to 1.6 V and 1.6 V to 2.6 V respectively, in increments of 10.23 mV (98 distinct adjustments).

Use the MIL-Lite *MdigReference()* function to set the black and white reference levels.

Digital Input

The digital input port on Matrox Corona-II captures TTL level digital video at up to 24 bits per pixel. It is designed to receive 8, 10, 12, 14, 16-bit, 2 x 8-bit, or 2 x 10-bit monochrome data, or 24-bit (8,8,8) RGB data through the companion digital-input board (or from a TTL digital video source).

The digital interface supports grabbing from up to three (8-bit) synchronized channels simultaneously, with each channel having its own destination address and pixel mask. The interface can accept continuous or single-frame/field data in progressive/interlaced input modes. The interface can operate at up to 40 MSPS.

The companion digital-input board translates 24-bit digital data (as well as control signals such as syncs, clocks, exposure, and trigger) from either standard RS-422 or LVDS format (depending on the board purchased) to TTL logic levels.

Lookup tables

Matrox Corona-II has a configurable lookup table (LUT). When grabbing analog or digital video, the LUT can be configured as a triple 256 x 8-bit or dual 1024 x 16-bit LUT. This allows you to map up to 3 x 8-bit or 2 x 10-bit input through the LUT. For all other inputs (12, 14, or 16-bit digital data), the LUT is not available.

Color space converter

The RGB to YUV color space converter (CSC) is used to convert 24-bit RGB data to YUV16 data. The data range and equations for the data conversions are as follows:

Data Range:

- Y = 0 to 255 bits
- U and V = 1 to 255 bits for each

Equations for Data Conversion:

- $Y = 0.299 R + 0.587 G + 0.114 B + 0$
- $U = -0.168 R - 0.327 G + 0.495 B + 128$
- $V = 0.497 R - 0.417 G - 0.080 B + 128$

PSG

The Programmable Synchronization Generator (PSG) is responsible for managing all timing and synchronization signals.

Video source detector

The video source detector is responsible for detecting whether or not a camera is turned on and properly connected to the Matrox Corona-II board. The video source detector verifies the presence of a sync signal within a specified time period.

Horizontal lock detector

The horizontal lock detector detects if the Matrox Corona-II PLL is synchronized with the source (locked) and therefore is ready to begin a grab. Its range of operation is 1.2 KHz to 2000 KHz and its lock detection window is ± 1 pixel.

Phase-locked loop

The high-performance, low-jitter phase-locked loop (PLL) uses frequency synthesis techniques to generate the clock signal, when necessary.

The PLL can use the following sources as a reference:

- The on-board crystal oscillator.
- The horizontal video synchronization signal supplied by the video source (line-locked mode).

When in line-locked mode and accepting a composite video signal, the PLL can synchronize to either serrated or block vertical synchronization signals.

- The clock signal supplied by the video source (to generate a different clock).

When the input source supplies a sampling clock that does not require adjustment, the PLL is bypassed to avoid adding jitter to the supplied clock.

General synchronization

Matrox Corona-II can operate in either **slave** or **master** mode.

Slave mode

- In **slave** mode, the video source provides the synchronization information to Matrox Corona-II. It can accept one of the following synchronization schemes:
 - The video source encodes the synchronization signals on the analog video signal provided to the board.
 - The video source supplies the horizontal and/or vertical synchronization signals separately in TTL format.
 - The video source provides a composite synchronization signal in TTL format, separate from the analog video.
- Synchronization information can be sent either with the video data, or on a separate analog synchronization channel.

Master mode

- In **master** mode, Matrox Corona-II generates (using the PSG) the horizontal and/or vertical (TTL) synchronization signals and supplies them to the video source. This allows the video source to synchronize to the board.

Trigger

Matrox Corona-II accepts an external trigger input which allows image acquisition to be synchronized to external events. The board can operate in one of two modes, and the selected mode is specified by the DCF.

Matrox Corona-II can operate in next valid frame/field mode. When in this mode, the digitizer waits for the next valid frame or field (as specified by the DCF file) before commencing the grab. This trigger mode functions in one of three ways:

- **Edge-triggered monoshot acquisition:** The VIA (Video Interface ASIC) waits for the rising/falling edge to capture a single frame.

- **Edge-triggered continuous acquisition:** The VIA waits for the rising/falling edge to start a continuous grab.
- **Level-sensitive "continuous" acquisition:** The VIA grabs continuously while the level of the trigger is high/low.
- ❖ The polarity of the active and inactive levels of the trigger signal are software programmable.

Matrox Corona-II can also operate in asynchronous reset mode. In this mode, the digitizer resets the camera to begin a new frame when the trigger signal is received.

Direct TTL trigger

Trigger signals can be received in TTL format directly through the video-input connector. The TTL level signal must have a maximum amplitude of 5 V. A signal over 2 V is considered high while anything less than 0.8 V is considered low. The transition of 0.8 V to 2 V is considered to be the rising edge.

The trigger signal's pulse width must be greater than one pixel. You can determine the pulse width by taking the inverse of the *pixel frequency*. For example, if the pixel frequency is 12.27 MHz, the minimum pulse width is $1/12.27 \text{ MHz} \approx 82$ nanoseconds.

▲ *Caution*

When using the companion digital-input board, do NOT simultaneously connect the TTL trigger input on the video input/output connector of the baseboard and the RS-422/LVDS trigger input on the digital video input connector of the companion digital-input board. Connecting to both trigger inputs simultaneously may cause permanent damage to the board.

opto-isolated trigger

Trigger signals connected to the OPTOTRIG- and OPTOTRIG+ input pins, pass through an opto-coupler, a device that protects the board from outside surges; OPTOTRIG- is usually connected to the ground of the trigger source. The voltage difference across OPTOTRIG+ and OPTOTRIG- must be between 4.05 V and 9.16 V for logic high, and between -5.0 V and 0.8 V for logic low. Refer to Appendix B for the pinouts of these signals on your board.

Exposures

Matrox Corona also has two 16-bit timers (located in the PSG) that are software or hardware re-triggerable. The output of these timers drive the exposure signals. These timers allow you to control the exposure time and other external events related to the video source. They can generate variable triggered or periodic exposure signals.

User bits

Matrox Corona-II supports six auxiliary TTL user bits through the video input connector: two inputs and four outputs. These are available for controlling external events such as a strobe light or PLC. User bits are programmed using the MIL-Lite *MdigControl()* function.

UART and RS-232 serial port

Matrox Corona-II features a Universal Asynchronous Receiver/Transmitter (UART) that provides an RS-232 serial interface. For example, this allows you to remotely control a camera or a motion control unit, or remotely communicate with a program logic controller (PLC). The UART is programmed using the MIL-Lite *MdigControl()* function with the M_UART... control types.

Event interrupts

The video-to-PCI bridge (VIA) can generate various interrupts that get the attention of the Host processor. These interrupts can be generated upon:

- **Grab events:** grab-end, grab-frame-end, grab-field-end, grab-field-end-odd, and grab-field-end-even.
- **Video synchronization events:** field-start, field-start-odd, and field-start-even.

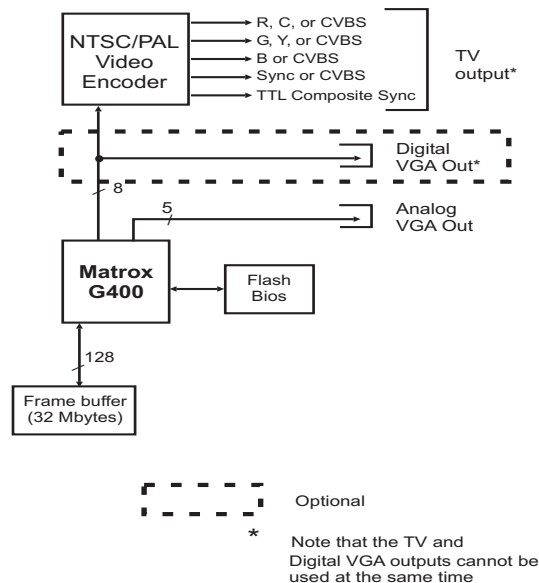
Using the auxiliary power supply

Matrox Corona-II can supply power to your camera. Use the 4-pin power cable provided with your board to connect to the power supply of your computer. The operating voltage can be set to either 5 V or 12 V, but the current drawn by all cameras is limited to 1.0 A. The circuit uses an auto-resettable fuse. For

further information on connecting to the auxiliary power supply connector, see the sections, *Connecting to external devices* in Chapter 2, and *Camera power supply selection* in Appendix B.

Display section

The following is an illustration of the display section of Matrox Corona-II.



To drive the display section, Matrox Corona-II uses the Matrox MGA-G400 graphics display controller. It has a maximum display resolution of 1280 x 1024 x 32 bits per pixel, and a refresh rate of 75 Hz. It has a 128-bit wide memory interface. The graphics controller is capable of non-destructive overlay. This means that the MGA-G400 controller can display non-destructive graphic annotations on top of live video. The MGA-G400 chip also supports Matrox DualHead display technology. A 256-Kbyte Flash Memory is used to permanently store the Video BIOS.

Display resolution

In an 8-bit display resolution, hardware-assisted overlay is available at a maximum resolution of 1600 x 1200 and a refresh rate of 75 Hz. In a 32-bit color display resolution (BGR32 packed), it is available at a maximum resolution of 1280 x 1024 and a refresh rate of 75 Hz.

See *Chapter 4: Matrox Display Properties and Matrox PowerDesk* to set your display properties.

Video encoder and TV output

In the display section, an NTSC/PAL video encoder provides an additional video output with overlay from Matrox Corona-II to external video devices (for example, TVs and VCRs). The TV output can output either component RGB video or both composite and Y/C (NTSC/PAL) video in square pixel resolutions.

DVI

The piggyback DVI flat panel module is an optional module that can be attached to the Matrox Corona-II board to allow Matrox Corona-II to display data on an DVI-D compliant digital flat panel monitor.

Data interfaces

Matrox Video Interface ASIC

Matrox VIA acts mainly as a video-to-PCI bridge. It uses 16 Mbytes of video transfer memory (SDRAM) to receive and transfer data across the PCI bus. For example, when grabbing to a Host buffer, it temporarily stores grabbed data in video transfer memory until the PCI bus becomes available.

Simultaneous data streams

Matrox VIA manages up to two simultaneous data streams. The following lists possible combinations:

- It can grab into video transfer memory, and concurrently transfer data between the video transfer memory and PCI device.
- It can perform PCI data transfers and concurrently permit the Host processor to access the video transfer memory.

General features

Matrox VIA is capable of color plane separation of RGB video (for example, RGB packed to RGB planar). The same mechanism can be used to merge line segments of monochrome multi-tap cameras.

PCI interface

Matrox Corona-II has a 32-bit PCI interface capable of a peak image transfer rate of 132 Mbytes/sec.

Matrox VIA's PCI port

Matrox VIA's PCI port is 32 bits wide and operates at 33 MHz. It allows all Matrox VIA resources to be accessed through a 128-Mbyte memory region, mappable anywhere within the 4-GByte PCI address space.

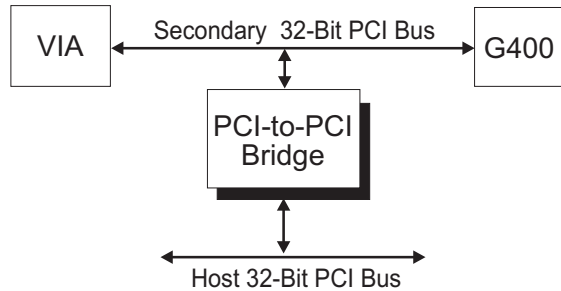
Read pre-fetch and write posting buffers are integrated to optimize Host access.

MGA-G400

The MGA-G400 has a PCI interface and an AGP interface. It contains a separate communication stream for graphics commands and for pixel data.

PCI-to-PCI bridge

The PCI-to-PCI bridge allows the connection of two or more PCI devices to one Host PCI slot (MGA-G400 and Matrox VIA), in which only one PCI device is allowed. It decouples the secondary or subordinate bus from the primary bus, making transfers exclusive to the secondary bus invisible to the primary bus. It provides write posting from the secondary PCI local bus to the primary one, allowing high throughput with minimal added latency.



The data transfer rate between the system bus master and the target memory (across the PCI bridge), in various read/write combinations, is highly dependent on the Host (core logic chipset).

Appendix A: Troubleshooting

This appendix gives suggestions to help you resolve potential problems. If your problem is not addressed here, contact your local Matrox representative, Matrox sales office, or the Matrox Imaging Customer Support Group.

Troubleshooting

If you have problems using your Matrox Corona-II, please try the following:

- Check for disconnected power cords or incorrect monitor connections.
- Read the suggestions in this chapter.

If your problem is not addressed in this chapter or if the solutions suggested don't work for you, contact your local Matrox representative, Matrox sales office, or the Matrox Imaging Customer Support Group.

Common problems and solutions

Installation problems

☛ **My computer beeps, hangs shortly after booting, or will not boot when I turn on the power.**

There are many possible causes for such a problem. Try the following:

- On Rev. 0 of Matrox Corona-II, ensure that DIP switch SW1 is in its default position (refer to chapter 2).
- Remove any non-compatible display adapters (such as an EGA or VGA) from your system, and ensure that the motherboard's graphics controller is disabled.

➤ **After installing the MGA Windows NT 4.0 driver for my Matrox Corona-II, my system does not reboot at the expected resolution.**

This is a problem that you are likely to encounter if the resolution settings are incorrect or if the MGA display driver is not the correct version. These problems can be addressed in the following ways:

- To verify the current resolution settings or to change them, click on the **MGA QuickDesk** icon (generally located at the bottom right of your monitor) and select **Display Properties**. The **Matrox Display Properties** dialog box appears. Select the **MGA Settings** property page. Set the resolution to one that is supported by your monitor and click on **Apply**.
- Install the MGA display driver provided with the Matrox Corona-II software.

➤ **Device attached to the computer failed to start under Windows NT 4.0**

When this occurs, your computer will prompt you to go to the Event Viewer utility to identify the device that was unable to start. This could happen due to the following two reasons:

- The drivers are not installed correctly. The cause of this error could be due to too much or insufficient allocation of DMA memory. To address this problem, uninstall and reinstall the drivers that failed to start, and specify the correct DMA setting.
- There is a conflict in the BIOS Setup program. This problem generally occurs when there is a PCI memory mapping error or when there is a PCI-IRQ routing error. To resolve this problem, first try to swap boards from one PCI slot to another. If the problem still persists, try upgrading your BIOS.

PCI system compatibility problems

☛ **Matrox Corona-II does not work on my PCI-bus computer.**

Some PCI computers do not recognize PCI-to-PCI bridges due to limitations in their BIOS software. Consequently, the system will not boot since it cannot initialize the display controller.

Grabbing problems

☛ **IRQ conflicts**

In general, PCI devices can share an interrupt line (IRQ). However, sometimes this might not be possible. The types of difficulties that you might run into are as follows:

■ BIOS driven IRQ conflict under Windows NT 4.0

In the event that your Matrox imaging board(s) cannot share an IRQ line, allocate a different IRQ to each device in the IRQ Configuration Setup section of the BIOS Setup Program (accessible on bootup).

■ IRQ conflict under Windows 2000

You can resolve this problem by re-assigning a different IRQ value to the PCI slot in which the Matrox board is installed.

❖ Note that PCI devices cannot share interrupt lines with EISA or ISA devices.

Other possible solutions to the above problems:

- Move the Matrox Corona-II board to another free PCI slot.
- Swap Matrox Corona-II with another board by switching PCI slots.

Video display problems

☛ **My monitor is blank (or it has shades or spots of gray and white).**

- Check that the system is plugged in and make sure your computer and monitor are turned on.
- Recheck your connections at both ends of the video cable.
- Ensure that Matrox Corona-II is sitting evenly and is fully inserted into its slot. To do this, press the board down firmly.

- Check that the brightness and contrast controls are set correctly.
- Set the monitor's switches (if any) to 75 ohms for the video (RGB) inputs, and set the synchronization to 'external' (and to high-impedance if this option is available). If there is a Digital/Analog switch on your monitor, set it to **Analog**.

☛ **When I run an application, there is no picture on my video display. The monitor is blank.**

The application you are running might be attempting to select a resolution that is not supported by your monitor. Check your monitor's manual for supported resolutions.

☛ **The colors are wrong.**

Incorrect colors indicate that either the cabling (for monitors that do not have a built-in cable) or the monitor impedance is incorrect.

- Ensure that the red, green, and blue lines are connected to the corresponding red, green, and blue monitor inputs (some monitor input connectors are not in the expected order).
- Make sure your monitor's RGB inputs are set to 75 ohms. Several monitors have individual switches to set the impedance of the inputs. Make sure that they are all set to 75 ohms.
- On some computers, you must run a setup program or set DIP switches to select the main video adapter type. For most computers, you should select an EGA/VGA type. Refer to the user manual for your computer.
- Check the cable continuity.

☛ **The display is not centered.**

Adjust the centering control of your monitor to position the picture on the screen (refer to your monitor's manual).

☛ **The picture quality is poor, with a dim picture, poor contrast, and poor sharpness.**

The monitor might be improperly adjusted.

- Adjust the brightness, sharpness, and contrast controls of your monitor.
- Ensure that the cable is correctly and completely inserted at both ends.
- Make sure that the RGB input switches are set to 75 ohms.

☛ **The picture is broken up, with bad horizontal sync; in other words, it rolls, jitters, or blinks.**

The cables connected to the monitor might not be attached properly or the monitor might not accept Matrox Corona-II's video parameters.

- Ensure that the synchronization line(s) is properly connected to your monitor (to identify the sync line(s), refer to the appropriate monitor configuration in the 'Connecting to a monitor' section of Chapter 2). If this does not solve the problem, your monitor might need horizontal setting adjustments, or it might be defective. Refer to your monitor's manual.
- Ensure that the resolution you specified is valid for your monitor.

Problems during application development

☛ **I am running an application and the system 'hangs' or produces unwanted results.**

Check for an interrupt, memory, or register conflict. Sometimes, an EISA or ISA device might attempt to use the same interrupts, register or memory space as Matrox Corona-II, and this causes a conflict.

Contacting Matrox

Before contacting your local Matrox representative or the Matrox Imaging Customer Support Group, you will need the following information:

- A description of what happened.
- Your board's serial number (found on the bar code label on the soldered side of the board).
- Computer type, environment, and peripherals (especially boards sharing the computer with your Matrox Corona-II).

A *Product Assistance Request Form* for recording the necessary information can be found at the back of this manual.

Appendix B: Technical information

This appendix contains information that might be useful when installing your Matrox Corona-II board.

Board summary

Global information

- System requirements: A computer with a PCI bus and an Intel Pentium processor (or equivalent) or better.
- Microsoft Windows if using Matrox Imaging software (consult the Matrox Imaging software package for specific supported environments and computer memory/storage requirements).

Some older systems use a core logic chipset (interfaces PCI with Host memory) that has limited throughput capabilities. Matrox Corona-II might not be able to attain full functionality on such systems. We recommend systems with newer PCI chipsets, such as the Intel 440BX, 810, 815E, 820, 840, or 850. If you need more specific information regarding potential problems, refer to Appendix A - *Troubleshooting*.

Technical features

- Six software-selectable channels, to which you can attach and switch between six monochrome RS-170/CCIR or two component RGB video inputs. Matrox Corona-II can support both 8-bit and 10-bit monochrome data.
 - ❖ If acquiring 10-bit monochrome data, use the R or G channels.
- 24-bit TTL-level digital interface, when used with the optional RS-422/LVDS Matrox Corona-II companion digital-input module.
- Captures from standard and non-standard frame scan sources.
- Supports both single and dual-tap (dual-output) monochrome acquisition of analog or digital data.
- Accepts an external trigger input and can operate in asynchronous reset mode.
- Software and hardware re-triggerable timers whose outputs drive the exposure signals of the video input/output connector and digital interface connector.

- Three 256 x 8-bit or two 1024 x 16-bit input LUTs.
- Programmable black and white reference levels.
- Supported gain factors:

Input video signal amplitude (excluding sync)	Total input video signal amplitude (including sync)	Required gain setting	MIL
0.0 V up to 0.5 V	0.0 - 0.7 Vpp	4	M_GAIN3
0.5 V up to 0.7 V	0.7 - 1.0 Vpp	2.8 Default	M_GAIN2
0.7 V up to 1.0 V	1.0 - 1.4 Vpp	2	M_GAIN1
1.0 V up to 2.0 V	1.4 - 2.1 Vpp	1	M_GAIN0
1.5 V up to 2.0 V	2.1 - 2.9 Vpp	1	M_GAIN4

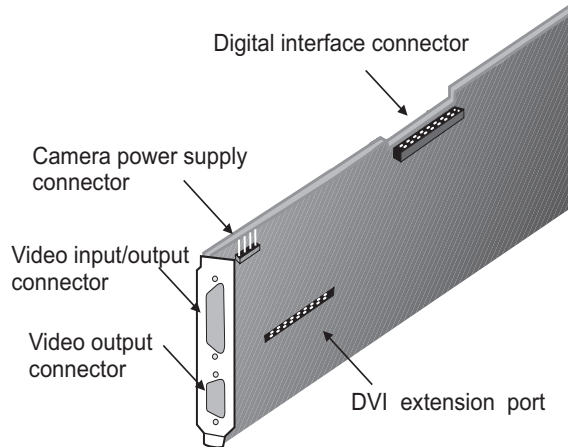
- Simultaneous capture to display and transfer to Host.
- Live scalable video-in-a-window.
- True color 32-bit non-destructive overlay.
- Maximum display resolution 1280 x 1024 x 32 bits.
- Encoder, which provides separate output for standard video.
- Features 32 Mbytes of frame buffer memory.
- 32-bit bus-master PCI interface.
- 16 Mbytes of video transfer memory for PCI transfers.
- DVI-compliant flat panel display device interface.
- Strap-selectable 5 or 12V DC output.

Default settings

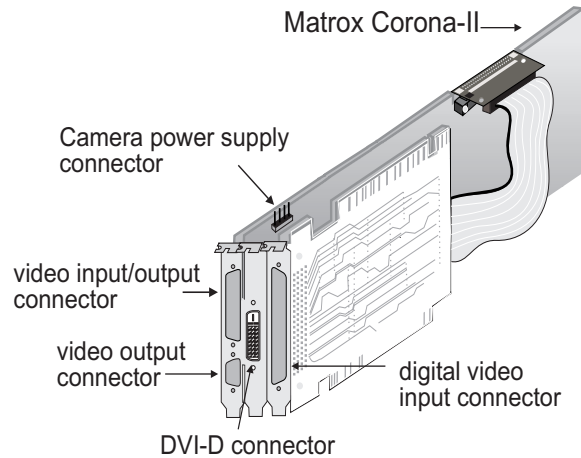
- Boot video mode/resolution: VGA Mode 3 (80 characters, 25 lines).
- Memory map: System-determined (configured on power-up).
- On-board graphics controller: Enabled.
- Camera power supply strapped for +5 V supply (pins 1-2).

Board input and output connectors

Matrox Corona-II has five user connectors: video input/output, video output, digital interface, DVI extension port, and camera power supply.

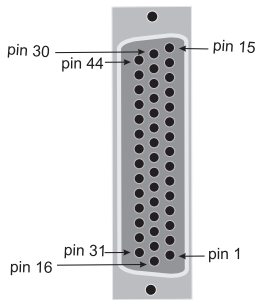


In addition, once all add-ons are connected, there are two additional external device interface connectors: piggyback DVI flat panel module and digital video input.



Video input/output connector

The video input/output connector is a high density DB-44 female connector. Its pinout is as follows:



Pin	Signal	Type*	Description
15	VID1_IN1	I	Analog Video Input 1 (RED1).
44	VID1_IN2	I	Analog Video Input 2 (GREEN1).
13	VID1_IN3	I	Analog Video Input 3 (BLUE1).
14	VID2_IN1	I	Analog Video Input 4 (RED2).
26	VID2_IN2	I	Analog Video Input 5 (GREEN2).
42	VID2_IN3	I	Analog Video Input 6 (BLUE2).
11	RED_C_OUT	O	Analog Video Output (C or RED).

*For the Type column, I refers to Input and O refers to Output

Pin	Signal	Type*	Description
41	GREEN_Y_OUT	O	Analog Video Output (Y or GREEN).
40	BLUE_COMP_OUT	O	Analog Video Output (CVBS or BLUE).
10	COMP_OUT	O	Analog CSYNC Video Output.
35	OPTOTRIG+	I	Opto-Isolated TRIGGER Input+.
34	OPTOTRIG-	I	Opto-Isolated TRIGGER Input-.
20	TRIGGER	I	TTL TRIGGER input.
43	SYNC_IN	I	Analog Composite SYNC Input
19	CLKIN	I	TTL CLOCK Input.
33	CLKOUT	O	TTL CLOCK Output.
32	VSYNC	I/O	TTL VSYNC Input or Output.
2	HSYNC	I/O	TTL HSYNC Input or Output.
12	E_CSINC	O	TTL CSYNC Output.
38	EXP1	O	TTL EXPOSURE1 Output.
23	EXP2	O	TTL EXPOSURE2 Output.
36	TX	O	RS-232 Serial Port Transmit.
22	RX	I	RS-232 Serial Port Receive.
6	CTS	I	RS-232 Serial Port CTS.
21	RTS	O	RS-232 Serial Port RTS.
37		O	Reserved for future use.
7		O	Reserved for future use.
39	USER1IN	I	TTL User Bit1 input.
9	USER2IN	I	TTL User Bit2 input.
*For the Type column, I refers to Input and O refers to Output			

Pin	Signal	Type*	Description
24	USER1OUT	O	TTL User Bit1 output.
8	USER2OUT	O	TTL User Bit2 output.
31	USER3OUT	O	TTL User Bit3 output
28	USER4OUT	O	TTL User Bit4 output
1,16	DC OUT	O	+5V or +12V Power Supply.
3-5, 30, 17-18, 25, 27, 29	GROUND	-	Ground.
*For the Type column, I refers to Input and O refers to Output			

▲ *Caution*

When using the companion digital-input board, do NOT simultaneously connect the TTL trigger input on the video input/output connector of the baseboard and the RS-422/LVDS trigger input on the digital video input connector of the companion digital-input board. Connecting to both trigger inputs simultaneously can cause permanent damage to the board.

Use Matrox cable COR2-44-TO-13 to interface to this connector. It has thirteen BNC connectors and a high-density 44-pin D-Subminiature male connector. This cable allows you to attach up to six analog video sources and a trigger input. For the Matrox Corona-II encoder, you can also attach either an RGB external video device or both a Y/C and an NTSC/PAL external video device.

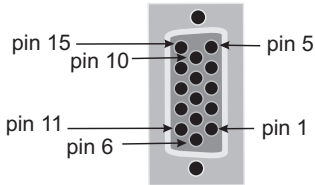
The open-ended COR2-44-TO-13/O cable is also available so that you can access other signals, if needed.

For customers planning to build their own cable, parts can be purchased from:

- Manufacturer: NorComp Interconnect Devices
- Connector and shell: HDT44P

Video output connector

The video output connector is a high density DB-15 female connector that provides analog video and digital synchronization signals to the monitor. The pinout is as follows:

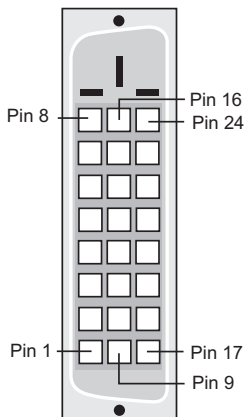


Pin	Signal	Type*	Description
1	RED	O	Analog Red Output.
2	GREEN	O	Analog Green Output.
3	BLUE	O	Analog Blue Output.
9	-	N/C	Not connected
12	DDC(1)		Monitor ID 1 Input/ Output
13	VSYNC	O	TTL VSYNC Output.
14	HSYNC	O	TTL HSYNC Output.
15	DDC(3)		Monitor ID 3 Output
4, 11	-	-	Connected internally to +5V
5, 6, 7, 8, 10	GND	-	Ground

*For the Type column, I refers to Input, O refers to Output. For the Signal column DDC refers to a VESA Display Device Channel.

DVI-D connector

The DVI-D connector on the piggyback module is composed of a 24-pin female connector for digital output. Its pinout is as follows:



Pin	Signal	Type*
1	-T.M.D.S. Data 2	O
2	+T.M.D.S. Data 2	O
3	T.M.D.S. Data 2/4 Shield	O
6	DDC Clock	O
7	DDC Data	O
9	-T.M.D.S. Data 1	O
10	+T.M.D.S. Data 1	O
11	T.M.D.S. 1/3 Shield	O

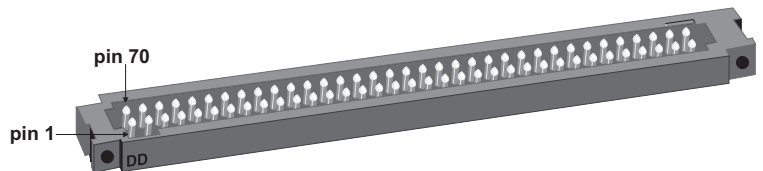
*For the Type column, I refers to Input and O refers to Output

Pin	Signal	Type*
14	+5V Power	O
15	Ground (for +5V)	O
16	Hot Plug Detect	O
17	-T.M.D.S. Data 0	O
18	+T.M.D.S. Data 0	O
19	T.M.D.S. Data 0/5 Shield	O
22	T.M.D.S. Clock Shield	O
23	+T.M.D.S. Clock	O
24	-T.M.D.S. Clock	O
4, 5, 8, 12, 13, 20, 21	Not Connected	-
*For the Type column, I refers to Input and O refers to Output		

A standard DVI cable is available from the monitor manufacturer for use with this connector. Refer to your monitor manual for more information about the cable.

Digital interface connector

The digital interface connector is a high density 70-pin male connector. It is used to interface with the companion digital-input board.



Pin	Signal	Type*	Description
1	PINCAPT	I	Capture from digital interface.
2	TRIGGER	I	Trigger from digital interface.
*For the Type column, I refers to Input and O refers to Output			

Pin	Signal	Type*	Description
3	CLKIN	I	Pixel Clock input from digital interface. All input signals on the digital interface are referenced to the rising edge of this clock.
4	NC		Not connected.
5	PVALIN	I	Pixel valid input from digital interface.
6	DGND		Digital Ground.
7	CLKOUT	O	Clock Output for digital interface.
8	NC		Not connected
9	VSYNC	I	Digital Interface Vertical Sync.
10	HSYNC	I	Digital Interface Horizontal Sync.
11	RESERVED		Reserved.
12	RESERVED		Reserved.
13	DGND		Digital Ground.
14	DGND		Digital Ground.
15	EXP(2)	O	Exposure2 output.
16	EXP(1)	O	Exposure1 output.
17	RESERVED		Reserved.
18	RESERVED		Reserved.
19	RESERVED		Reserved.
20	RESERVED		Reserved.
21	RESERVED		Reserved.
22	RESERVED		Reserved.
23	DGND		Digital Ground.
24	DGND		Digital Ground.

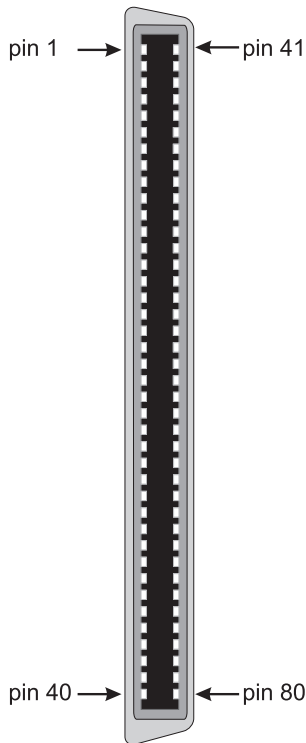
*For the Type column, I refers to Input and O refers to Output

Pin	Signal	Type*	Description
25	NC		Not Connected.
26	NC		Not Connected.
27	NC		Not Connected.
28	NC		Not Connected.
29	NC		Not Connected.
30	NC		Not Connected.
31	NC		Not Connected.
32	NC		Not Connected.
33	DGND		Digital Ground.
34	DGND		Digital Ground.
35	RESERVED		Reserved.
36	RESERVED		Reserved.
37	GD[23]	I	Digital Interface data. Bit 23.
38	GD[22]	I	Digital Interface data. Bit 22.
39	GD[21]	I	Digital Interface data. Bit 21.
40	GD[20]	I	Digital Interface data. Bit 20.
41	GD[19]	I	Digital Interface data. Bit 19.
42	GD[18]	I	Digital Interface data. Bit 18.
43	GD[17]	I	Digital Interface data. Bit 17.
44	GD[16]	I	Digital Interface data. Bit 16.
45	DGND		Digital Ground.
46	DGND		Digital Ground.
47	RESERVED		Reserved.
48	RESERVED		Reserved.
49	GD[15]	I	Digital Interface data. Bit 15.
50	GD[14]	I	Digital Interface data. Bit 14.
51	GD[13]	I	Digital Interface data. Bit 13.
52	GD[12]	I	Digital Interface data. Bit 12.
*For the Type column, I refers to Input and O refers to Output			

Pin	Signal	Type*	Description
53	GD[11]	I	Digital Interface data. Bit 11.
54	GD[10]	I	Digital Interface data. Bit 10.
55	GD[9]	I	Digital Interface data. Bit 9.
56	GD[8]	I	Digital Interface data. Bit 8.
57	CKMOD	O	Clock serial interface to the companion digital-input board.
58	RESERVED		Reserved.
59	LDMOD	O	Load serial interface to companion digital-input board.
60	DATAMOD	I/O	Data serial interface to companion digital-input board.
61	GD[7]	I	Digital Interface data. Bit 7.
62	GD[6]	I	Digital Interface data. Bit 6.
63	GD[5]	I	Digital Interface data. Bit 5.
64	GD[4]	I	Digital Interface data. Bit 4.
65	GD[3]	I	Digital Interface data. Bit 3.
66	GD[2]	I	Digital Interface data. Bit 2.
67	GD[1]	I	Digital Interface data. Bit 1.
68	GD[0]	I	Digital Interface data. Bit 0.
69	DGND		Digital Ground.
70	DGND		Digital Ground.
*For the Type column, I refers to Input and O refers to Output			

Video input connector on the companion digital-input board

The video input connector on the Matrox Corona-II companion digital-input board is a high density, SCSI-2 like, 80-pin female connector, that attaches to a matching male connector on the camera-connecting cable (generally the DBHD80-TO-OPEN cable).



Pin	Signal	Type**	Description
1	DATA0+	I	Data Input 0 RED LSB
2	DATA0-	I	Data Input 0 RED LSB
3	DATA2+	I	Data Input 2
4	DATA2-	I	Data Input 2
5	DATA4+	I	Data Input 4
6	DATA4-	I	Data Input 4
7	DATA6+	I	Data Input 6
8	DATA6-	I	Data Input 6
9	DATA8+	I	Data Input 8 GREEN LSB
10	DATA8-	I	Data Input 8 GREEN LSB
11	DATA10+	I	Data Input 10
12	DATA10-	I	Data Input 10
13	DATA12+	I	Data Input 12
14	DATA12-	I	Data Input 12
15	DATA14+	I	Data Input 14
16	DATA14-	I	Data Input 14
17	DATA16+	I	Data Input 16 BLUE LSB
18	DATA16-	I	Data Input 16 BLUE LSB
19	DATA18+	I	Data Input 18
20	DATA18-	I	Data Input 18
21	DATA20+	I	Data Input 20

**For the Type column, I refers to Input and O refers to Output.

Pin	Signal	Type**	Description
22	DATA20-	I	Data Input 20
23	DATA22+	I	Data Input 22
24	DATA22-	I	Data Input 22
25	GROUND	-	Ground
26	EXP(1)	O	TTL Exposure 1 Output
27	HSYNCOU+	I/O*	HSYNC Output
28	HSYNCOU-	I/O*	HSYNC Output
29	VSYNCOU+	I/O*	VSYNC Output
30	VSYNCOU-	I/O*	VSYNC Output
31	EXP1+	O	Exposure 1 Output
32	EXP1-	O	Exposure 1 Output
33	EXP2+	O	Exposure 2 Output
34	EXP2-	O	Exposure 2 Output
35	USEROUT0+	O	User bit 0 Output
36	USEROUT0-	O	User bit 0 Output
37	USEROUT1+	O	User bit 1 Output
38	USEROUT1-	O	User bit 1 Output
39	CLKOUT+	O	Clock Output
40	CLKOUT-	O	Clock Output
41	DATA1+	I	Data Input 1
42	DATA1-	I	Data Input 1
43	DATA3+	I	Data Input 3
44	DATA3-	I	Data Input 3
45	DATA5+	I	Data Input 5
46	DATA5-	I	Data Input 5
47	DATA7+	I	Data Input 7 RED LSB
48	DATA7-	I	Data Input 7 RED LSB
*The outputs are currently not available on Corona-II.			
**For the Type column, I refers to Input and O refers to Output.			

Pin	Signal	Type**	Description
49	DATA9+	I	Data Input 9
50	DATA9-	I	Data Input 9
51	DATA11+	I	Data Input 11
52	DATA11-	I	Data Input 11
53	DATA13+	I	Data Input 13
54	DATA13-	I	Data Input 13
55	DATA15+	I	Data Input 15 GREEN MSB
56	DATA15-	I	Data Input 15 GREEN MSB
57	DATA17+	I	Data Input 17
58	DATA17-	I	Data Input 17
59	DATA19+	I	Data Input 19
60	DATA19-	I	Data Input 19
61	DATA21+	I	Data Input 21
62	DATA21-	I	Data Input 21
63	DATA23+	I	Data Input 23 BLUE MSB
64	DATA23-	I	Data Input 23 BLUE MSB
65	GROUND	-	Ground
66	PINCAPT	I/O	TTL General Purpose I/O Pin
67	HSYNCIN+	I	HSYNC Input
68	HSYNCIN-	I	HSYNC Input
69	VSYNCIN+	I	VSYNC Input
70	VSYNCIN-	I	VSYNC Input
71	PVALIN+	I	Pixel Valid Input
72	PVALIN-	I	Pixel Valid Input
73	TRIG+	I	Trigger Input
74	TRIG-	I	Trigger Input
75	USERIN0+	I	User bit 0 Input

**For the Type column, I refers to Input and O refers to Output.

Pin	Signal	Type**	Description
76	USERIN0-	I	User bit 0 Input
77	USERIN1+	I	User bit 1 Input
78	USERIN1-	I	User bit 1 Input
79	CLKIN+	I	Clock Input
80	CLKIN-	I	Clock Input

**For the Type column, I refers to Input and O refers to Output.

▲ Caution

When using the companion digital-input board, do NOT simultaneously connect the TTL trigger input on the video input/output connector of the baseboard and the RS-422/LVDS trigger input on the digital video input connector of the companion digital-input board. Connecting to both trigger inputs simultaneously can cause permanent damage to the board.

For customers planning to build their own cable, parts can be purchased from:

- Manufacturer: AMP
- Connector: 3-175677-0
- Shell: 1-176793-0

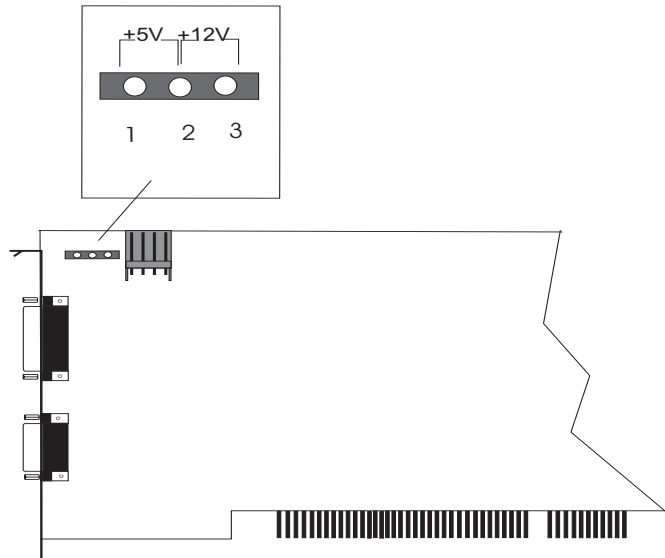
Camera power supply selection

The camera power supply selection pins allow you to select the voltage that is output from the Matrox Corona-II board through the video input connector. As shown in the table below, place the jumper across pins 1 and 2 for a +5 V supply output and across pins 2 and 3 for a +12 V supply output.



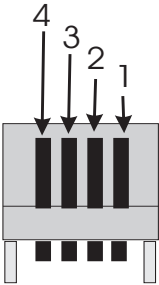
Pin	Voltage
1-2	+5 V
2-3	+12 V

This diagram shows the location of the camera supply selection pins and the corresponding numbers. The default setting for the jumper is +5 V.



Camera power supply connector

The camera power supply connector is a standard 4-pin male connector. The pinout is as follows:



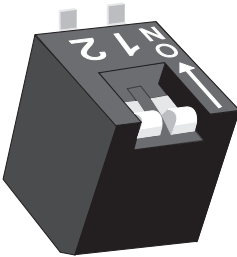
Pin	Voltage
1	+12 V
2	Ground
3	Ground
4	+5 V

The part number is as follows:

- Manufacturer: VEN
- Connector: 2490-04PRT

DIP switch

The DIP switch settings are:



	On	Off
Position 1 (SW1)	Not used for Rev.1 and all future revisions of the board.*	Not used for Rev.1 and all future revisions of the board.*
Position 2 (SW2)	Disable the Matrox Corona-II graphics controller's capability to display the operating system.	Enable the Matrox Corona-II graphics controller's capability to display the operating system (default).

*On Rev. 0, DIP switch SW1 is either:

- Off = BIOS loaded into memory (default)
- On = BIOS unloaded

Specifications

Environmental

- Min/max ambient operating temperature: 0°C - 50° C.
- Min/max storage temperature: -40° C - 75° C.
- Maximum altitude for operation: 3000 meters.
- Maximum altitude for transport: 12000 meters.
- Operating humidity: 20 - 80% relative humidity (non-condensing).

Electrical

Operating voltage and current:

- 5 V \pm 5%, 3.3 A
- 12 V \pm 10%, 500 mA
- -12 V \pm 10%, 100 mA

The specifications for the high density DB-44 female video input/output connector are as follows:

Pin	Signal	Type*	Range	Termination	Output Voltage	Output Current
<i>Analog Video Inputs</i>						
15	VID1_IN1	I	0.5 to 2.0 Vpp	75 Ω		
44	VID1_IN2	I	0.5 to 2.0 Vpp	75 Ω		
13	VID1_IN3	I	0.5 to 2.0 Vpp	75 Ω		
14	VID2_IN1	I	0.5 to 2.0 Vpp	75 Ω		
26	VID2_IN2	I	0.5 to 2.0 Vpp	75 Ω		
42	VID2_IN3	I	0.5 to 2.0 Vpp	75 Ω		
43	SYNC_IN	I	0.5 to 2.0 Vpp	75 Ω		
<i>Analog Video/ Encoder Outputs</i>						
11	RED_C_OUT	O	0 to 1.4 V	75 Ω		37 mA max.
41	GREEN_Y_OUT	O	0 to 1.4 V	75 Ω		
40	BLUE_COMP_OUT	O	0 to 1.4 V	75 Ω		
10	COMP_OUT	O	0 to 1.4 V	75 Ω		
*For the Type column, I refers to Input and O refers to Output						

Pin	Signal	Type*	Range	Termination	Output Voltage	Output Current
12	E_CS SYNC	O			High-level: 2 V min. Low-level: 0.55 V max.	High-level: -15 mA max. Low-level: 64 mA max.
*For the Type column, I refers to Input and O refers to Output						

Pin	Signal	Type*	Input	Output
<i>UART signals</i>				
22	RX	I	<i>RS-232 Receiver</i> Voltage range: -30 to 30 V Resistance: 3 to 7 k Ω	
6	CTS	I		
36	TX	O		<i>RS-232 Transmitter</i> Voltage Swing: +/- 5 V min. +/- 9 V (typical) Resistance: 300 Ω Short-circuit current: +/- 15 mA (typical)
21	RTS	O		
*For the Type column, I refers to Input and O refers to Output				

Pin	Signal	Type*	Input Voltage	Output Voltage	Output Current
<i>Clock & Synchronization signals</i>					
19	CLKIN	I	High-level: 2 V min. Low-level: 0.8 V max. Range: 0 to 5.0 V	High-level: 2 V min. Low-level: 0.55 V max.	High-level: -32 mA max. Low-level: 64 mA max.
32	VSYNC	I/O			
2	HSYNC	I/O			
33	CLKOUT	O			
*For the Type column, I refers to Input and O refers to Output					

Pin	Signal	Type*	Input Voltage	Output Voltage	Output Current
<i>Trigger Inputs</i>					
34	OPTOTRIG- **	I			
35	OPTOTRIG+	I	High-level: 3.26 to 8.37 V at 5 mA min. Low-level: 3.0 V max.		
20	TRIG	I	High-level: 2 V min. Low-level: 0.8 V max. Range: 0 to 5.5 V		
** The signal is connected internally to the GND.					
<i>Timer Outputs</i>					
38	EXP1	O		High-level: 2 V min. Low-level: 0.55 V max.	High-level: -32 mA max. Low-level: 64 mA max.
23	EXP2	O			
<i>User I/Os</i>					
39	USER1IN	I	High-level: 2 V min. Low-level: 0.8 V max. Range: 0 to 5.5 V		
9	USER2IN	I			
24	USER1OUT	O		High-level: 2.2 V min. Low-level: 0.55 V max. Range: 0 to 3.3 V	High-level: -24 mA max. Low-level: 24 mA max.
8	USER2OUT	O			
31	USER3OUT	O			
28	USER4OUT	O			
*For the Type column, I refers to Input and O refers to Output					

Pin	Signal	Type*	Maximum Voltage Output	Maximum Current Output	Description
<i>Power supply</i>					
1, 16	DC OUT	O	+5 or +12 V	1.0 A	Strap selectable
*For the Type column, I refers to Input and O refers to Output					

Appendix C: Listing of Matrox Corona-II board revisions

This appendix lists specific revisions of the Matrox Corona-II board.

Matrox Corona-II revisions

The following table lists revisions made to the Matrox Corona-II:

Board	Version	Description
Matrox Corona-II	7030_00	-Original version
	7030_01	-Dipswitch functionality modified
	7030_0102	-Pinout changes on the DB-44 connector*. -Change of PLL power supply pin from +5 V digital to +5 V analog regulated supply.
	7030-0103	-Correction of DVI display in DOS mode.

* For a description of the cable differences, refer to Appendix D.

Appendix D: Migrating from Matrox Corona to Matrox Corona-II

*This appendix indicates the cable differences between
Matrox Corona and Matrox Corona-II*

Cable differences

The differences between the DBHD44-TO-8BNC cable (Matrox Corona) and the COR2-44-TO-13 cable (Matrox Corona-II) are shown in the following table:

Pins	Signals on Matrox Corona	Signals on Matrox Corona-II
30	RED (GND)	GND
13	BLUE	BLUE1
14	BLUE (GND)	RED2
42	SYNC (GND)	BLUE2
26	GREEN_Y_OUT (GND)	GREEN2

Appendix E: Glossary

This appendix defines some of the specialized terms used in this Matrox Corona-II document.

- **ASIC**

Application-specific integrated circuit. An integrated circuit custom-made to meet the requirements of a specific application. It integrates several digital and/or analog functions into a single die. This results in a reduction in cost, board area, and power consumption, while improving performance when compared to an equivalent implementation using off-the-shelf components.

- **Band**

One of the surfaces of a buffer. A grayscale image requires one band. A color image requires three bands, one for each color component.

- **Bandwidth**

A term describing the capacity to transfer data. Greater bandwidth is needed to sustain a higher transfer rate. Greater bandwidth can be achieved, for example, by using a wider bus.

- **Bus**

A pathway along which signals are sent, generally in two directions, for communication of data.

- **Color component**

One of the components that make up a color space. Typically, each component of a color image is stored in a separate band of a multi-band buffer.

- **Color space**

A color space is a way of representing and describing the complete range of perceived colors. A number of color spaces have been developed. Common color spaces are RGB and HSL. Both describe the same range of perceivable colors.

- **Composite sync**

A synchronization signal made up of two components: one horizontal and one vertical.

- **Contiguous memory**

A block of physical memory occupying a single, consecutive series of locations.

- **DCF**

Digitizer Configuration Format. A DCF defines the input data format and among other things, how to accept or generate video timing signals such as horizontal sync, vertical sync, and pixel clock.

- **Display memory**

See *frame buffer*.

- **Exposure signal**

The signal generated by one of the programmable timers of the grab module. The exposure signal can be used to control external hardware. For example, it can be fed to the camera to control its exposure time or used to fire a strobe light.

- **Driver**

A software program that services an operating system so that the operating system can use a hardware device.

- **Exposure time**

Refers to the period during which the image sensor of a camera is exposed to light. As the length of this period increases, so does the image brightness.

- **Field**

One of the two halves that make up an image. One half consists of the image's odd lines (known as the *odd field*); the other half consists of the image's even lines (known as the *even field*).

- **Frame**

A single image grabbed from a video camera.

- **Frame buffer**

A frame buffer is a dedicated storage area used for display. Since a computer sends out data faster than a screen can display it, the data is temporarily stored in the frame buffer. Matrox imaging boards that have a display section typically have two frame buffer surfaces: a dedicated or dynamically allocated main (underlay) surface and an overlay surface. Separate graphics controller boards typically have only one frame buffer surface, a graphics controller frame buffer surface.

If keying is enabled, those areas of the overlay frame buffer surface that have a specified color allow the underlay frame buffer surface to show through.

Grab

To acquire an image from a camera.

- **Horizontal sync**

The part of a video signal that indicates the end of a line and the start of a new one.

See also *vertical sync*.

- **HSL**

A color space that represents color using components of hue, saturation, and luminance. The hue component describes the actual color of a pixel. The saturation component describes the concentration of that color. The luminance component describes the combined brightness of the primary colors.

Host

In general, Host refers to the principal CPU in one's computer. It can also refer to the principal computer in a multi-computer set-up.

- **Interlaced scanning**

Describes a transfer of data in which the odd-numbered lines of the source are written to the destination buffer first and then the even-numbered lines (or vice-versa).

See also *progressive scanning*.

- **Keying**

A display effect that switches between two display sources depending on the pixel values in one of the sources. Keying is used to make portions of the overlay frame buffer surface transparent so that corresponding areas of the underlay frame buffer surface can show through it.

- **Latency**

The time from when an operation is started to when the final result is produced.

- **Live processing**

See *real-time processing*.

- **LUT mapping**

Look-up table mapping. A point-to-point operation that uses a table to define a replacement value for each possible pixel value in an image.

- **LVDS**

Low-Voltage Differential Signaling. It is a way to communicate data using a very low voltage swing (about 350mV) over two differential printed circuit board (PCB) traces or a balanced cable.

- **MSPS**

Mega samples per second.

- **Network bindings**

The series of associations that enable communication among the network services, protocols, and adapters in your computer. In this case, 'binding' refers to the conversion or association of symbolic addresses in the operating system to storage-related addresses. These associations can be adjusted to increase the performance of certain network services among multiple network adapters.

❖ Note that you should not adjust network bindings unless you are an experienced network administrator and are familiar with the requirements of your network software.

- **PCI**

Peripheral Component Interconnect. An expansion bus standard for the '90s.

- **PCI Primary/Secondary Bus**

A high-performance bus that provides a processor-independent data path between the CPU and high-speed peripherals.

- **PLC**

Programmable Logic Controller. A device used to automate monitoring and control of industrial plants. It can be used as a stand-alone device or in conjunction with data acquisition.

- **PLL**

Phase-locked loop. A technique in electronic circuitry for maintaining synchronization. The circuit receives its timing from input signals, but also provides a feedback circuit for synchronization. The resulting output signal varies according to differences between the reference signal and the feedback signal. In particular, a frame grabber's PLL creates a pixel clock, which is a multiple of a referenced signal's frequency. In this context, the referenced signal is usually the horizontal sync. A PLL adjusts the pixel clock frequency according to changes or variations in its reference signal. Adjusting the pixel clock frequency ensures that the same number of pixels appears on every line.

- **Progressive scanning**

Describes a transfer of data in which the lines of the source input device are written sequentially into the destination buffer.

Also known as *non-interlaced*. See also *interlaced scanning*.

- **PSG**

Programmable synchronization generator. It has various functions related to video synchronization and control. For example, it supplies feedback signals to the PLL, and is fully responsible for the sampling clock value.

■ Real-time processing

The processing of an image as quickly as the next image is grabbed.

Also known as *live processing*.

■ Reference levels

The zero and full-scale levels of an analog-to-digital converter. Voltages below a *black reference level* are converted to the minimum pixel value; voltages above a *white reference level* are converted to the maximum pixel value. Together with the analog gain factor, the reference levels affect the brightness and contrast of the resulting image.

■ RGB

A color space that represents color using the primary colors (red, green and blue) as components.

■ Synchronous function

A function that does not return control to the caller until it has finished executing.

See also *asynchronous function*.

■ Trigger

A signal that allows image acquisition to be synchronized to external events. If supported, a digitizer can operate in one of two modes upon receiving a trigger:

- *Asynchronous reset mode*: If your digitizer supports and uses this mode, the camera is reset to begin a new frame when the trigger signal is received.
- *Next valid frame/field mode*: If your digitizer supports and uses this mode, the digitizer will grab the next valid frame or field.

■ Vertical sync

The part of a video signal that indicates the end of a frame (or field) and the start of a new one.

See also *horizontal sync*.

■ **VIA**

Video Interface ASIC. A custom ASIC that connects all the data buses on the board (the grab, VMChannel, and PCI bus) to one another, and directs and monitors data flow "traffic". It is a video interface that provides various ways of inputting and outputting data.

■ **Vpp**

Voltage peak to peak. The signal amplitude measured between the maximum positive and negative voltage peak excursions of a signal.

Index

A

- A/D converters 53
- acquisition
 - continuous 57
 - level-sensitive 57
 - dual-tap 72
 - features 11, 51
 - monoshot 56
- ActiveMIL 14
- ActiveMIL-Lite 14
- analog input channels 52
- attaching a video source 33, 75
- automatic gain control 53, 73
- auxiliary power supply 58

B

- backplane
 - digital interface 79
- bandwidth, PCI bus 48
- BIOS
 - conflict 65
 - limitations 66
 - protection 25
- blank monitor 66
- board summary 72

C

- cable
 - COR2-44-TO-13 16, 33, 77
 - COR2-44-TO-13/O 16, 35, 77
 - DBHD80-TO-OPEN 17, 31, 34
 - optional 33–34
- camera detector (video source detector) 55
- camera power supply 35
- cameras per board 48
- color space converter 54
- colors
 - problems with 67
- companion digital-input board 16, 28, 83

- components, handling 17
- connector
 - camera power supply 31–32, 86
 - digital interface 26, 31, 79
 - digital video input 31, 83
 - DVI-D 78
 - video input/output 33, 75
 - video output 31, 78
- Contacting Matrox 69
- continuous acquisition 57
 - level-sensitive 57
- COR2-44-TO-13 cable 16, 33, 77
- COR2-44-TO-13/O cable 16, 35, 77
- COR-DVI-MOD 26, 78
- Customer Support 18, 69

D

- DB-44 connector electrical specifications 89
- DBHD80-TO-OPEN cable 17, 31, 34
- default settings 23, 74
- digital interface 54
- digital interface connector 79
- digital video input connector 83
- DIP switch 25, 88
- display
 - configuration 25
 - features 12
 - non-centered 67
 - quality 68
 - resolution 12
 - maximum desktop 73
- display resolution 60
- display section 59
- DMA 65
- dual-tap acquisition 72
- DVI 26, 60
- DVI extension port 26
- DVI-D connector 78

E

- electrical specifications 89
 - DB-44 connector 89
- encoded output 60, 73
- environmental specifications 89
- exposure 58, 72

F

- features
 - acquisition 11
 - display 12
- files
 - readme 38
- flat panel 26, 78

G

- genlocked cameras 47
- grab section 51
 - A/D converters 53
 - analog input channels 52
 - automatic gain control 53
 - color space converter 54
 - exposures 58
 - horizontal lock detector 55
 - lookup table 54
 - low-pass filter 52
 - phase-locked loop 55
 - PSG 55
 - synchronization 56
 - trigger 56–57
 - UART 58
 - user bits 58
 - video source detector 55
- grabbing
 - genlocked 47
 - limited memory availability 66
 - limited memory available 65
 - non-synchronous 47
 - simultaneously 47–48
 - to video transfer memory 61

H

- hardware
 - installing 22, 46
 - reference 50
- horizontal lock detector 55
- horizontal synchronization 32, 68

I

- input and output connectors 74
- input LUTs 73
- installation
 - companion digital-input board 28
 - DVI flat panel module 26
 - hardware 22, 46
 - overview 18
 - software 38
- interrupt conflicts 66
- IRQ 66

L

- level sensitive 57
- limitations, BIOS 66
- limited memory available 65
- low-pass filter 52
- LUT 54, 73

M

- master mode 56
- Matrox Imaging Customer Support group 18, 69
- Matrox Inspector 14
- Matrox Intellicam 15, 38
- Matrox VIA 13, 61
- maximum display resolution 73
- memory
 - limited 65
- MGA
 - display drivers 40
 - Display Properties 41–42
 - Power Desk tools 40
 - QuickDesk 40
- MGA-G400 graphics display controller 12, 40, 59
- MIL 14

MIL-Lite 14, 16

mode

master 56

slave 56

monitor 67

analog switch 67

blank 66

customizing 41–42

impedance 32, 67

settings

Windows 98/2000 41

monitor setup 42

monoshot acquisition 56

multiple boards 46–47

O

optional

cables 33–34

parts 16

optional items

MIL-Lite 16

P

PCI

bandwidth requirements 48

bus 48

interface 61, 73

PCI-to-PCI bridge 62, 66

phase-locked loop 55

pinout

digital interface connector 79

digital video input connector 83

DVI-D connector 78

video input/output connector 75

video output connector 78

PLC 13, 58

Plug-and-Play 41–42

power cable 16

power output

installing 35

number of cameras 12

power supply 73

Product assistance 69

programming Matrox Corona-II 38

PSG 55

R

reference levels 73

RS-232 13, 58

S

serial interface 13

slave mode 56

software

installing 38

supported on Matrox Corona-II 14

specifications

electrical 89

DB-44 connector 89

environmental 89

static electricity 17

synchronization 56

horizontal 68

vertical 32

synchronized cameras 47

synchroization

horizontal 32

system requirements 15

T

taps, supported 72

technical features 72

timers 58, 72

timing

lines/frame 52

pixels/line 52

sampling rate 52

trigger 56

edge-triggered

continuous 57

monoshot 56

input 34, 72, 77

optotrigger 57

TTL 57

- troubleshooting 64
 - booting problems 64–65
 - grabbing problems 66
 - installation problems 64
 - PCI computer incompatibility 66
 - problems during application development 68
 - video display problems 66
- TV output 60

U

- UART 13, 58
- Uninstall program
 - MGA PowerDesk 43
- user bits 58

V

- vertical synchronization 32
- VIA 13, 61
- video encoder 33, 60, 73
 - output formats 13
- video formats supported 54
 - monochrome 11
 - RGB 11
- video input
 - analog 33, 75
- video input, analog 33, 75, 77
- video output, analog 78
- video source detector 55
- video-in-a-window 73

W

- warranty 19

Regulatory Compliance

FCC Compliance Statement

Remark for the Matrox hardware products supported by this guide

These devices have 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 causes harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures: • Reorient or relocate the receiving antenna • Increase the separation between the equipment and receiver • Connect the equipment into an outlet on a circuit different from that to which the receiver is connected • Consult the dealer or an experienced radio/TV technician for help.

WARNING

Changes or modifications to this unit not expressly approved by the party responsible for the compliance could void the user's authority to operate this equipment. The use of shielded cables for connection of the monitor to the card is required to meet FCC requirements.

Declaration of conformity of a Class B digital device according to the FCC rules

We, the Responsible Party

Matrox, 1075 Broken Sound Parkway, Boca Raton, FL 33487 • Telephone: (561) 989-9626 • Attention: Conformity Group Matrox

Declaration

The Matrox hardware products supported by this guide comply with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) these devices may not cause harmful interference, and (2) these devices must accept any interference received, including interference that may cause undesired operation. Any question regarding this declaration should be forwarded to the above coordinates.

(English) Industry Canada Compliance Statement

Remark for the Matrox hardware products supported by this guide

These digital devices do not exceed the Class B limits for radio noise emission from digital apparatus devices set out in the Radio Interference Regulation of Industry Canada.

(Français) Conformité avec les exigences du ministère de l'Industrie Canada

Remarque sur les produits matériels Matrox couverts par ce guide

Ces appareils numériques n'émettent aucun bruit radioélectrique dépassant les limites applicables aux appareils numériques de Classe B prescrites dans le Règlement sur le brouillage radioélectrique édicté par Industrie Canada.

(English) European user's information – Declaration of Conformity

Remark for the Matrox hardware products supported by this guide

These devices comply with EC Directive 89/336/EEC for a Class B digital device. They have been tested and found to comply with EN55022/CISPR22 and EN55024/CISPR24. In a domestic environment these products may cause radio interference in which case the user may be required to take adequate measures. To meet EC requirements, shielded cables must be used to connect the monitor and other peripherals to the card. These products have been tested in a typical class B compliant host system. It is assumed that these products will also achieve compliance in any class B compliant system.

(Français) Informations aux utilisateurs Européens – Déclaration de conformité

Remarque sur les produits matériels Matrox couverts par ce guide

Ces unités sont conformes à la directive communautaire 89/336/EEC pour les unités numériques de classe B. Les tests effectués ont prouvé qu'elles sont conformes aux normes EN55022/CISPR22 et EN55024/CISPR24. Le fonctionnement de ces produits dans un environnement résidentiel peut causer des interférences radio, dans ce cas l'utilisateur peut être amené à prendre les mesures appropriées. Pour respecter les impératifs communautaires, les câbles de connexion entre le moniteur ou autres périphériques et la carte doivent être blindés. Ces produits ont été testés dans un système hôte typique compatible classe B. On suppose qu'ils présenteront la même compatibilité dans tout système compatible classe B.

(Deutsch) Information für europäische Anwender – Konformitätserklärung

Anmerkung für die Matrox Hardware-Produktunterstützung durch dieses Handbuch

Diese Geräte entsprechen EC Direktive 89/336/EEC für ein digitales Gerät Klasse B. Sie wurden getestet und entsprechen demnach EN55022/CISPR22 und EN55024/CISPR24. In einer Wohnumgebung können diese Produkte Funkinterferenzen erzeugen, und der Benutzer kann genötigt sein, entsprechende Maßnahmen zu ergreifen. Um EG-Anforderungen zu entsprechen, müssen zum Anschließen des Monitors und anderer Peripheriegeräte an die Karte abgeschirmte Kabel verwendet werden. Diese Produkt wurden in einem typischen, der Klasse B entsprechenden, Host-System getestet. Es wird davon ausgegangen, daß diese Produkte auch in jedem Klasse B entsprechenden System entsprechend funktionieren.

(Italiano) Informazioni per gli utenti europei – Dichiarazione di conformità

Nota per i prodotti hardware Matrox supportati da questa guida

Questi dispositivi sono conformi alla direttiva CEE 89/336/EEC relativamente ai dispositivi digitali di Classe B. Sono stati provati e sono risultati conformi alle norme EN55022/CISPR22 e EN55024/CISPR24. In un ambiente domestico, questi prodotti possono causare radiointerferenze, nel qual caso all'utente potrebbe venire richiesto di prendere le misure adeguate. Per soddisfare i requisiti CEE, il monitor e le altre periferiche vanno collegati alla scheda grafica con cavi schermati. Questi prodotti sono stati provati in un tipico sistema host conforme alla classe B. Inoltre, si dà per scontato che questi prodotti acquisiranno la conformità in qualsiasi sistema conforme alla classe B.

(Español) Información para usuarios europeos – Declaración de conformidad

Observación referente a los productos de hardware de Matrox apoyados por este manual

Estos dispositivos cumplen con la directiva de la CE 89/336/EEC para dispositivos digitales de Clase B. Dichos dispositivos han sido sometidos a prueba y se ha comprobado que cumplen con las normas EN55022/CISPR22 y EN55024/CISPR24. En entornos residenciales, estos productos pueden causar interferencias en las comunicaciones por radio; en tal caso el usuario deberá adoptar las medidas adecuadas. Para satisfacer las disposiciones de la CE, deberán utilizarse cables apantallados para conectar el monitor y demás periféricos a la tarjeta. Estos productos han sido sometidos a prueba en un típico sistema anfitrión que responde a los requisitos de la clase B. Se supone que estos productos cumplirán también con las normas en cualquier sistema que responda a los requisitos de la clase B.

Product support

Limited Warranty

*Matrox warrants this product against defects in materials and workmanship for a period of **one year** from the date of delivery. Matrox and its suppliers expressly disclaim any and all other warranties, express or implied.*

Your sole remedy shall be, repair or replacement of the product provided that the defective product be returned to the authorized dealer within a year from the date of delivery.

If you wish to return your board, contact the Matrox authorized dealer where you purchased the board for service. **Do not return a product to Matrox without authorization.**

In the event you must return the board directly to Matrox, follow these steps:

1. Contact Customer Support (The *Customer support contacts* information sheet included in your package has the phone numbers for Matrox's offices).

Customer Support will ask you to describe the problem and will issue a Return Merchandise Authorization (RMA).

2. Leave the configuration as it was when you were using the board.
3. Pack the board in its original box and return it with a completed "Product Assistance Request" form (provided in the following page).

Return address

U.S. customers must return their products to our U.S. address:

- Matrox International Corp.
625 Route 3 Unit B
Plattsburg, N.Y.
12901-6530

Canadian and other international customers can return their products directly to our Canadian facility:

- Matrox Electronic Systems Ltd.
1055 St. Regis Blvd.
Dorval, Quebec
H9P 2T4

Product Assistance Request Form

Name:	
Company:	
Address:	
Phone:	Fax:
E-mail:	
Hardware Specific Information	
Computer:	CPU:
System memory:	PCI Chipset:
System BIOS rev:	
Video card used:	Resolution:
Network Card:	Network Software:
Other cards in system:	
Software Specific Information	
Operating system:	Rev:
Matrox SW used:	Rev:
Compiler:	Rev:
Fill out only if you are returning a board	
RMA #:	
Who were you talking to in customer support?	
Date board was received:	Date of failure:
MOD #:	These numbers are on the label at the back of the board.
SER #:	
REV #:	
PMB #:	
PNS #:	
Can you reproduce the problem? Yes <input type="checkbox"/> No <input type="checkbox"/>	
Is an error code displayed? Yes <input type="checkbox"/> No <input type="checkbox"/>	If so, what code?
... Continued on reverse	

