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Matrox Meteor

Installation and Hardware Reference

Manual no. 10529-MT-0111

September 16, 1998

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Customer support

- Note, when a reference is made to Matrox Meteor or Matrox Meteor/RGB, the information that follows also applies to the version of these boards that includes the integrated PCI-to-PCI bridge.

Chapter 1: Introduction

This chapter briefly describes the features of Matrox Meteor.

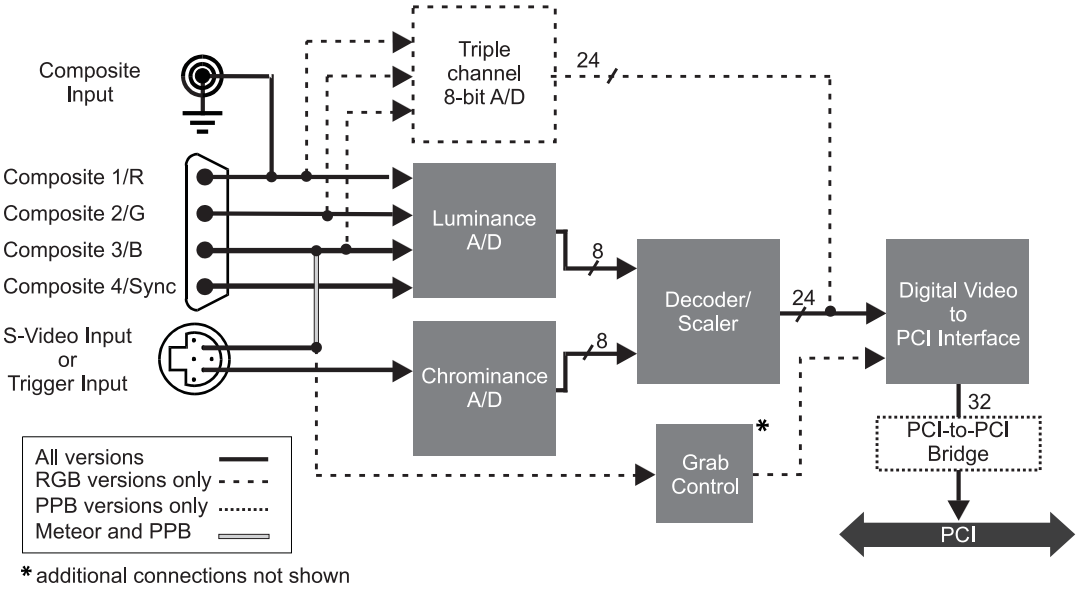
Matrox Meteor

Matrox Meteor is a single-slot, monochrome and color PCI frame grabber. It features real-time transfers to off-board system or display RAM (depending on the system and VGA board used) and provides support for live video-in-a-window. You can use the Matrox Imaging Library (MIL) or any of its derivatives to program Matrox Meteor.

Matrox Meteor comes in four versions:

- Matrox Meteor, a standard monochrome and color frame grabber.
- Matrox Meteor/PPB, a standard monochrome and color frame grabber with an integrated PCI-to-PCI bridge.
- Matrox Meteor/RGB, an RGB color frame grabber.
- Matrox Meteor/PPB/RGB, an RGB color frame grabber with an integrated PCI-to-PCI bridge.

❖ Note, when a reference is made to Matrox Meteor or Matrox Meteor/RGB, the information that follows also applies to the version of these boards that includes the integrated PCI-to-PCI bridge.



Acquisition

Matrox Meteor boards have standard monochrome and color acquisition capabilities. They accept RS-170/CCIR monochrome video signals and NTSC/PAL color video signals in either a composite or Y/C (S-Video or S-VHS) format. They have four software-selectable video input channels for interfacing with up to four video sources. Furthermore, for easy signal calibration, they support programmable brightness, contrast, hue, and saturation.

Meteor/RGB boards provide support for component RGB acquisition, with independent gain and offset controls for each channel. They support all of Meteor's input capabilities, except for color video signals in Y/C format. This capability has been exchanged for support of a synchronous trigger input (by way of the Y/C connector).

For added flexibility, the Meteor/RGB frame grabber can simultaneously grab from up to three standard monochrome video sources, provided the sources are genlocked. In this case, the three inputs cannot be displayed in real-time since the video data is packed (consecutive pixels belong to different channels).

Data transfer

Matrox Meteor's high-speed, 32-bit PCI bus interface supports transfers of 132 MBytes/second (maximum theoretical transfer rate for a bus running at 33 MHz). This provides real-time transfers of images to either:

- Host RAM for processing.
- Display memory for real-time display.

Note that Matrox Meteor can only provide real-time transfers to the display when transferring to a Matrox MGA display board.

In addition, real time acquisition into main memory depends on the maximum sustained-throughput for transfers delivered by your PC's architecture (including the type of core logic chipset used).

Software

You can purchase one or more of the Matrox Imaging software packages that support the Matrox Meteor board. These are MIL and its derivatives (MIL-Lite, ActiveMIL-Lite and Inspector).

MIL

MIL is a development library with commands for image acquisition, transfer, display control, and image processing applications. Environments supported are Windows 95, Windows NT 4.0, and DOS4GW 32-bit DOS extender.

MIL provides an extensive list of commands for image processing, geometric transformations, pattern matching and alignment, measurement, blob analysis, and optical character recognition.

MIL-Lite

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

ActiveMIL-Lite

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. Environments supported are Windows 95 and Windows NT 4.0.

Inspector

Inspector is an interactive Windows application for image capture, processing, analysis, and archiving.Environments supported are Windows 95 and Windows NT 4.0.

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.

Intellicam

Matrox Intellicam is an interactive Windows program that allows fast camera interfacing and provides interactive access to all the acquisition features of the Matrox Meteor board. Intellicam is included with both MIL and MIL-Lite. Environments supported are Windows 95 and Windows NT 4.0.

What you need to get started

To begin using Matrox Meteor, you need the following:

- PC with a PCI bus and a Pentium processor or better.
- When running Windows 95, 16 MBytes of memory are required; when running Windows NT 4.0, 24 MBytes of memory are required; when running DOS4GW, 4 MBytes of memory are required. These are minimum requirements.
- For full Matrox Meteor functionality, we recommend systems that use newer PCI chipsets, such as the Intel 430HX, 430TX, 430VX, 440FX, 440LX, because they generally offer the required sustained-throughput capability.

❖ For a Pentium Pro or a Pentium II system with a 440FX or 440LX chipset, you must use a Matrox Meteor/PPB or a Matrox Meteor PPB/RGB; other versions will not work. In addition, when using the 440FX chipset, a color grab will be limited to an RGB 5:5:5 (15-bit) format because of system memory bandwidth limitations.

Δ ***Important***

- For both PPB versions of the Matrox Meteor, your system BIOS must be able to recognize a PCI-to-PCI bridge configuration. Find out by:
  - ❒ Asking your PC manufacturer whether the installed version of the system BIOS meets the above requirements.
  - ❒ Consulting the PC compatibility list on the Matrox Imaging Web site.
- A system with one empty, full-length 32-bit PCI expansion slot (bus master capable).
- A CD drive, and a hard disk or network drive on which to install the Matrox Meteor software.

Inspecting the Matrox Meteor package

When you unpack your Matrox Meteor package, you should check its contents. Note that optional parts might or might not be included, depending on what you ordered. If something is missing or damaged, contact your Matrox representative.

Standard package

If you ordered Matrox Meteor you should receive the following items:

- A Matrox Meteor board (METEOR, METEOR/PPB, METEOR/RGB, or METEOR/RGB/PPB).
- The *Matrox Meteor Installation and Hardware Reference* manual (this document).
- Diagnostic utility.

Optional parts

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

- MIL/CD or MIL-Lite/CD (both include ActiveMIL-Lite & Intellicam).
- Inspector-32/CD (32-bit, Windows-based, image processing application).
- PC-OCABLE-4 (four-inch input cable with 4 BNC-type connectors).
- PC-OCABLE-10 (ten-inch input cable with 4 BNC-type connectors).

Handling components

The electronic circuits in your computer and the circuits on Matrox Meteor are sensitive to static electricity and surges. Improper handling can seriously damage the circuits. Be sure to follow these precautions:

- Drain static electricity from your body by touching a metal fixture (or ground) before you touch any electronic component.
- Avoid letting your clothing 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 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.

More information

For information on data transfers to Host memory or VGA display memory, refer to Chapter 4. For information on using multiple Matrox Meteor boards, refer to Chapter 5. Also, for information on using the trigger input on Matrox Meteor/RGB, refer to Chapter 6.

If you want technical information about Matrox Meteor, including specifications and connector pinout descriptions, see Appendix B.

Conventions

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

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-Lite, and Inspector[1].

Need help?

Appendix A offers solutions to potential problems. If your Matrox Meteor installation questions are not answered in this manual, contact your local Matrox representative, Matrox sales, or Matrox customer support (see the *Customer Support* section at the back of this manual for telephone numbers).

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.

1. Most items can be accomplished with Inspector.

Chapter 2: Hardware installation

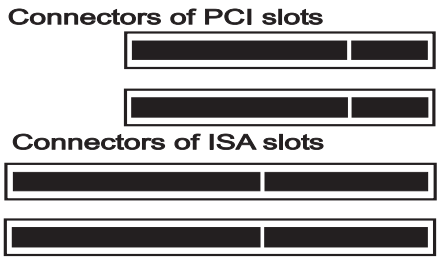
This chapter explains how to install your new Matrox Meteor board in your PC.

Installing Matrox Meteor

Before you install your board, some precautionary measures must be taken. Turn off 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 host 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 Meteor board and take note of the slot number you choose.

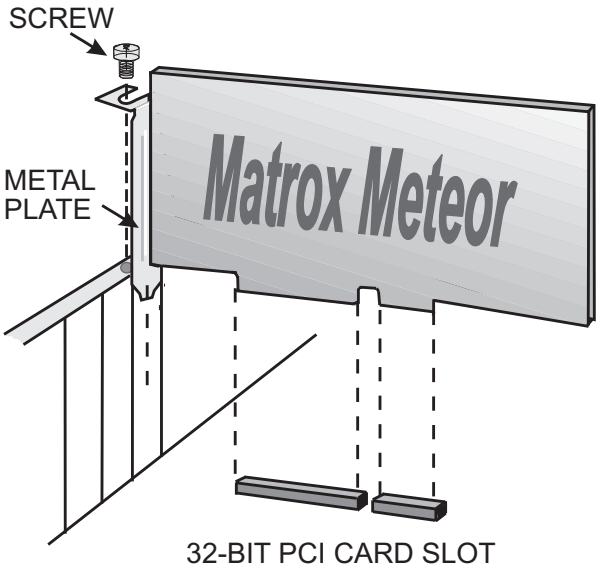


▲ ***Caution***

Some computers have a large, black-ridged heat sink that prevents long boards from using most PCI board slots. Your Matrox Meteor **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 screw at the top; since you will need it to fasten the Matrox Meteor board.

4. Carefully position Matrox Meteor in the selected PCI slot as illustrated in the following picture. If you are using a tower computer, orient the board to suit the board slots in your computer.



5. Slide the board into the slot. Ensure that the metal plate, at the back of the board, slips into the slot's filler bracket.
6. Once the board is perfectly aligned, press the board firmly but carefully into the connector.
7. Anchor the board by replacing the screw that you removed.
8. Replace the cover of your computer.

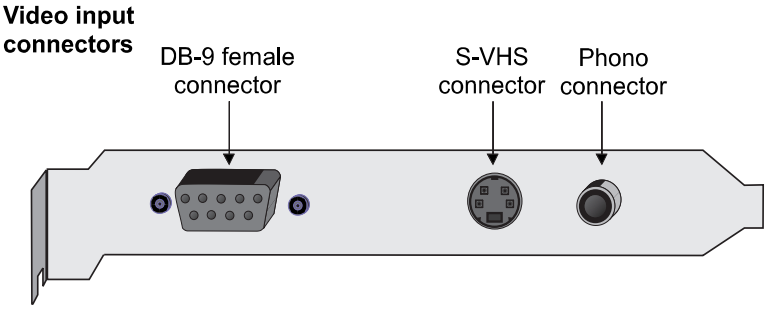
9. Attach your video sources.
10. Turn on your computer.

    Under Windows 95, when you boot your PC, Windows' Plug-and-Play system will detect a new PCI Multimedia Video Device and you will be asked to assign a driver to it. At this point, you should click on **Cancel**.

    - Note that even though you select **Cancel** in older versions of Windows 95, Windows 95 will log the device as unidentified. Since you cannot run MIL-Lite while Windows detects an unidentified device, run the **System** utility from the **Control Panel**, select the **Device Manager** property sheet, and under the **Other Devices** option, remove "PCI Multimedia Video Device". Now, you can install MIL-Lite. If MIL-Lite was already installed, you need to uninstall and reinstall it.

Attaching a video input

Matrox Meteor and Matrox Meteor/RGB have three connectors on their brackets:



Use the PC-OCABLE-4 or PC-OCABLE-10 cable when connecting to the DB-9 input connector. These cables work with composite or RGB input.

To connect to the S-VHS (for Y/C or trigger input) or phono input (for single composite input), use standard video cables available from local electronic stores.

No circuitry protection

▲ ***Warning***

The trigger signal on Matrox Meteor/RGB is not buffered or conditioned. The circuits on Meteor/RGB are sensitive to static electricity and surges. Please be careful about what is hooked to the trigger input of the board since there is no circuitry protection.

There are several ways to provide circuitry protection. For example, you can add an opto coupler between your TTL trigger source and Matrox Meteor/RGB trigger input. This would help isolate the rest of the circuitry from any potential surges.

Chapter 3: Installing software

This chapter explains how to install the Matrox Meteor software.

Installing the software

To install any Matrox Imaging software, place its CD in the appropriate drive, then:

- under Windows, the *setup.exe* file will run automatically.
- under DOS, using the appropriate drive letter, type at the prompt:

```
d:\install
```

While installing the software, you will be asked to provide the following information:

- The drive and directory in which to install the software.
- The target operating system and compiler.
- The type of Matrox hardware that is installed in your system.

❖ If you have an MGA board, check the MGA control panel to ensure that you have the latest display driver installed. If you do not have the latest, install the display driver that is on the CD.

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

Note about Intellicam

Matrox Intellicam has the ability to create digitizer configuration format (DCF) files. MIL-Lite uses DCFs to configure the camera interface on Matrox digitizers in order to accept a wide variety of video (camera) inputs. However, since the Matrox Meteor board accepts only standard input formats, you can only use the predefined DCFs.

Chapter 4: Transferring data

This chapter discusses transfer speeds.

Transfer speeds

Matrox Meteor is capable of transferring full-resolution, full-frame, NTSC or PAL, digitized video in real-time (up to 42 MBytes/second), over the PCI bus.

	NTSC	PAL
Size	640 x 480	768 x 576
Color depth	8, 15, or 32-bit*	8, 15 or 32-bit*
Frame rate	30 FPS	25 FPS
Transfer rate	up to 35 MBytes/s	up to 42 MBytes/s

*32-bit color input data is RGBx (8:8:8:x)

Although Matrox Meteor is capable of transferring data in real-time, this ability is dependent on the performance of your PC. The PCI's maximum theoretical data transfer is 132 MBytes/second, however actual performance is generally much less; it depends on CPU memory caching, interactions between boards, and the quality of the PCI bus interface.

Some PCI bus systems, for example, with an Intel 430NX (Neptune) chipset, do not offer sufficient bandwidth for full transfer capability with Matrox Meteor, therefore:

- 32-bit capture requires selecting composite video input and scaling it down;
- For RGB streams, you cannot scale down, but you can reduce color depth to 15-bit.

More recent PCI bus systems, using a newer PCI chipset, for example, Intel 440LX, offer sufficient bandwidth to ensure full transfer capability to system memory with Matrox Meteor.

Chapter 5: Using multiple Matrox Meteor boards

This chapter explains how multiple Meteor boards can be supported in a single PC.

Using multiple Matrox Meteor boards

This section describes how multiple Matrox Meteor boards can be supported in a single PC. The use of multiple Matrox Meteor boards allow you to grab multiple images simultaneously and display them. It is possible to grab from genlocked cameras or from non-synchronous sources (in the latter case, camera output formats can be different).

The display of grabbed images from each camera will be live (active window) or pseudo-live (non-active window), depending on the operating system, the position of the windows, and the available PCI bandwidth.

Multiple board installation

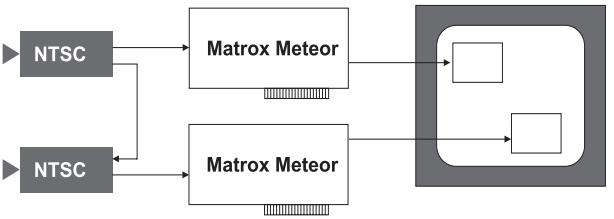
Install each additional Meteor board in the same fashion as you installed the first (refer to Chapter 2). In other words, place each additional board in an empty PCI slot, taking care that they avoid the CPU heat sink. You can theoretically have as many as 16 Matrox Meteor boards installed in your PC at one time; this number is, however, limited by the number of empty slots in your system and, for simultaneous grabs, the available bandwidth of your system.

You indicate which Matrox Meteor boards to use using MIL software.

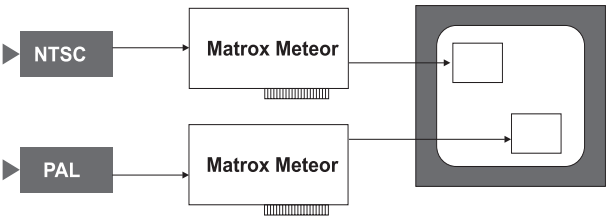
Grabbing simultaneously from different boards

You can simultaneously grab images from cameras attached to different Matrox Meteor boards, however the destination of the grabs must be to different memory locations or memory buffers. To grab at exactly the same time, the cameras must be genlocked (synchronous) and their camera definition formats must be the same.

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



Grabbing from two genlocked cameras

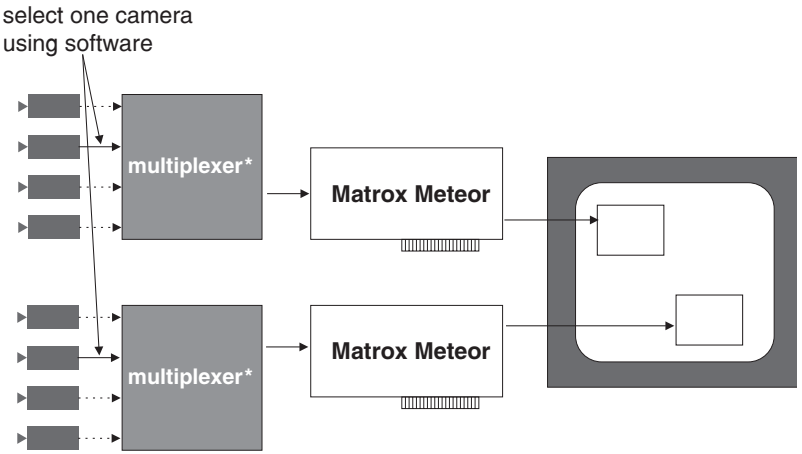


Grabbing from two non-synchronous cameras (with different formats)

Number of cameras per board

The number of cameras that you can connect to each board depends on the version of the board.

Matrox Meteor has four software-selectable video input channels, so you can connect up to 4 cameras to these boards. However, these boards can only grab from one camera per board at a time since only one camera is selected through the board's multiplexer.



Grabbing from multiple cameras connected to each board

On each Matrox Meteor/RGB, you can grab from one RGB camera or three standard monochrome video sources. Note that if you grab from multiple monochrome video sources, the video sources on a board must be genlocked, and the captured images cannot be displayed in real-time because the video data is packed (consecutive pixels belong to different channels).

PCI bandwidth requirements

Sustained PCI-transfers to memory require the use of a high performance PCI core-logic chipset, such as the Intel 430TX or 440LX. If a high performance chipset is used, you should not have any PCI bandwidth problems grabbing two full-sized images simultaneously from two Matrox Meteor boards in real time. However, grabbing more than two images simultaneously might result in PCI bandwidth problems.

For example, grabbing one full-sized NTSC or PAL image in real time will require a PCI bandwidth of 35 MBytes/sec. or 42 MBytes/sec., respectively.

When grabbing from three or more Matrox Meteors simultaneously, you will have to reduce the image size to avoid reaching the upper limits of the overall available bandwidth.

Chapter 6: Using Matrox Meteor/RGB's trigger input capability

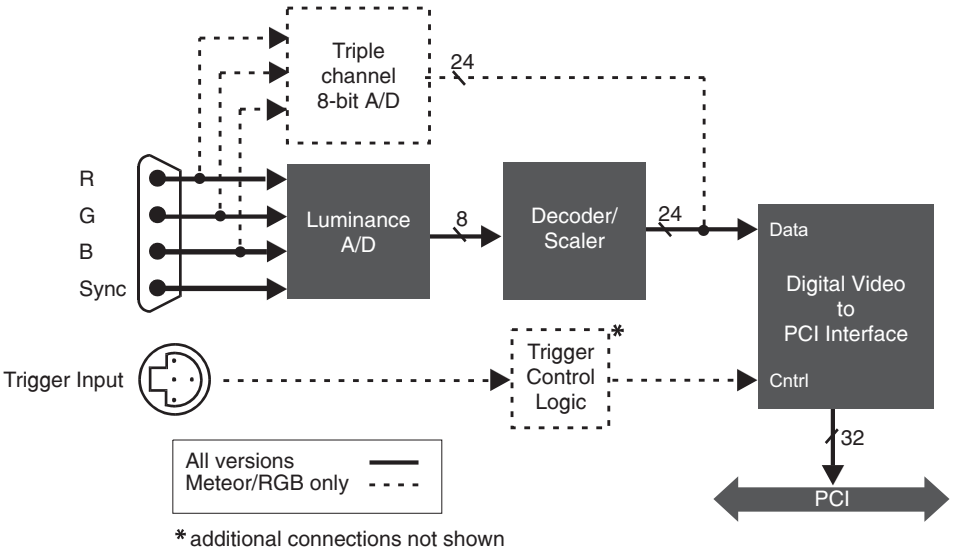
This chapter explains how to use Matrox Meteor/RGB's trigger input capability.

Using the Matrox Meteor trigger

Besides software-controlled single-frame grabbing and continuous grabbing (available on all versions of the Meteor), Matrox Meteor/RGB can grab using an external hardware-controlled trigger.

Signal paths and requirements

The RGB video data is digitized through a triple channel A/D, bypassing the decoder, and is streamed into the Digital Video to PCI interface



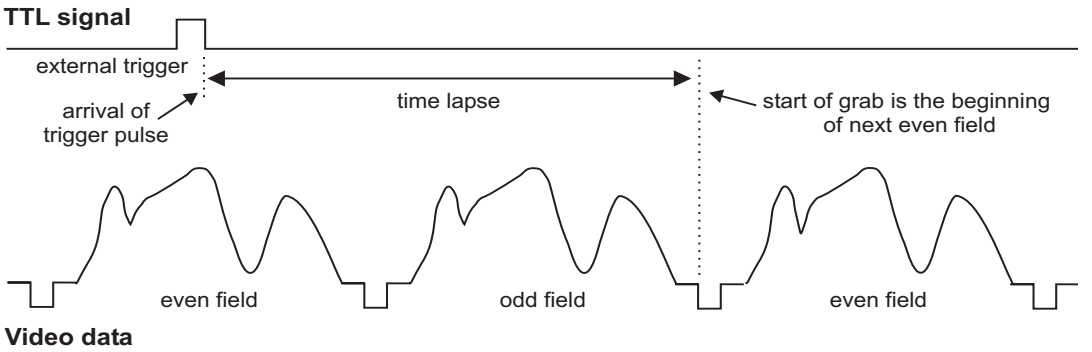
The Digital Video to PCI Interface controls the flow of video data to the memory (system or display). When a trigger is used, no video information is sent to the PCI bus until the trigger signal is received by the trigger control logic. That is, no data is written to system or display memory until the trigger pulse is received.

❖ Note that triggered acquisition is only available for a video stream digitized by the triple channel A/D, in other words, composite monochrome or component RGB only.

TTL pulse

Matrox Meteor/RGB trigger input accepts a TTL level pulse. The TTL level signal must have a maximum amplitude of 5V. A signal over 2V is considered high while anything less than 0.8V is considered low. The transition of 0.8V to 2V is considered to be the rising edge.

The Trigger Control Logic waits for the falling edge of the signal. Upon the active trigger signal, the Trigger Control Logic instructs the Digital Video to PCI Interface to send the next frame to the PCI bus. The beginning of the next video frame is the falling edge of the even field's vsync. Depending on when the trigger arrives in relationship to the video signal, the period between the arrival of the pulse and the frame transfer to the PCI will be null or a maximum of one full frame



Pulse width

The Trigger Control Logic cannot detect the trigger signal's edge unless the trigger signal's pulse width is at least greater than one pixel. You can determine the pulse width by taking the inverse of the *pixel frequency*. The pulse width of one pixel on the Meteor is as follows:

- NTSC Pixel Frequency = 12.27 MHz ∴
  Pulse Width = 1/ Pixel Frequency ≈ 82 nanoseconds
- PAL Pixel Frequency = 14.75 MHz ∴
  Pulse Width = 1/ Pixel Frequency ≈ 68 nanoseconds

No circuitry protection

▲ ***Warning***

The trigger signal on Meteor/RGB is not buffered or conditioned. The circuits on Meteor/RGB are sensitive to static electricity and surges. Please be careful about what is hooked up to the trigger input of the board since there is no circuitry protection.

There are several ways to provide circuitry protection. For example, you can add an opto-coupler between your TTL source and the Matrox Meteor/RGB input. This helps isolate the rest of the circuitry from any potential surges.

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 Meteor board, 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 here, or if the above mentioned suggestions don't work for you, contact your local Matrox representative, Matrox sales office, or the Matrox Imaging Customer Support Group.

Common problems and solutions

☛ IRQ conflicts

In general, PCI devices can share an interrupt line (IRQ). However, sometimes this might not be possible, and the type of difficulties 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 95

  You can resolve this problem either by re-assigning a different IRQ value to the PCI slot in which the Matrox Meteor board is installed or by changing the resource settings in the Windows' **Device Manager** property sheet, accessed using the **System** utility in the **Control Panel.**

If you cannot assign an interrupt line that will be used exclusively by Matrox Meteor, try to assign an interrupt line that Matrox Meteor will share with an another PCI device. If problems occur, try to reassign interrupt lines so that Matrox Meteor will use an interrupt line shared with a PCI device that will not interfere with Matrox Meteor's operation.

If you cannot assign an interrupt line that allows the board to function properly, disable the use of interrupts for grab operations, and consequently run with limited functionality. To do this, pass the M_NO_INTERRUPT initialization flag to the *MsysAlloc()* function at Meteor system allocation time. Please refer to the description of the *MsysAlloc()* function in the Meteor's board specific notes.

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

☛ **PC 'hangs' or produces unwanted results while an application is running**

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 cards, and this causes a conflict.

☛ **Device attached to the PC fails to start under Windows NT 4.0**

This is a type of a message that you will receive if a device failed to start. Your PC 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. This problem could occur if there is too much or insufficient allocation of DMA memory. This problem can be addressed by uninstalling and reinstalling the drivers that failed to start, and by specifying 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. This problem could be resolved by first trying to swap cards from one PCI slot to another. If the problem still persists, upgrade your BIOS.

- **Not enough memory to allocate buffer under Windows NT 4.0**

  This is a message that you will receive if you allocate a grab buffer that is greater than the amount of the DMA memory specified at the time of software installation. This problem can be addressed by allocating more memory. To do so, type the following line at the Windows' run prompt:

```
mildrv meteor x replace
```

  Replace *x* with the appropriate amount of the DMA memory in Kilobytes. Note that for every *x* amount of DMA memory required, Windows NT reserves twice that amount as non-paged memory, only half of which is accessible to the user.

- **Linking or compiling error under DOS**

  To avoid running into this problem, install MIL-Lite (versions 5.0 or greater) after installing Watcom Version 11.

- **Not enough environment memory under DOS**

  This is a message that you might receive when you try to boot your PC. To address this problem, add the following command in your config.sys file:

```
shell=c:\command.com /e:4096
```

- **Incomplete field**

  You will receive a message that a field has been dropped, if some data was lost while grabbing continuously. With the latest version of PCI chipsets, included in the newer PC models, you should not run into this problem any more. However, should you still encounter this problem, disable error messages by calling the following MIL-Lite function:

```
Mappcontrol(MILappID,M_ERROR,M_PRINT_DISABLE
```

  ❖ Note that MilappID refers to your application ID.

☛ **Matrox Meteor doesn't grab properly on my PCI-bus system**

In certain PCs, the bridge between the PCI bus and PC memory has fast PCI-transfer disabled. This is done automatically by the BIOS of the PC when the PC's manufacturer judges it appropriate. If this is the case, you might be unable to grab properly with Matrox Meteor on your PC.

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.
- PC type, environment, and peripherals (especially boards sharing the computer with your Matrox Meteor).
- Your board's serial number (printed on the bar code label).

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 Meteor.

Technical information

This appendix contains information that might be useful when installing your Matrox Meteor board.

Global information

- System requirements: A PC with a PCI bus and a Pentium processor or better. When running Windows 95, 16 MBytes of memory; when running Windows NT 4.0, 24 MBytes of memory; when running DOS, 4 MBytes of memory.
- Operating systems: Windows NT 4.0, Windows 95, or Rational DOS4GW 32-bit DOS extender.
- Technical features:
  - Captures and transfers full-resolution, full-frame NTSC or PAL video input in real-time.
  - Allows live display with a Matrox MGA display board (for example, Matrox Millennium-II or Matrox Mystique) or any other VGA that supports fast linear memory accesses.
  - Allows video to be scaled down to any size, without missing any frames, while providing real-time transfers to an MGA display board.
  - Accepts external trigger input (Matrox Meteor/RGB only).
  - Software programmable reference levels.
  - Multiple Meteor boards can be used in a PC.

Grab information

- Matrox Meteor captures standard color and monochrome video:
  - Standard monochrome: RS-170 (at 640 x 480) and CCIR (at 768 x 576).
  - Standard color: NTSC (at 640 x 480), PAL (at 768 x 576), and SECAM (at 768 x 576).
  - Composite or Y/C (S-Video: S-VHS, Hi8).
- Matrox Meteor/RGB captures standard monochrome and color video (see above), as well as composite RGB color.

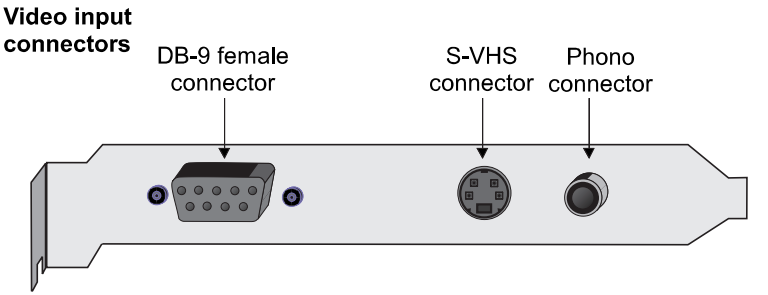
- Pixel jitter: ±3ns (typical).
- Analog interface.
  - Up to four software-selectable video inputs.
  - A triple 8-bit analog-to-digital converter.
  - Sampling rate: 12.27 MHz NTSC, 14.75 MHz PAL
- Video adjustment.
  - Independent gain and offset controls for the R, G, and B channels (Matrox Meteor/RGB only).
  - Software programmable input hue, brightness, contrast, and saturation.
  - Software programmable black and white reference levels (Matrox Meteor/RGB only).
- Synchronization and control.
  - External TTL trigger input (Matrox Meteor/RGB only).
  - Synchronization even when grabbing from still video cameras and VCR's in playback and pause modes.

Data transfers

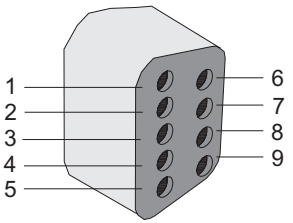
- Digital video to PCI interface supports the following data transfer formats: 8-bit monochrome, 15-bit RGB 5:5:5 and 32-bit RGBx.
- Real-time transfers to off-board system or display RAM at up to 42 MBytes/sec.

Board input

Matrox Meteor and Matrox Meteor/RGB have three connectors on the bracket for video input:



DB-9 female connector

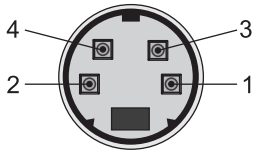


The DB-9 female connector provides composite or RGB input to the Matrox Meteor board. The pin assignment is as follows:

Pin	Signal
1	Composite 1 or RED
2	Composite 2 or GREEN
3	Composite 3/or LUMA in or BLUE
4	Composite 4 or Composite Sync
5	Ground
6	Ground
7	Ground
8	Ground
9	Ground

Use one of the following Matrox cables to interface to this connector: PC-OCABLE-4 or PC-OCABLE-10.

S-VHS connector

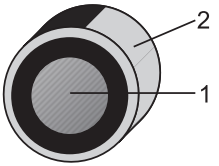


The S-VHS connector provides Y/C or trigger input to the Matrox Meteor board. The pin assignment is as follows:

Pin	Signal
1	Ground
2	Ground
3	Y (Luma) In (on Matrox Meteor) Trigger In (on Meteor/RGB)
4	C (Chroma) In

You can use a standard video cable (available from local electronic stores) to interface to this connector.

Phono connector



The phono connector provides a single composite input to the Matrox Meteor board. The pin assignment is as follows:

Pin	Signal
1	Composite 1
2 (shell)	Ground

You can use a standard video cable (available from local electronic stores) to interface to this connector.

Specifications

Electrical

Operating voltage and current:

- 5 V ± 5%, 0.5A
- 12 V ± 5%, 350 mA
- -12 V ± 5%, 50 mA

Environmental

- Power consumption < 7.5 watts.
- Board size is 23.55 cm x 10.55 cm (9.3” x 4.2”).
- Operating temperature from 0 to 55°C (32 to 131°F).

Appendix C: Glossary

This appendix defines some of the specialized terms used in this Matrox Meteor document.

- **Band**

  One of the surfaces of a buffer. A grayscale image requires just 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.

- **Bit**

  A digit of a binary number. Images are described as 1-bit, 8-bit, 16-bit, etc. The numbers indicate the bits available to store the value of each pixel in the image.

- **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 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 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 often used for data transfers between devices of differing speeds. For example, since a computer sends out data faster than a screen can display it, the data is temporarily stored in the frame buffer. The buffer is generally thought of as a two-dimensional surface with a certain pixel depth.

- **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.

- **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*.

- **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.

- **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.

- **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*.

- **RAMDAC**

  Random access memory digital-to-analog converter. A digital to analog converter that includes static RAM for use as a look-up table.

- **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 a zero 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*.

- **Vertical sync**

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

  See also *horizontal sync*.

Customer support

Note: The most up-to-date telephone numbers are available from the Matrox internet web site.

If you have a question that is not answered in your manual, in the release notes, or in the *readme* files on the software CDs, contact your local representative, your regional Matrox office (if applicable), or Matrox Canada (corporate headquarters).

To ensure that Customer Support can answer your questions quickly, fill out and fax the "Product Assistance Request" form before calling.

	Telephone	Fax	E-mail
Matrox Canada (corporate headquarters)	country code: 1 514- 822-6061	(514) 822-6273	imaging.techsupport@matrox.com
Matrox France SARL (France only)	country code: 33 (0)1-45 60 62 03	(0)1-45-60-62-05	tech_support_imaging@matrox.fr
Matrox Electronic Systems GmbH (Germany or Austria only)	country code: 49 (0)89-614 4740	089/614-9743	100726.2600@compuserve.com
Matrox (UK) Ltd. (UK or Benelux only)	country code: 44 (0)1793-44 11 00	(0)1793 441199	image.tech.uk@matrox.com

You will find up-to-the-minute release information on our web site.

Internet Web site: **http://www.matrox.com/imaging**
ftp site: **ftp.matrox.com/pub/imaging**

Warranty

This product is warranted against defects in materials and workmanship for a period of ***one year*** *from date of delivery. We will repair or replace products that prove to be defective during the warranty period provided they are returned, at the user's expense, to Matrox Electronic Systems Limited. No other warranty is expressed or implied. Matrox is not liable for consequential damages.*

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.**

If for some reason you must return the board directly to Matrox, follow these steps:

1. Contact Customer Support (see above for phone numbers).

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

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 (see the following page).

Return address

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

- Matrox International Corp.
  Trimex Building
  Mooers, N.Y.
  12958

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 ❒ No ❒	
Is an error code displayed? Yes ❒ No ❒	If so, what code?
	... Continued on reverse

Describe the problem:

Artisan Technology Group

Artisan Technology Group is your source for quality new and certified-used/pre-owned equipment

- FAST SHIPPING AND DELIVERY
- TENS OF THOUSANDS OF IN-STOCK ITEMS
- EQUIPMENT DEMOS
- HUNDREDS OF MANUFACTURERS SUPPORTED
- LEASING/MONTHLY RENTALS
- ITAR CERTIFIED SECURE ASSET SOLUTIONS

SERVICE CENTER REPAIRS
Experienced engineers and technicians on staff at our full-service, in-house repair center

WE BUY USED EQUIPMENT
Sell your excess, underutilized, and idle used equipment
We also offer credit for buy-backs and trade-ins
www.artisantg.com/WeBuyEquipment ↗

InstraView™ **REMOTE INSPECTION**
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Contact us: (888) 88-SOURCE | sales@artisantg.com | www.artisantg.com