Matrox 4Sight GP

Installation and Hardware Reference

Manual no. Y11221-101-0400

February 14, 2014

Patent Notice

This product may be protected by one or more patents. See www.matrox.com/patents.

PRINTED IN CANADA

Contents

Chapter 1: Before you begin. 9

Overview 10

Operating system 10

Hardware components 11

Motherboard 12

Mass storage 13

Chassis 13

Inspecting the Matrox 4Sight GP package 14

Standard items 14

Additional components 15

Handling precautions 15

Manual overview 16

Chapter 2: Getting started with your Matrox 4Sight GP unit. . . 17

Steps to get started 18

Operating Matrox 4Sight GP for the first time 18

Connecting peripheral devices 20

Connecting video output display devices 21

Connecting a high-resolution analog display device. 21

Connecting a high-resolution digital display device 21

Connecting a USB mouse, keyboard, printer, or other USB device 22

Networking connections 22

Connecting devices to the auxiliary I/O interface 23

Connecting external devices to the output signals of the auxiliary I/O interface 23

Connecting external devices to the input signals of the auxiliary I/O interface 30

Connecting a stereo audio device 30

Connecting frame grabber boards 30

Light emitting diodes (LEDs) 31

Front panel LEDs 31

Back panel LEDs 31

Chapter 3: Changing the air filter and adding devices to Matrox 4Sight GP 33

Overview 34

Cleaning and replacing the air filter 34

Cleaning the air filter 34

Replacing the air filter 34

Devices that can be added to your Matrox 4Sight GP motherboard 36

Removing the Matrox 4Sight GP chassis cover 38

Connecting a hard disk or CD/DVD drive 41

Drive assignments 42

Connecting USB devices 42

Installing or removing RAM 43

Installing memory 44

Removing memory 44

Adjusting the new memory settings 44

Installing full-height, half-length PCIe boards in the Matrox 4Sight GP unit 45

Installing full-height, half-length PCIe boards 45

Chapter 4: Matrox 4Sight GP hardware reference 47

Overview 48

Motherboard 48

Processing 50

Processor technologies 51

Caches 52

Display 53

Graphics controller 53

Video encoder 53

RAM 53

BIOS 54

Mass storage 54

I/O interfaces 55

USB interfaces 55

Networking interfaces 56

PCIe interfaces 56

Audio interface 57

Auxiliary I/O interface 57

Power supply, fans, air filter and chassis 58

Power supply 58

Fans 59

Air filter 59

Chassis 60

Power management and temperature control 61

Appendix A: BIOS reference 63

Overview 64

The BIOS Setup Utility 65

Entering the BIOS Setup Utility 65

The Menu bar. 66

The Legend window 66

The Selection window. 67

The Item Specific Help window 68

Default options 68

Main menu 69

Advanced menu 70

Boot Configuration submenu 71

Peripheral Configuration submenu 71

IDE Configuration submenu 72

Thermal Configuration submenu 74

Video Configuration submenu 76

USB Configuration submenu 79

Chipset Configuration submenu 81

ACPI Table/Features Control submenu. 83

Active Management Technology Support submenu. 84

PCI Express Configuration submenu 86

Intel Fast Flash Standby submenu 87

System Information submenu 88

Security menu 88

Power menu 89

Advanced CPU Control submenu. 90

Boot menu 93
EFI submenu 95
Legacy submenu 96
Exit menu 97
Overriding the device sequence 99

Appendix B: Technical reference 103

Overview 104
Motherboard 104
Environmental specifications 105
RAM 106
Hard disk drive 106
Power supply 106
Chassis 107
Fans 107
Battery 107
Auxiliary I/O interface 107
Characteristics of the auxiliary I/O signals. 108
Pinout descriptions of external connectors 110
USB 2.0 connectors 111
USB 3.0 connectors 111
Gigabit Ethernet connectors 112
DVI-I connector 112
DVI-D connector 114
Auxiliary I/O connector 116
RS-232 COM port 119
Audio input and audio output connectors. 120
AC power connector 120

Pinout descriptions of internal connectors 121
PCIe connectors 123
Internal USB header 123
SO-DIMM slots for system memory modules (DDR3) 123
SATA connectors for mass storage devices 123
Power supply connectors for peripheral devices (fans) 124
RS-232 COM port header 124

Appendix C: Operating system recovery 125

Matrox rescue utility 126
Restore to factory default settings 127
Backup current customized image 128
Create a backup on a USB storage device 129

Appendix D: Hardware glossary 131

Glossary 132

Appendix E: Listing of Matrox 4Sight GP imaging computers . 141

Key feature changes 142

Index

Regulatory Compliance

Limited Warranty

Chapter

1

Before you begin

This chapter introduces you to the key features of Matrox 4Sight GP.

Overview

The Matrox 4Sight GP unit is a self-contained platform that integrates processing and display, along with image capture, networking, and general purpose I/O.

Matrox 4Sight GP includes a motherboard, SO-DIMM memory modules, a mass storage device, and two fans, all of which are encased within a metal chassis. You can install Matrox or third-party full-height, half-length PCIe boards in the Matrox 4Sight GP unit.

Operating system

The Matrox 4Sight GP unit uses Microsoft Windows Embedded Standard (WES) 7 (64-bit version). Both the 64-bit and 32-bit WES 7 recovery OS images are included.

Note that if you try using any other operating system, there might be driver issues (for example, driver issues with USB devices). Refer to the documentation accompanying the operating system for more information.

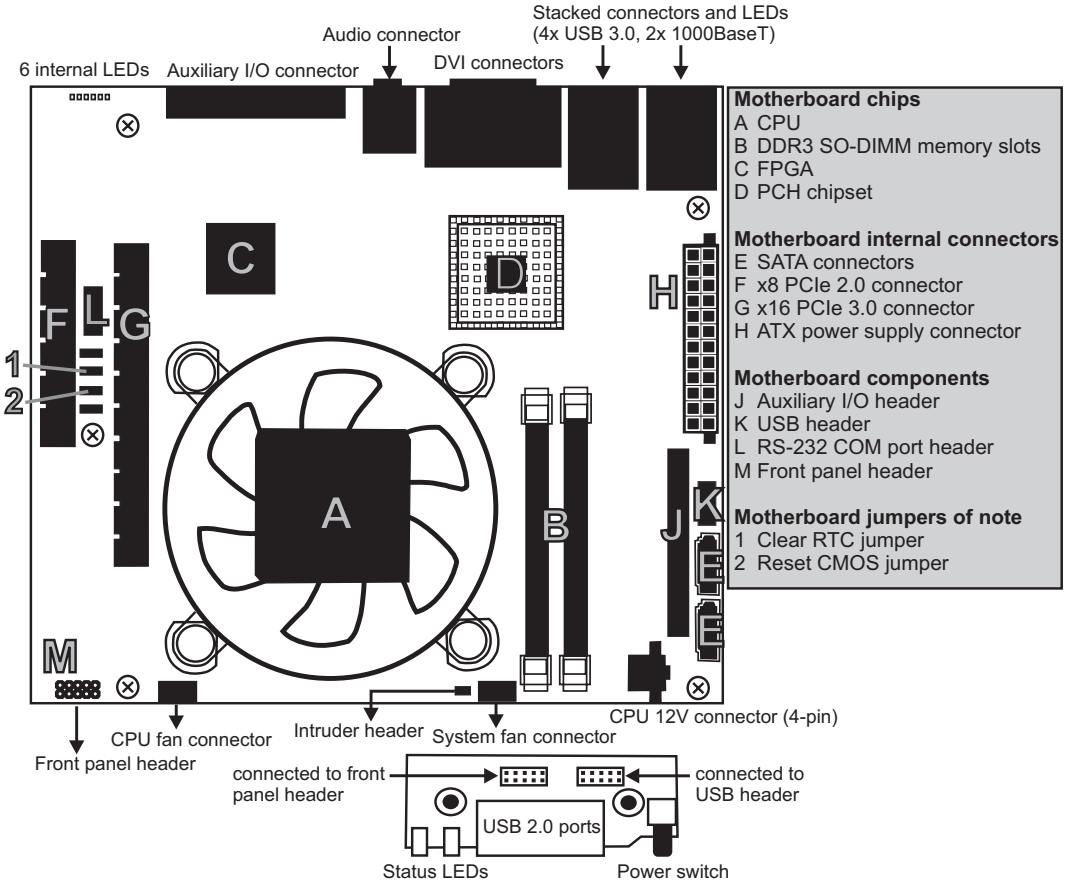
Hardware components

This section lists the major hardware components of the Matrox 4Sight GP unit:

- The motherboard.
- Mass storage.
- The chassis.

Matrox 4Sight GP motherboard

Back panel external connectors and components



Front panel external connectors and components

Motherboard

The Matrox 4Sight GP motherboard integrates processing, display, memory, networking, BIOS, a SATA controller, PCIe connectivity, and general purpose I/O (auxiliary I/O, serial I/O, audio I/O, USB 2.0 and USB 3.0).

- **Processing.** The Matrox 4Sight GP motherboard features an Intel core, covered by a heat sink.

  The chipset contains a combined northbridge and southbridge in an Intel Platform Controller Hub (PCH) Q77 Express chipset. The PCH provides control for both I/O and graphics.

- **Display.** Display capabilities are provided via the Intel processor and chipset. Matrox 4Sight GP supports up to two video output display devices. Matrox 4Sight GP allows you to connect a high-resolution analog display device (such as an analog monitor or analog flat panel) to the analog video output connector. It also allows you to connect a digital display device (such as a digital flat-panel display) to each of the two DVI connectors. If you connect two digital devices, you will not be able to simultaneously have an analog device connected.

  In addition, the Intel integrated graphics supports 32-bit (true-color) non-destructive graphics overlay onto live video, for a completely true-color display.

- **PCIe slots.** The Matrox 4Sight GP motherboard has connectors for both PCIe 3.0 and PCIe 2.0 boards. Both interfaces allow you to connect full-height, half-length PCIe boards to your unit.

  - **x16 PCIe slot (PCIe 3.0).** You can connect x1, x4, x8, or x16 PCIe 3.0 boards to this PCIe slot.

  - **x8 PCIe slot (PCIe 2.0).** You can connect x1, x4, or x8 PCIe 2.0 boards to this PCIe slot. Note that this PCIe slot is electrically wired as a x4 PCIe slot, so x8 PCIe boards will operate at a maximum of x4 PCIe.

- **Auxiliary I/O interface.** The auxiliary I/O interface is composed of 32 independent auxiliary sink-driver signals; 16 of which can be used to receive application-specific user input, and 16 of which can be used to transmit application-specific user output.

- **Networking.** Matrox 4Sight GP integrates two Gigabit Ethernet interfaces. Each Gigabit Ethernet interface supports 10 BaseT, 100 BaseT, and 1000 BaseT.

- **Random access memory (RAM).** The Matrox 4Sight GP motherboard has two 204-pin SO-DIMM slots, each slot supporting a SO-DIMM memory module up to 8 Gbytes in size. The Matrox 4Sight GP unit can have one or two identical memory modules installed; the total memory is either 4 Gbytes, 8 Gbytes, or 16 Gbytes depending on what was ordered.

- **Basic input/output system (BIOS).** Flash memory is used to store the BIOS.

- **Audio and USB interfaces.** Matrox 4Sight GP also features audio and USB interfaces:

  - One 24-bit stereo audio input connector, and one 24-bit audio output connector.

  - Six USB interfaces (4 USB 3.0, and 2 USB 2.0), to connect a USB keyboard, mouse, and printer.

Mass storage

A storage device, such as a hard disk drive (HDD), can be connected to each of the two internal SATA 7-pin connectors. Matrox 4Sight GP is shipped with a SATA-connected hard disk drive, with a minimum storage capacity of 250 Gbytes.

Note that the HDD specifications are subject to change without notice.

Chassis

The Matrox 4Sight GP chassis encloses the Matrox 4Sight GP motherboard, a SATA-connected hard disk drive, SO-DIMM memory modules, the power supply, and two fans (one for the CPU and one for the chassis). Mounting points on the chassis allow the unit to be secured to other equipment.

Inspecting the Matrox 4Sight GP package

The following tables list standard items that are included in the Matrox 4Sight GP package, as well as additional items that are available from Matrox. If anything is missing or damaged, contact Matrox for assistance.

Standard items

Your Matrox 4Sight GP package should include the following standard items:

Standard package item	Details
Matrox 4Sight GP unit	Encases the following components: • The Matrox 4Sight GP motherboard*. • One or two DDR3 1067/1333/1600 MHz SO-DIMM memory modules.† • A 250-Gbyte mass storage device. • Two cooling fans. • 300 W power supply.
Matrox 4Sight GP power cable	• Standard AC power cable for your region.
Matrox 4Sight GP software package	Includes the following: • An operating system license. • Drivers and utilities. These are pre-installed and are also compressed in the following file on your Matrox 4Sight GP: *C:\Drivers and Utilities\SystemDriverAndUtilities.zip*
Instructions to receive the *Matrox 4Sight GP installation and hardware reference*	A sheet that directs you to the Matrox website to download this manual. This manual can assist you with the setup of the Matrox 4Sight GP unit and the connection of peripheral and internal devices.

*. The motherboard will include one of the following processors: Intel i7-3770, i5-3550S, or Celeron G540 processor.

†. If two modules are installed, the total memory will be 4 Gbytes, 8 Gbytes, or 16 Gbytes of RAM, depending on what was ordered.

Additional components

You can also purchase one or more of the following additional Matrox components:

Additional component	Details
Matrox frame grabbers	Contact your Matrox sales representative for availability.
Matrox video cables	Used to connect video sources to Matrox frame grabber boards. Contact your Matrox sales representative for availability.

Handling precautions

The Matrox 4Sight GP motherboard is sensitive to static electricity and surges. To avoid damaging the motherboard, follow these precautions:

- Be sure to turn off the power to the unit and all peripherals before adding or removing devices.
- Do not touch the heat sinks while the unit is operating; they might be very hot.
- Drain static electricity from your body by touching a metal fixture (or ground) before touching the motherboard.
- Wear a grounded wrist strap designed to prevent static discharge.
- Avoid letting your clothing come in contact with the motherboard.

Manual overview

This installation and hardware reference explains how to setup your Matrox 4Sight GP and connect external and internal devices.

This manual contains the following information:

- *Chapter 1: Before you begin* introduces you to the key features of your Matrox 4Sight GP unit.
- *Chapter 2: Getting started with your Matrox 4Sight GP unit* details how to get your Matrox 4Sight GP up and running. It includes instructions for connecting various peripherals to the front and back panels of the Matrox 4Sight GP unit.
- *Chapter 3: Changing the air filter and adding devices to Matrox 4Sight GP* details how to change the air filter and how to add devices to the Matrox 4Sight GP motherboard.
- *Chapter 4: Matrox 4Sight GP hardware reference* provides a detailed hardware description of all the components in the Matrox 4Sight GP unit.
- The appendices provide useful information regarding the Matrox 4Sight GP unit and its modules. The appendices include a BIOS reference, a technical reference, and a glossary.

Need help?

If you experience problems during installation or while using this product, you can refer to the support page on the Matrox Imaging web site: http://www.matrox.com/imaging/support.

The support page provides answers to frequently asked questions and offers registered customers additional ways of obtaining support.

If your question is not addressed and you are registered, contact technical support. To do so, you should first complete and submit the online Technical Support Request Form, accessible from the above-mentioned web page. Once you have submitted the information, a Matrox support agent will contact you shortly thereafter by email or phone, depending on the problem.

In the unlikely event of a failure, you will find the warranty, which outlines return conditions and procedures, at the back of this manual.

Chapter

2

Getting started with your Matrox 4Sight GP unit

This chapter explains how to operate your Matrox 4Sight GP, including how to connect peripherals to the unit.

Steps to get started

This chapter provides instructions on how to get started with your Matrox 4Sight GP, including how to connect peripheral devices to the unit.

Operating Matrox 4Sight GP for the first time

Perform the following steps to operate Matrox 4Sight GP for the first time:

1. Connect your display device, USB keyboard, and USB mouse to the unit.

   For more information on how to connect and configure these devices, refer to the *Connecting video output display devices* section and the *Connecting a USB mouse, keyboard, printer, or other USB device* section, later in this chapter.

2. Turn the unit on using the power button on the front panel.

Important

3. Once the unit boots, use the presented drop-down menu to select your language. Once you have selected the language, you cannot change your selection (you will have to reinstall the operating system to change the language).

   Note that Matrox 4Sight GP assumes that your keyboard language is the same as the language you selected.

4. Verify that your connected devices are operating correctly.

   Once your devices are operational, you can power down the unit to connect devices to the motherboard, or connect devices to the auxiliary I/O interface. For information on adding hardware to the Matrox 4Sight GP motherboard, refer to *Chapter 3: Changing the air filter and adding devices to Matrox 4Sight GP*. For information on connecting devices to the auxiliary I/O interface, refer to *Connecting devices to the auxiliary I/O interface* section, later in this chapter.

Turning off the Matrox 4Sight GP unit

To turn off the Matrox 4Sight GP unit, press the power button. You can also shut down the unit by shutting down Windows with the **Shut Down** command.

If the unit does not respond to the above methods, push and hold the power button until the unit shuts down.

Rebooting the unit

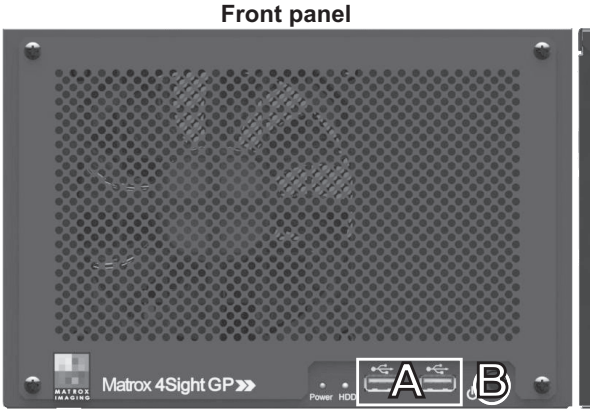
When the unit is on, you can reboot the unit by using one of the two following techniques:

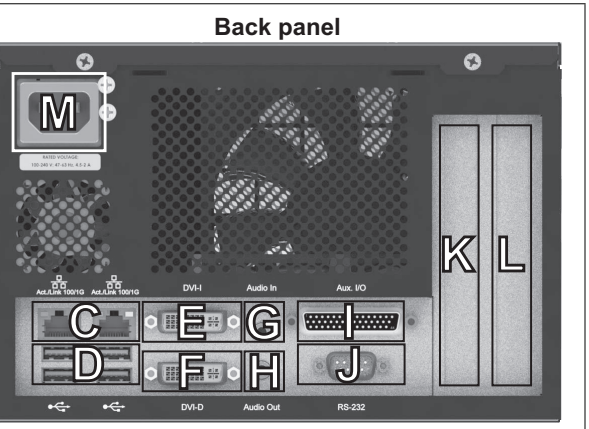
- Press the **Control-Alt-Delete** keys on your keyboard simultaneously.
- Press the power button to turn the unit off, and then press the power button to turn the unit on again.

  If you need to enter the BIOS Setup utility, you must press the **Esc** key during power-on self-test (POST). You only have a few moments to press the **Esc** key before the boot-up process continues. For more information on the BIOS Setup utility, refer to *Appendix A: BIOS reference*.

Connecting peripheral devices

The following sections describe how to connect various devices to the external connectors on the Matrox 4Sight GP unit.





Front panel connectors
A USB ports
B Power button

Back panel connectors
C Gigabit Ethernet connectors (each with two LEDs)
D USB ports
E DVI-I connector
F DVI-D connector
G Audio In connector
H Audio Out connector
I Auxiliary I/O connector
J RS-232 COM port connector
K Slot for optional add-on board
L Slot for optional add-on board
M Power connector

Matrox 4Sight GP has connectors on its front and back panels to connect to the following devices:

- Six USB devices (USB 3.0, 2.0 and 1.1 compatible), such as a USB mouse, keyboard, printer, flash drive, hard disk drive, or a USB-connected CD/DVD drive.

- Two Gigabit Ethernet interfaces at 10/100/1000 Mbits/sec.

- Two video output display devices: a high-resolution analog display device (such as an analog monitor or analog flat panel), or two high-resolution digital display devices (such as digital flat panels).

  ❖ Note that the analog display device must be connected to the DVI-I output connector using a DVI-to-VGA adapter.

- External devices that connect to the auxiliary I/O interface.

- A stereo audio device.

Connecting video output display devices

You can connect up to two video output display devices to the Matrox 4Sight GP unit:

- You can connect a high-resolution analog display device (such as an analog monitor or an analog flat panel) to the DVI-I connector using a DVI-to-VGA adapter.

- You can connect a high-resolution digital display device (such as digital flat panels) to each of the DVI connectors.

The procedures required to connect these display devices are outlined in the following subsections.

Connecting a high-resolution analog display device

To connect a high-resolution analog display device to the DVI-I connector on the Matrox 4Sight GP unit, use a standard DVI-to-VGA (DBHD-15) adapter.

Connecting a high-resolution digital display device

You can connect a digital display device (such as a digital flat panel) to either of the DVI connectors using the cable provided with your display device.

Connecting a USB mouse, keyboard, printer, or other USB device

USB connectors

You can connect any USB-compliant mouse, keyboard, or printer to one of the six USB connectors. Four USB connectors (USB 3.0) are located on the back panel of the Matrox 4Sight GP unit, and two USB connectors (USB 2.0) are located on the front panel.

❖ Note that USB hubs can also be used to connect multiple USB devices to the Matrox 4Sight GP unit.

Networking connections

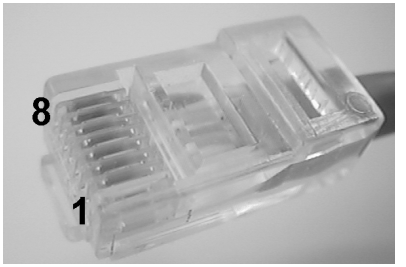
You can connect Matrox 4Sight GP to your local area network (LAN). To do so, connect a network cable to one of the two Gigabit Ethernet connectors, located on the back panel of the chassis.

Matrox 4Sight GP can gain access to a LAN via Gigabit Ethernet (1000 BaseT), Fast Ethernet (100 BaseT), or Twisted Pair Ethernet (10 BaseT) through the two Gigabit Ethernet connectors.

Required cabling for Ethernet connections

If you plan to use Gigabit Ethernet, use a Category 5e (CAT5e) cable. If you plan to use Fast Ethernet, use a Twisted Pair Category 5 (UTP5) cable. If you plan to use Twisted Pair Ethernet, use a UTP5 or UTP3 cable.

An RJ45 connector (shown below) must be attached to each end of the cable.



Connecting devices to the auxiliary I/O interface

Matrox 4Sight GP has an auxiliary I/O interface connector, to which you can receive input from or send output to external devices. To do so, a custom cable is required. For more information, refer to the *Auxiliary I/O connector* subsection of the *Pinout descriptions of external connectors* section, in *Appendix B: Technical reference*.

Important

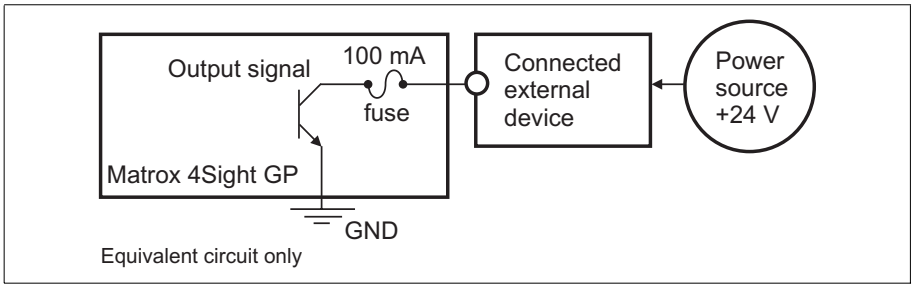
Voltage from external devices connected to the auxiliary I/O interface connector should not exceed 24 V.

For details regarding signal characteristics, see the *Auxiliary I/O interface* section, in *Appendix B: Technical reference*.

Connecting external devices to the output signals of the auxiliary I/O interface

You can control a wide variety of external devices with the output signals of the Matrox 4Sight GP auxiliary I/O interface, such as programmable logic controllers (PLC), lighting devices, and TTL (transistor-transistor logic) devices.

Each of the output signals of Matrox 4Sight GP uses an open collector (sink driver); instead of transmitting a high or low voltage state, a current from a connected device is either terminated (grounded) or not. The power source must be provided by the connected device because Matrox 4Sight GP output signals are not capable of providing (sourcing) voltage to drive a device. In the circuit depicted below, the device connected to Matrox 4Sight GP is terminated.



Each of the sink drivers of Matrox 4Sight GP uses a 100 mA non-resettable fuse to protect it from connected external devices. The fuse tries to protect your Matrox 4Sight GP if you accidentally connect it to an external device that provides more amperage than Matrox 4Sight GP can safely sink to ground.

Warning

If you connect your Matrox 4Sight GP to a device that exceeds the maximum amperage of 100 mA, the fuse will blow. The auxiliary I/O interface will become unusable, and you will have to return your unit to Matrox.

When the output signal is on, the circuit is grounded and the current flows from the connected device to your Matrox 4Sight GP (the observed voltage at the output pin will be low). When the auxiliary output signal is off, the circuit is open (the observed voltage will be high if pulled high by the connected circuitry).

State of the output signal	State of the sink driver	Circuit goes to
On	Closed.	Ground.
Off	Open.	Not ground (floating).

The exact connection between the Matrox 4Sight GP auxiliary I/O interface, the connected external device, and its power source depends entirely on the type of external device to which you connect.

- **NPN-compatible PLC devices**. NPN-compatible PLC devices include all forms of external devices that are programmable logic controllers with NPN transistor types. An NPN-compatible PLC device has an input that is enabled when it is grounded (sinking input). An NPN-compatible PLC device does not provide power to the connected device.

- **PNP-compatible PLC devices**. PNP-compatible PLC devices include all forms of external devices that are programmable logic controllers with PNP transistor types. A PNP-compatible PLC device has an input that is enabled when it receives a current (sourcing input).

- **Inductive load devices**. Inductive load devices include all forms of external devices that have inductor wiring, such as a relay or small motor. Devices connected to an inductive load device require a diode to protect them from over-voltage. Over-voltage typically occurs when the connected device disconnects. An inductive load device does not provide power to the connected device.

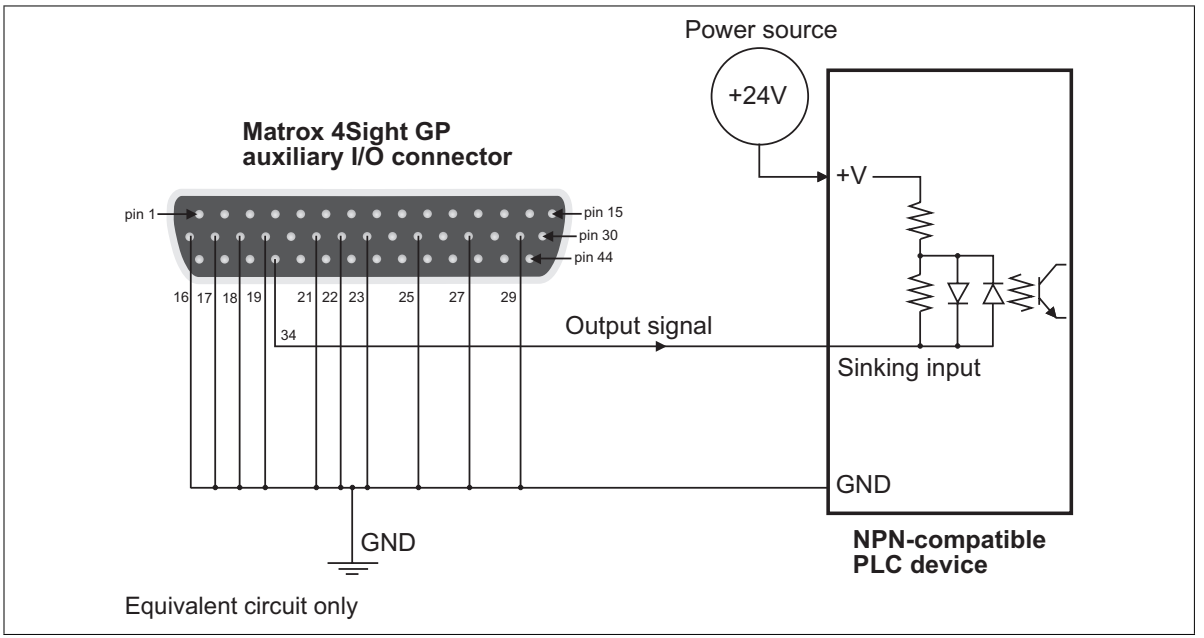
- **Lighting devices**. Lighting devices include all forms of output devices that provide additional lighting upon request, providing the best possible results when grabbing an image in otherwise reduced or poor illumination.

- **TTL devices**. Transistor-transistor logic (TTL) devices expect the device to which they are connected to provide the necessary voltage. Note that a TTL device can be used as either an input or an output device. For more information on using a TTL device as an input device, refer to the *Connecting external devices to the input signals of the auxiliary I/O interface* section later in this chapter.

Connecting to an NPN-compatible PLC device

To connect Matrox 4Sight GP to an NPN-compatible PLC device, the ground of the NPN-compatible PLC device and the ground of Matrox 4Sight GP must be connected to a common ground. In addition, an output signal of Matrox 4Sight GP must be connected to the device's sinking input.

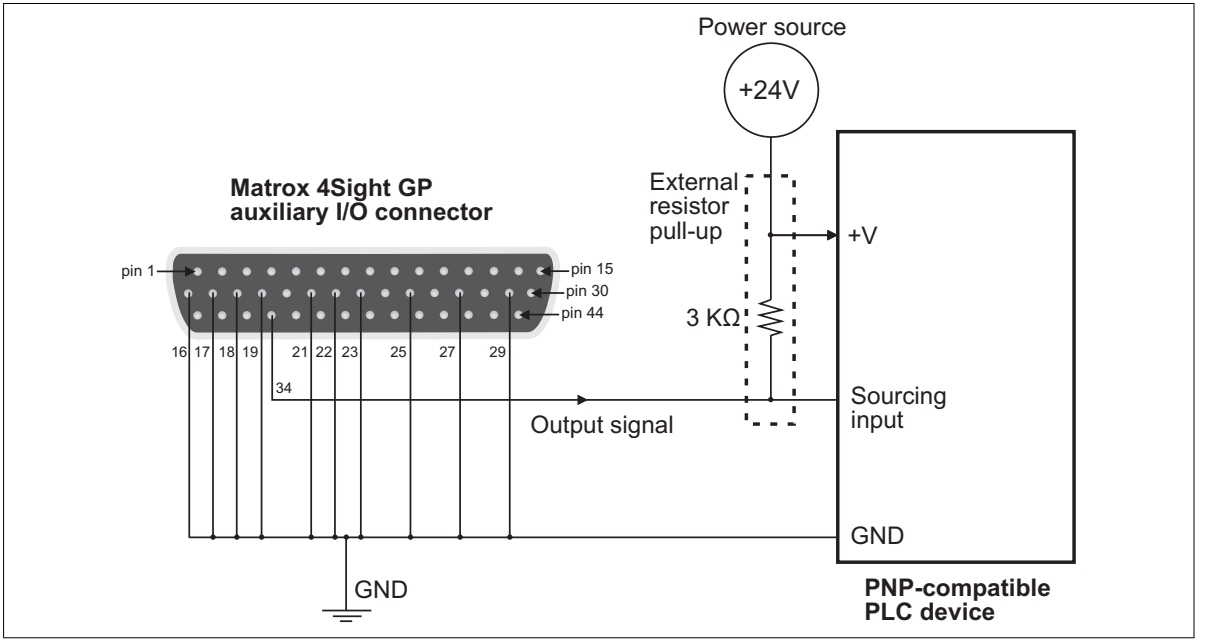
The NPN-compatible PLC device provides its own power source. When the Matrox 4Sight GP output signal is "on", the NPN-compatible PLC device connects to ground and completes the circuit.



Connecting to a PNP-compatible PLC device

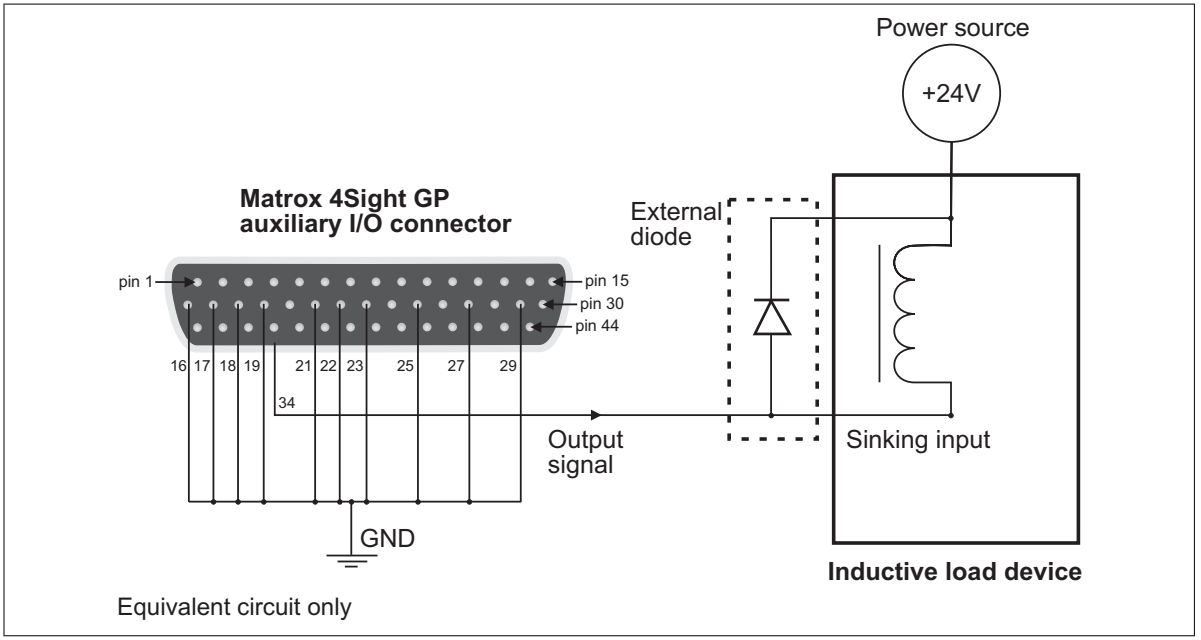
To connect Matrox 4Sight GP to a PNP-compatible PLC device, you must first connect an external pull-up resistor between them. The external pull-up resistor is needed because PNP-compatible PLC devices expect to be connected to a device that can provide power (a sourcing device) and Matrox 4Sight GP is a sinking device. Therefore, connect an output signal of Matrox 4Sight GP and the sourcing input to an external pull-up resistor. In addition, connect the ground of the PNP-compatible PLC device and the ground of Matrox 4Sight GP to a common ground.

The external pull-up resistor assures that when the output is disabled (off), the external resistor will pull-up the PLC input to a positive voltage (+V). This creates an inversion, with the PLC input "on" when the Matrox 4Sight GP output is "off", and vice-versa.



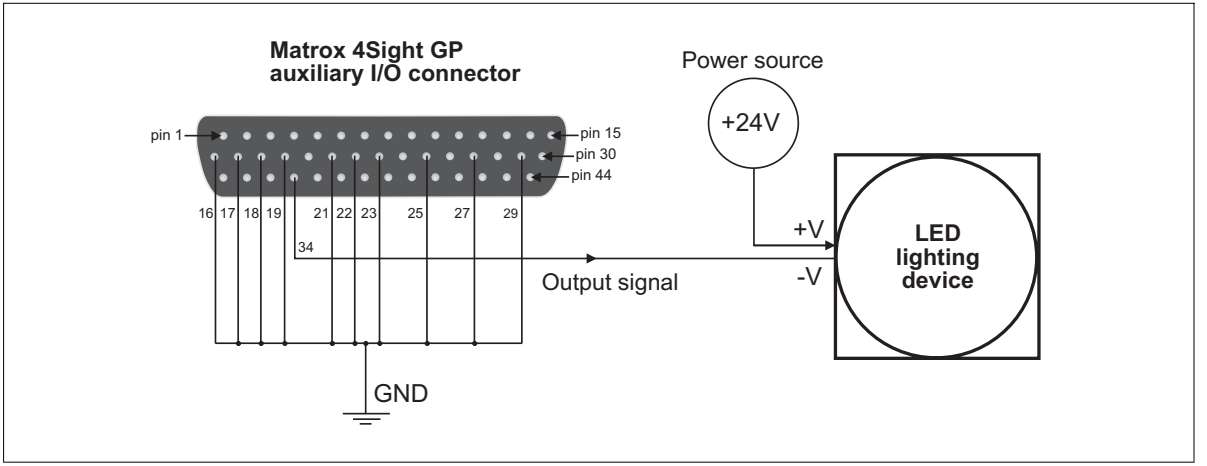
Connecting to an inductive load device

To connect Matrox 4Sight GP to an inductive load device, you must first connect a high-voltage diode between them. The diode protects Matrox 4Sight GP from sudden voltage spikes, which occur when disconnecting from the inductive load device. You should connect the negative side of the load (anode) and a Matrox 4Sight GP output signal to the external diode. In addition, you should connect the positive side (cathode) of the load to a +24 V power supply. When the Matrox 4Sight GP output signal is enabled, the negative side of the load is reduced to 0 V, and 24 V appears across the circuit.



Connecting to a lighting device

To connect Matrox 4Sight GP to a lighting device, such as a strobe, connect the Matrox 4Sight GP output signal directly to the lighting device. The lighting device activates when the connected Matrox 4Sight GP output signal is enabled (on).

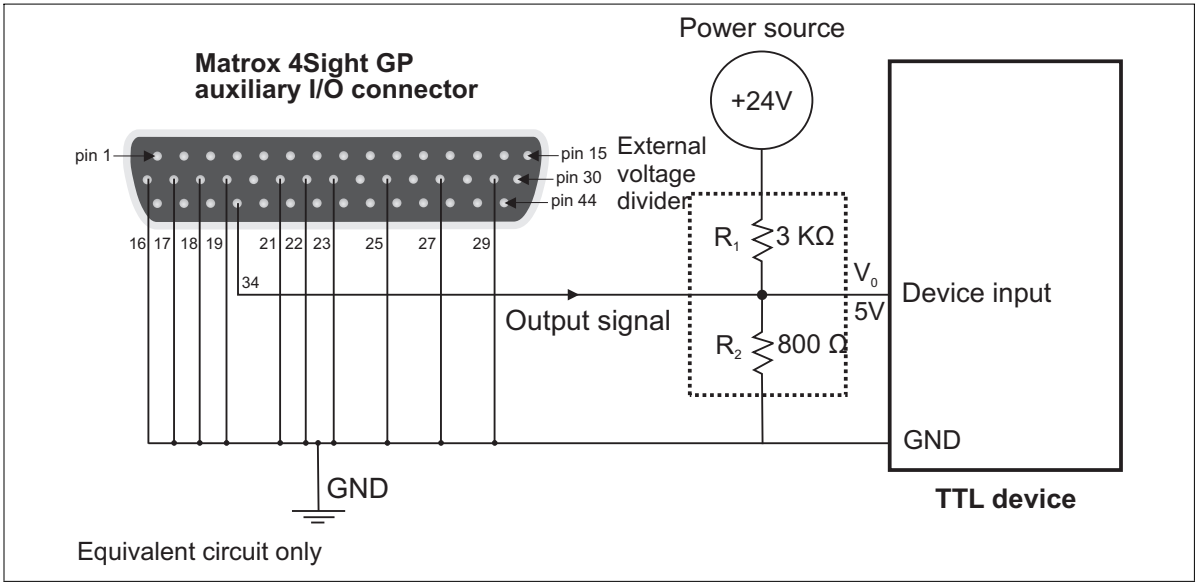


Connecting to a TTL device

To connect your Matrox 4Sight GP to a TTL device, you must use an external voltage source because TTL devices expect to be connected to a sourcing signal and the auxiliary output signals of your Matrox 4Sight GP are sinking signals. If using a 24 V voltage source, you must first connect an external voltage divider between the TTL device and your Matrox 4Sight GP. Select a voltage divider whose resistors reduce the voltage such that the connected device receives 5 V.

$$V_0 = 24\text{V} \times \frac{R_2}{R_1 + R_2}$$

Then, connect the voltage input wire from your external voltage divider to the 24 V voltage source, and connect the ground of your voltage divider to the ground of your Matrox 4Sight GP.



If using a different voltage than 24 V, replace 24 V in the above formula accordingly. If the external voltage source is 5 V, use a pull-up resistor instead of a voltage divider.

Connecting external devices to the input signals of the auxiliary I/O interface

You can connect a wide variety of external devices to the input signals of the Matrox 4Sight GP auxiliary I/O interface.

Each of the input signals of Matrox 4Sight GP is TTL-compatible. The Matrox 4Sight GP input signals will be enabled (on) when the voltage applied is greater than 2 V. The Matrox 4Sight GP input signals will be disabled (off) when voltage is lower than 0.8 V.

Each of the input signals of Matrox 4Sight GP is able to accept input voltages ranging from 0 V to 24 V.

Connecting a stereo audio device

You can connect a stereo audio device to the audio input and output connectors, using a 1/8" mini audio input/output plug. The audio interface is only designed for line input/output operations. Since there is no output amplifier or input preamplifier, the interface does not support speakers or microphones.

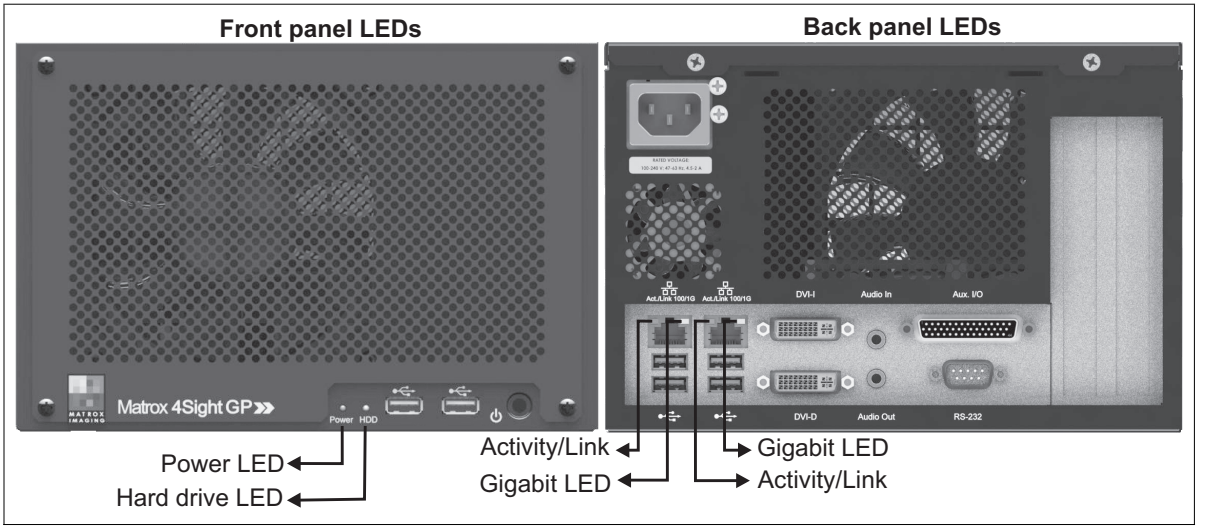
Connecting frame grabber boards

If you install a Matrox or third-party frame grabber board in Matrox 4Sight GP, the frame grabber's external connectors will be accessible on the back panel of the unit. With the frame grabber installed, you can connect video sources to Matrox 4Sight GP.

For more on installing these boards in the unit, refer to *Chapter 3: Changing the air filter and adding devices to Matrox 4Sight GP*. Refer to the board's installation manual for cable and pinout information.

Light emitting diodes (LEDs)

There are a total of six clearly-labelled LEDs on the Matrox 4Sight GP unit.



Front panel LEDs

On the front panel, there are two LEDs for the power status and hard disk activity.

- **Power LED.** The power LED is on when Matrox 4Sight GP is receiving power and turned on.
- **HDD LED.** The hard disk drive LED turns green when the hard disk is working.

Back panel LEDs

On the back panel, there are four network LEDs for the two Gigabit Ethernet ports. The following two LEDs are available for each Gigabit Ethernet port:

Gigabit Ethernet port LEDs

- **Gigabit LED** (**orange/green**). The Gigabit LED turns orange when the port is using the 1000 BaseT Ethernet network connection, and the LED turns green when the port is using the 100 BaseT Ethernet network connection.

  This LED shuts off when the port is not using the 1000 BaseT connection nor the 100 BaseT connection. When this LED is off, it indicates that the unit is using the 10 BaseT connection, *but only if the activity/link LED is yellow.*

Activity/link LED (yellow). The activity/link LED for the Gigabit Ethernet port turns yellow when the port is connected to a network, and blinks during data transfers. This LED shuts off when there is no connection present.

For more information on the four back-panel LEDs, refer to the *Networking interfaces* section, in *Chapter 4: Matrox 4Sight GP hardware reference*.

Chapter

3

Changing the air filter and adding devices to Matrox 4Sight GP

This chapter deals with additions that can be made to Matrox 4Sight GP.

Overview

This chapter explains how to clean and replace the air filter in your Matrox 4Sight GP and how to connect various devices to the Matrox 4Sight GP motherboard.

Cleaning and replacing the air filter

The Matrox 4Sight GP unit contains a UL 94 HF-1, UL 900-certified, quadrafoam air filter. The air filter prevents dust and dirt from entering the unit.

Cleaning the air filter

To ensure efficient cooling of the Matrox 4Sight GP unit, you must regularly clean the air filter.

1. Before cleaning, turn off the Matrox 4Sight GP unit and unplug the power cord.

2. Using a household vacuum, turned on at a low setting, position the vacuum nozzle in front of the air vents on the front panel of Matrox 4Sight GP. Excess dust and particles will be safely removed through the air vents.

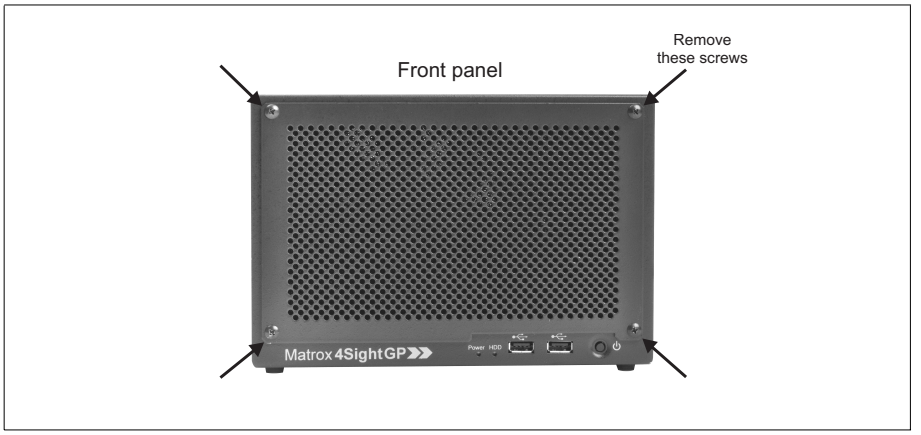
Replacing the air filter

If you operate your Matrox 4Sight GP in a dusty environment, the filter will eventually need to be replaced. You will know that the filter needs replacing if your Matrox 4Sight GP is overheating, or the fan is running faster and noisier than usual.

To remove and replace the air filter, perform the following:

1. Turn off the Matrox 4Sight GP unit and unplug the power cord.

2. Using a Phillips #2 screw driver, remove the four screws illustrated below from the Matrox 4Sight GP unit's front panel.



3. To remove the filter from the unit, pull on the edge of the filter. It will loosen and come away from the unit.

4. Before inserting the new filter, press the filter against a flat, hard surface with your hand. The filter should not have any bulges or folds.

5. Place the new filter in the same position as the original filter, behind the front panel. Reinstall the front panel and the screws.

Devices that can be added to your Matrox 4Sight GP motherboard

Matrox 4Sight GP is designed to accommodate selected hardware additions. The motherboard has connectors for USB devices and SO-DIMM memory modules.

The Matrox 4Sight GP motherboard also has connectors for add-on boards:

- A x16 PCIe 3.0 connector; you can connect a Matrox or third-party full-height, half-length x1, x4, x8, or x16 PCIe board.
- A x8 PCIe 2.0 connector; you can connect a Matrox or third-party full-height, half-length x1, x4, or x8[1] PCIe board.

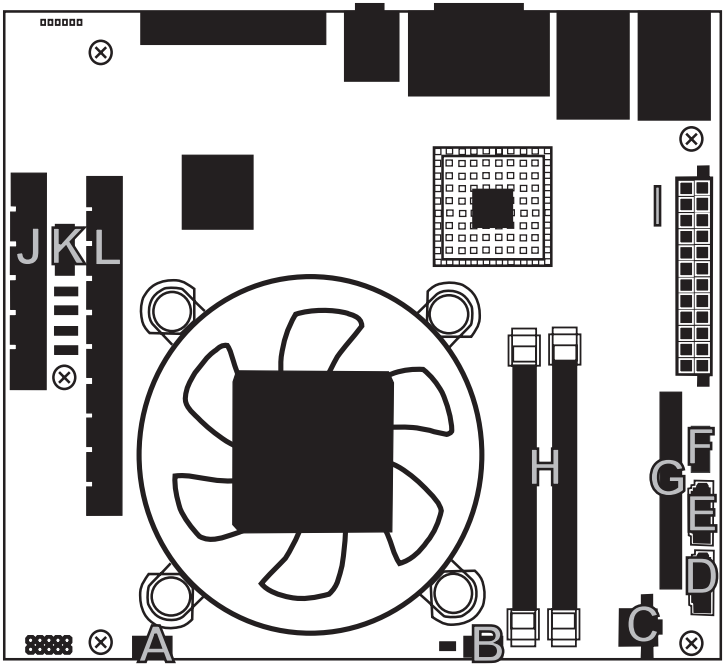
The first step in making hardware additions to your Matrox 4Sight GP typically involves removing the chassis cover[2].

If you remove the chassis cover, you will have access to all the connectors located on the motherboard. The following sections outline how to remove the chassis cover, as well as how to connect USB devices, memory modules, and optional PCIe boards.

The following diagram provides a reference to motherboard connectors.

1. The x8 PCIe 2.0 connector is electrically wired as a x4 PCIe slot, so x8 PCIe boards will operate at a maximum of x4 PCIe.
2. Be sure to always **operate the Matrox 4Sight GP unit with the cover on.** This ensures that the fan properly removes any heat accumulating in the heat sinks.

Matrox 4Sight GP motherboard internal connectors



A CPU fan connector
B System fan connector
C CPU 12V connector (4-pin)
D SATA connector 0 (port 0)
E SATA connector 1 (port 1)
F USB header
G Auxiliary I/O header
H DDR3 SO-DIMM memory slots
I ATX power supply connector
J x8 PCIe 2.0 connector
K RS-232 COM port header
L x16 PCIe 3.0 connector

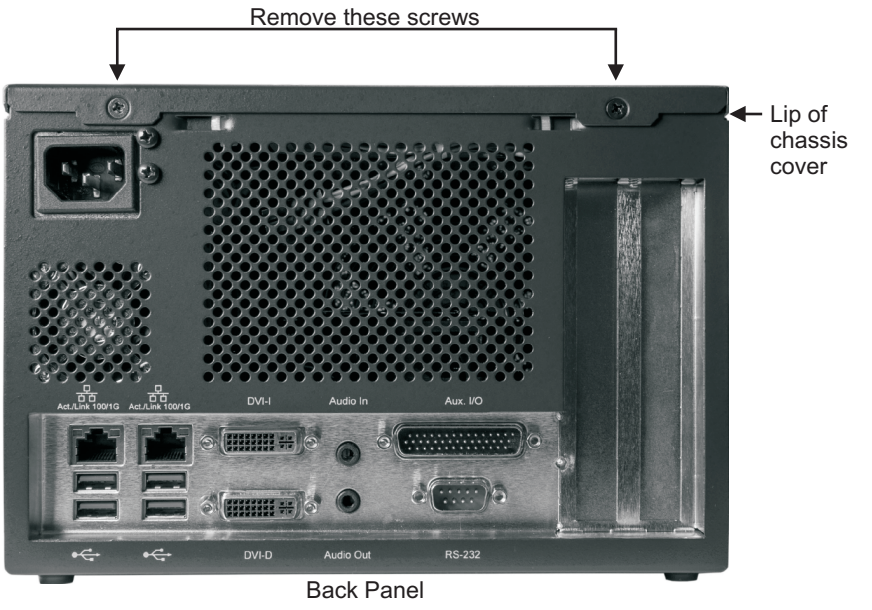
Removing the Matrox 4Sight GP chassis cover

Follow the steps listed below to remove the chassis cover.

Important

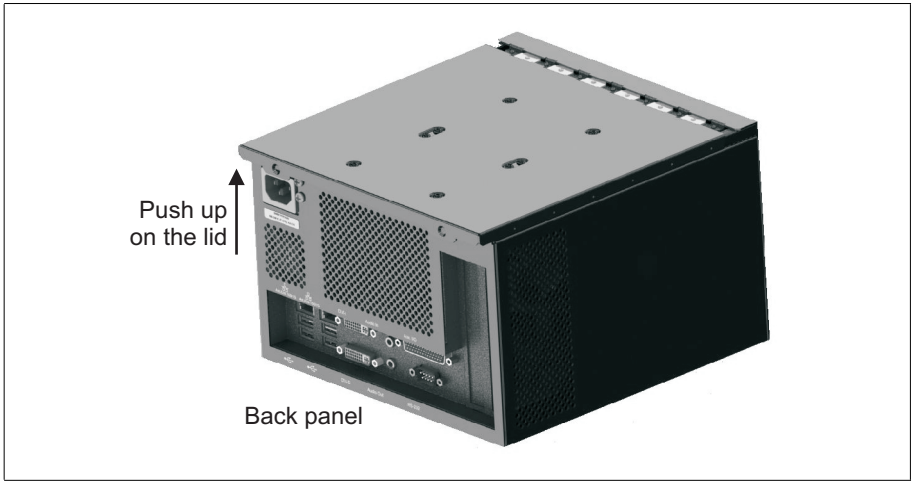
1. Unplug the Matrox 4Sight GP power cord.

2. Using a Phillips #2 screw driver, remove the appropriate screws from the Matrox 4Sight GP unit's back panel (see the following illustration).



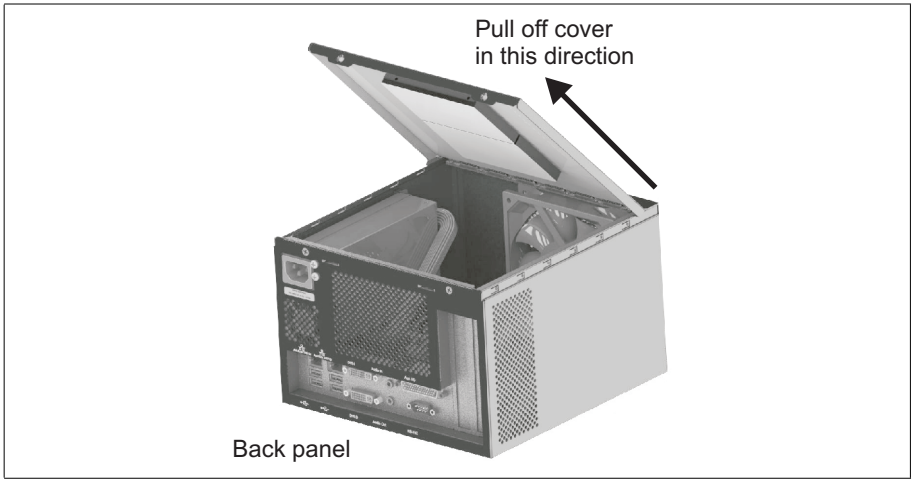
Back Panel

3. The back of the chassis cover has a lip that snaps on to the unit. Push up on the lip. Carefully open the cover all the way. You will notice that the hard drive is attached to the cover. Be careful not to pull on the hard drive cable.



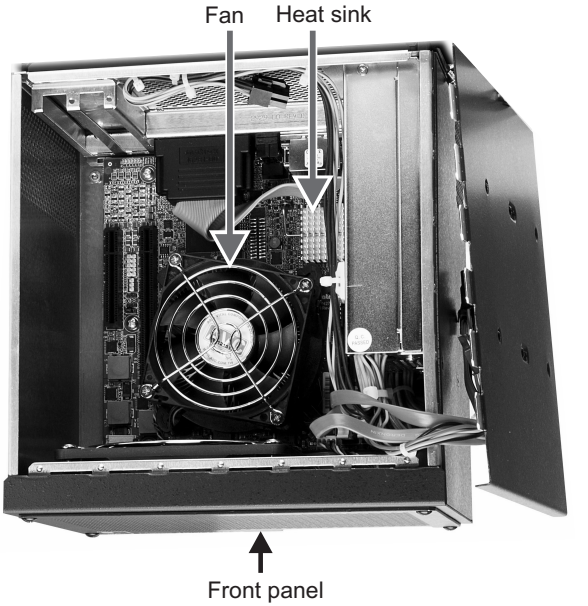
Use caution when inserting and removing components with the chassis cover open. The cover leans at an unstable angle and could fall.

❖ Alternatively, you can remove the chassis cover completely, to allow easier access to the motherboard. To remove the cover, first unplug the cables attached to your hard drive(s). Pull the cover away from the hinges, and it will come apart from the chassis.



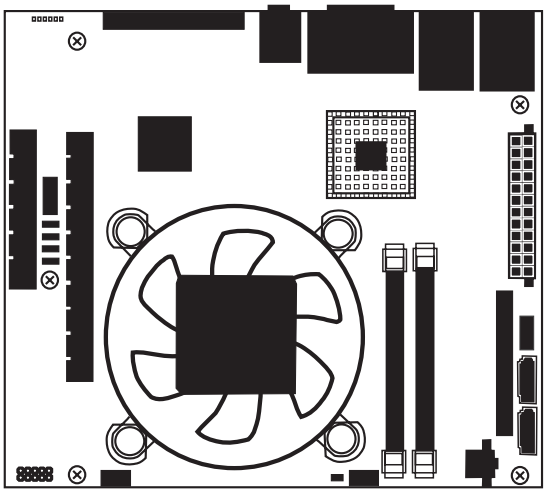
Warning

Once you have removed the cover and exposed the motherboard, do not touch the heat sink or fans while the unit is running, or soon after the unit has been turned off; they might be very hot.



Connecting a hard disk or CD/DVD drive

The Matrox 4Sight GP motherboard provides two SATA 7-pin connectors, allowing you to connect one or two mass storage devices such as hard disk drives or solid-state drives (SSDs). The locations of the two SATA connectors on the Matrox 4Sight GP motherboard are shown in the diagram below.



Important The Matrox 4Sight GP motherboard does not provide connectors for ATA/IDE devices.

Drive assignments

When you connect a mass storage device to one of the 7-pin SATA connectors, the operating system and BIOS identify it by the SATA connector (port) to which it is connected. SATA connector 0 is below connector 1 when facing the front panel of the unit. The BIOS identifies the device connected to SATA connector 0 (port 0) as the *primary IDE master*. The device connected to SATA connector 1 (port 1) is identified as the *secondary IDE master*.

Primary and secondary designations are used simply to differentiate between the mass storage devices connected to the motherboard. There is no difference in performance between the primary or secondary device. For more information, refer to your device's documentation.

Run the BIOS Setup program to verify the configuration of your mass storage devices.

Connecting USB devices

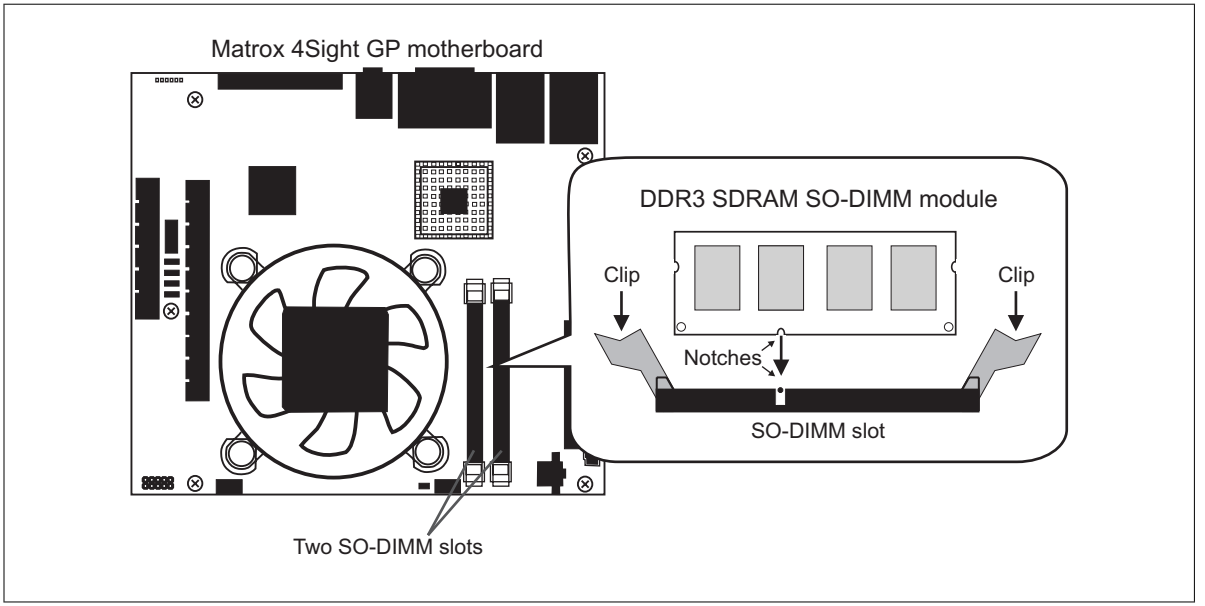
The Matrox 4Sight GP motherboard provides two USB 2.0 connections, accessible on the front panel of the Matrox 4Sight GP chassis. These USB connectors can be used to attach two USB devices.

Installing or removing RAM

The Matrox 4Sight GP motherboard features two 204-pin SO-DIMM slots in which you can install random access memory (RAM) modules. Each slot can support one DDR3 SDRAM module up to 8 Gbytes in size. Matrox 4Sight GP supports 1.5 V, unbuffered, PC3-12800-compliant DDR3 SDRAM. Contact Matrox for a list of supported modules.

- Note that for optimal performance and reliability, when installing new memory modules, the same model (that is, two SO-DIMM modules of the same size and speed with the same manufacturer and part-number) must be used. Mixing different models is not recommended.

You can also use low voltage 1.35 V SO-DIMM memory modules, as long as they support 1.5 V signaling.



Installing memory

To install a memory module in the Matrox 4Sight GP unit:

1. Ensure that the clips at each end of the SO-DIMM slot are spread.
2. Position the module over the SO-DIMM slot, such that the notch along the module's bottom edge is aligned with the notch of the SO-DIMM slot. If installing a second memory module, ensure that it is the same model as the first.
3. Gently insert the bottom edge of the module into the slot.
4. Carefully close the two clips over the side notches of the module.

Removing memory

To remove a memory module from the Matrox 4Sight GP unit:

1. Spread the clips at each end of the SO-DIMM slot.
2. Lift the module out of the slot.

Adjusting the new memory settings

After installing memory in your Matrox 4Sight GP, you must adjust the unit's new memory settings using MilConfig (the MIL Configuration utility). Refer to the MIL User Guide for more information on using this utility.

Installing full-height, half-length PCIe boards in the Matrox 4Sight GP unit

To insert PCIe boards in the Matrox 4Sight GP unit, you must remove the chassis cover. To see instructions on how to do so, refer to *Removing the Matrox 4Sight GP chassis cover* section, earlier in this chapter.

Installing full-height, half-length PCIe boards

You can connect one or two full-height, half-length x1, x4, x8, or x16[1] PCIe boards to the motherboard of the Matrox 4Sight GP unit. If you connect two boards, you can simultaneously grab images from video sources attached to both boards.

Matrox 4Sight GP supports PCIe boards with a single or a double bracket. You can install two boards with a single bracket, or one board with a double bracket.

PCIe board with a single bracket

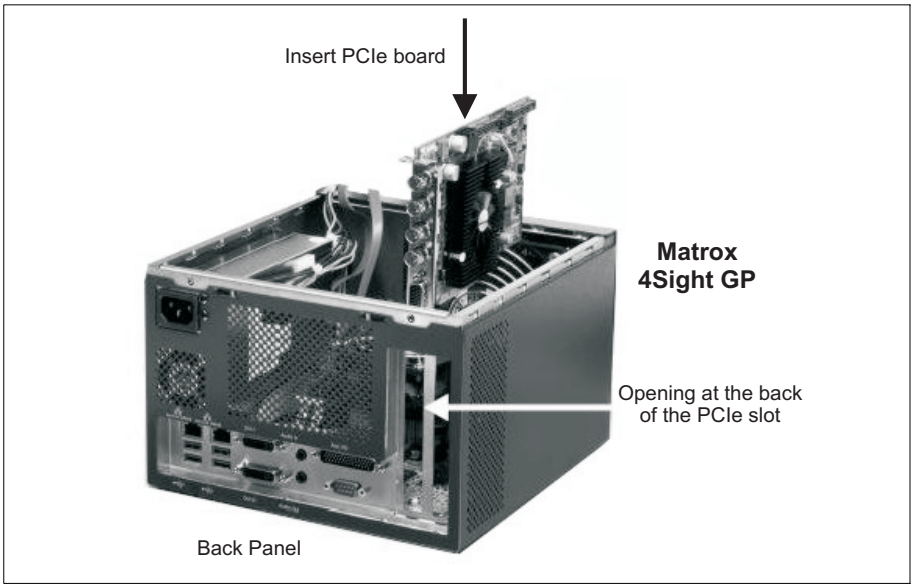
PCIe board with a double bracket

1. The x8 PCIe 2.0 connector supports x1 or x4 electrical connections. If you install a x8 PCIe board in the x8 slot, the board will operate at a maximum of x4 PCIe.

To connect your PCIe board to the motherboard, follow the steps below:

1. Using a Phillips #2 screw driver, remove the metal cover from the appropriate slot's opening on the back panel of your Matrox 4Sight GP.

2. Position your PCIe board in the selected slot, as illustrated below.



3. Press the board firmly but carefully straight down into the connector of the slot.

Chapter

4

Matrox 4Sight GP hardware reference

This chapter provides hardware descriptions of Matrox 4Sight GP components.

Overview

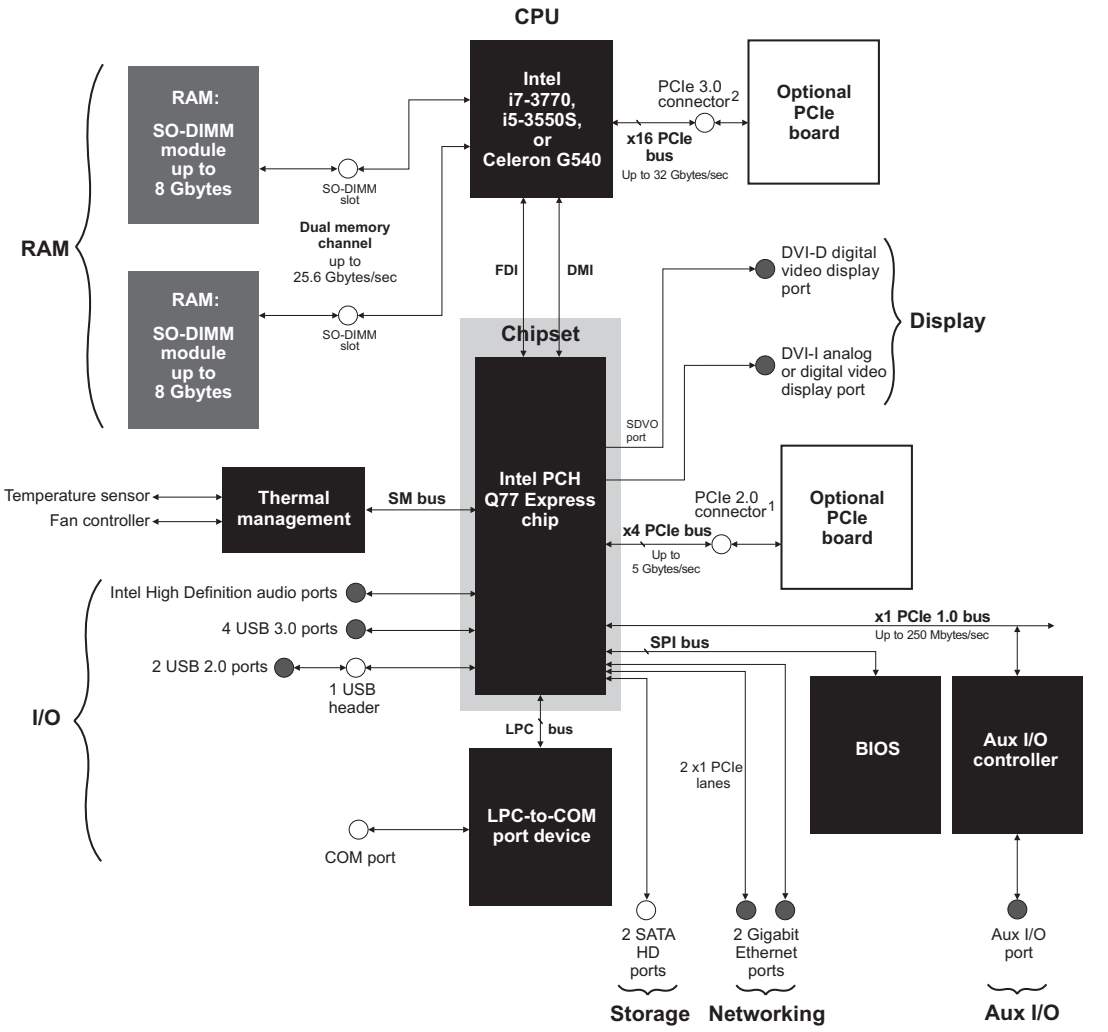
This hardware reference chapter provides a detailed description of the major components of Matrox 4Sight GP.

Technical information, such as connector pinout and hardware specifications, can be found in *Appendix B: Technical reference*.

Motherboard

The Matrox 4Sight GP mini-ITX based motherboard (see following block diagram) integrates processing, display, storage, networking, and I/O functionality. The motherboard measures 6.693" x 7.493" (17.00 cm x 19.03 cm).

Motherboard block diagram



1 You can attach full-height, half-length PCIe 2.0 boards to this PCIe connector.

2 You can attach full-height, half-length PCIe 3.0 or 2.0 boards to this PCIe connector.

Processing

Processor

The Matrox 4Sight GP motherboard supports either the Intel Celeron G540 processor (Sandy bridge) running at 2.0 GHz, the Intel i5-3550S processor (Ivy bridge) running at 3.0 GHz, or the Intel i7-3770 processor (Ivy bridge) running at 3.4 GHz.

Chipset

The Intel PCH Q77 Express chipset provides control for both graphics and I/O. The chipset components include:

- A serial digital video output (SDVO) port, which transmits data to a digital display device.
- An analog video display port.
- A SATA controller.
- A USB 2.0/3.0 controller.
- A RealTime clock.
- A Gigabit LAN controller at rates of 10/100/1000 Mbits/sec.
- A high-definition audio controller.
- Power management features.
- PCIe interfaces:
  - x4 PCIe 2.0 interface, which can transfer data over the PCIe bus at rates up to 5 Gbytes/sec (2.5 Gbytes/sec in each direction).
  - ❖ There is also a x16 PCIe 3.0 interface on the motherboard, connected directly to the processor. This connector facilitates the transfer of data over the PCIe bus at rates up to 32 Gbytes/sec (16 Gbytes/sec in each direction).

The Intel PCH chipset interfaces with:

- The BIOS via the serial peripheral interface (SPI) bus.
- The processor via the flexible display interface (FDI) and the direct media interface (DMI) at speeds up to 4.0 Gbytes/sec.
- The COM port chip via the low-pin count (LPC) bus.

Processor technologies

The processor installed in your Matrox 4Sight GP uses processor technologies designed to accelerate multimedia and imaging applications. It also has Intel Active Management Technology 8.1 (AMT), which allows you to manage your Matrox 4Sight GP remotely.[1]

For multimedia and imaging applications, the processor uses multimedia extension (MMX) technology, streaming SIMD extensions (SSE, SSE2, SSE3, and SSSE3) technology, and EM64T (Intel 64 architecture) technology. These technologies are an extension to the Intel architecture that address the key characteristics of applications that must handle large amounts of image, video, and graphics data.

Intel Active Management Technology

With Intel's Active Management Technology (AMT), Matrox 4Sight GP can be accessed and managed remotely. The computer can be booted, the BIOS can be configured, and applications can be run on Matrox 4Sight GP, all from a separate computer. To get started with AMT, you need to connect your Matrox 4Sight GP to the network, and download Intel's manageability developer toolkit. To download the toolkit, which includes utilities to configure and access Matrox 4Sight GP using AMT, search Intel's website (http://software.intel.com/) for toolkit "AMT manageability developer toolkit".

You can also find additional information about Intel's Active Management Technology on this website.

1. Note that this technology is supported only when using the Intel PCH Q77 Express chipset along with either the Intel i5-3550S or the Intel i7-3770 processor.

Intel Quick Sync Video technology

The Intel i5-3550S and Intel i7-3770 processors use Intel Quick Sync Video (QSV) technology. QSV is used to perform image conversion, compression, and decompression.

When processing images with the Matrox Imaging Library (MIL), MIL detects whether the Intel processor has QSV technology. If QSV is included, MIL will use the hardware to perform image conversion, compression, and decompression. These operations are significantly accelerated with QSV.

Caches

The processor installed in your Matrox 4Sight GP has level 1 (L1), level 2 (L2), and level 3 (L3) caches.

- With the Intel Celeron G540 processor:
  - Level 1 cache: one 64-Kbyte, non-blocking cache per core (separated into a 32-Kbyte data cache and a 32-Kbyte instruction cache).
  - Level 2 cache: one 256-Kbyte, non-blocking cache per core.
  - Level 3 cache: one 2-Mbyte, shared, non-blocking cache.
- With the Intel i5-3550S and Intel i7-3770 processor:
  - Level 1 cache: one 64-Kbyte, non-blocking cache per core (separated into a 32-Kbyte data cache and a 32-Kbyte instruction cache).
  - Level 2 cache: four 256-Kbyte, non-blocking caches per core.
  - Level 3 cache: one 6-Mbyte (Intel i5-3550S), or one 8-Mbyte (Intel i7-3770) shared, non-blocking cache with virtualization technology.

Display

Display capabilities in your Matrox 4Sight GP are made possible due to the processor's integrated graphics controller. Matrox 4Sight GP supports output to two devices at a time.

Graphics controller

The processor's graphics controller transmits graphics data to display devices through the PCH chipset. The chipset has two display outputs:

- **A Serial Digital Video Output (SDVO).** The SDVO allows you to connect a digital display device such as a digital flat panel.

- **A random access memory digital-to-analog converter (RAMDAC) output.** The 340 MHz RAMDAC output generates analog signals to drive a high-resolution analog display device.

The processor uses up to 1760 Mbytes of computer memory to store display data.

Video encoder

The Intel PCH chipset contains a video encoder, which uses transition minimized differential signaling (TMDS) to transmit digital data through the digital visual interface (DVI-D). This encoder is driven by the processor's graphics controller.

RAM

On the motherboard, RAM is installed into one or both 204-pin SO-DIMM slots. Each slot supports a PC3-12800 compliant, unbuffered DDR3 SDRAM module, up to 8 Gbyte in size. The SDRAM modules will run at 1600 MHz[1] if either the Intel i5-3550S or Intel i7-3770 processor is installed. The SDRAM modules will run at 1067 MHz if the Intel Celeron G540 processor is installed.

1. The memory will run at the specified speed if the modules are DDR3 SDRAM 1600 MHz memory modules.

BIOS

The basic input/output system (BIOS) is the interface between the operating system and the hardware. Its data, crucial to the proper functioning of the hardware, is stored in a flash memory device which sits on the Matrox 4Sight GP motherboard.

The capabilities of the BIOS flash memory chips are similar to that of electrically-erasable programmable read-only memory (EEPROM), in that they can be erased and re-written, as well as hold their content without power. This flash memory chip is limited to 10000 write cycles.

The BIOS Setup program allows you to reconfigure the BIOS to your specifications. It is accessed by pressing the **Esc** key at startup, during power-on self-test (POST). For more information on the BIOS Setup utility, refer to *Appendix A: BIOS reference*.

Mass storage

To store data, the Matrox 4Sight GP unit features a 2.5-inch hard disk drive, with a minimum storage capacity of 250 Gbytes. It is connected to one of the 7-pin SATA connectors on the motherboard. A second hard disk drive can also be connected to the motherboard, via the second 7-pin SATA connector.

The hard disk drive is resistant to small and medium shocks or vibration, but can be permanently damaged if subjected to excessive forces.

I/O interfaces

The Matrox 4Sight GP unit integrates the following I/O interfaces:

- Four USB 3.0 ports (USB 3.0, 2.0 and 1.1 compatible) and two USB 2.0 ports (USB 2.0 and 1.1 compatible) connected to a USB header.
- Two Gigabit Ethernet networking interfaces.
- Two PCIe interfaces.
- One DVI-I port and one DVI-D port.
- One audio interface that supports one audio input and one audio output.
- One auxiliary I/O connector (which supports 16 auxiliary input signals and 16 auxiliary output signals).

USB interfaces

The universal serial bus (USB) is a serial bus standard for interconnecting peripherals. A single USB interface can support up to 127 devices.

Matrox 4Sight GP is equipped with four high-speed USB 3.0 interfaces running at 4.8 Gbits/s. These USB 3.0 interfaces support high-speed peripherals (such as an external hard disk drive, a USB-connected CD/DVD drive, or a printer) as well as low-speed peripherals (such as a keyboard or a mouse).

Matrox 4Sight GP is also equipped with a USB header, connected to the two USB connectors on the front panel of the chassis.

Networking interfaces

The networking capabilities of Matrox 4Sight GP are met by two Gigabit Ethernet networking interfaces that support the 10/100/1000 BaseT Ethernet standards.

A standard 10/100/1000 BaseT Ethernet controller is built into the Intel PCH chip, providing high transfer rates to and from memory.

The four network LEDs (two LEDs above each Ethernet connector) on the back panel provide transmission and reception information. The following table describes the two LEDs:

LED	Description
Activity/Link LED	Turns yellow when connected to a network.
	Blinks whenever packets are being transmitted or received.
	Turns off when no network connection is present.
10/100/1000 LED	Turns orange when operating in 1000 BaseT mode.
	Turns green when operating in 100 BaseT mode.
	Turns off when one of the following conditions is true: • No network connection is present. • The unit is operating in 10 BaseT mode. If the unit is operating in 10 BaseT mode, the Activity/Link LED will be solid yellow or blinking.

The LEDs can be seen in the illustration in the *Light emitting diodes (LEDs)* section, in *Chapter 2: Getting started with your Matrox 4Sight GP unit*.

PCIe interfaces

The Matrox 4Sight GP motherboard has connectors that provide a x16 PCIe 3.0 interface and a x8 PCIe 2.0 interface. These interfaces allow you to connect one or two Matrox (or third-party) full-height, half-length x1, x4, x8, or x16 PCIe boards to your Matrox 4Sight GP.

Note that the x8 PCIe slot supports x1 or x4 electrical connections. If you install a x8 PCIe board in the x8 PCIe slot, the x8 PCIe board will operate at a maximum of x4 PCIe.

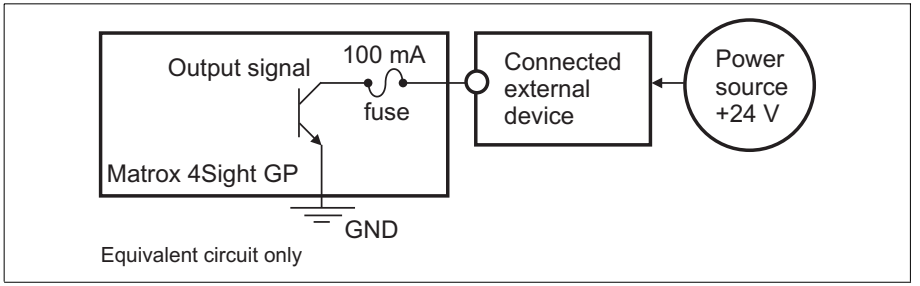
Audio interface

The Matrox 4Sight GP unit supports an audio interface, with one 24-bit stereo audio input and one 24-bit stereo audio output. The interface is only designed for line input/output operations. Since there is no output amplifier or input preamplifier, it will not support speakers or microphones.

Auxiliary I/O interface

The Matrox 4Sight GP unit has an auxiliary I/O interface, composed of 32 independent auxiliary sink-driver signals; 16 of which can be used to receive application-specific user input, and 16 of which can be used to transmit application-specific user output.

For input signals, the voltage range for a logical "1" is 2.4 - 24 V, and the voltage range for a logical "0" is 0 - 0.8 V. For output signals, a logical "1" is a sink to ground (100 mA maximum) that is fuse-protected up to 24 V; a logical "0" is an open circuit.



If you want to start or stop an external event based on some calculation or analysis, you can manually set the state of any auxiliary output signal. To do so, you set the state (on/off) of a bit in a user settable register (static-user-output register). When the bit is on, the circuit of the corresponding auxiliary output signal is grounded and the current flows from the connected device to your Matrox 4Sight GP; when the bit is off, the circuit of the signal is open (the observed voltage will be pulled high if pulled high by the connected circuitry). This bit is referred to as a user-bit. To change the state of a user-bit to control an auxiliary output signal, use the MIL-Lite function **MsysControl**() with **M_IO_SOURCE** and **M_USER_BITn**; to set the state of a user-bit, use **MsysControl**() with **M_USER_BIT_STATE**.

Your application can also act upon and interpret the state of an auxiliary input signal. The state of an auxiliary input signal is not associate with a user-bit; you poll the state of the signal directly. To poll the state of an auxiliary input signal, use **MsysInquire**() with **M_IO_STATUS.** The state of an auxiliary input signal can also generate an interrupt; to do so, use **MsysControl**() with **M_IO_INTERRUPT_STATE** and then use **MdigHookFunction**() with **M_IO_CHANGE** to hook a function to this event (that is, to set up an event handler).

Power supply, fans, air filter and chassis

Your Matrox 4Sight GP unit includes a power supply, two fans, and a chassis. The fans and the power supply are installed inside the metal chassis, and an appropriate power cord is included with the power supply.

Power supply

Matrox 4Sight GP features an internal, universal ATX power supply with the following specifications:

- Input:
  - 100-240 V_{ac} (+/- 10% tolerance).
  - Frequency range: 47-63 Hz.
  - Steady-state current: 4.5 A/2 A at any low/high input voltage range.
  - Inrush current: 60/100 A @ 115/230 VAC (at 25°C ambient, cold start)
  - Active power factor correction.
- Output:
  - 300 W total, which is used to power all components connected to the motherboard, including any PCIe boards that you install.
  - Processor consumption: 77 W (TDP).

Fans

The fans, which are used to cool the unit, operate at speeds controlled by the on-board fan controller, based on the temperatures of the processor and the motherboard. Note that when the unit is first turned on, or restarted, the fans will initially operate at their maximum speed.

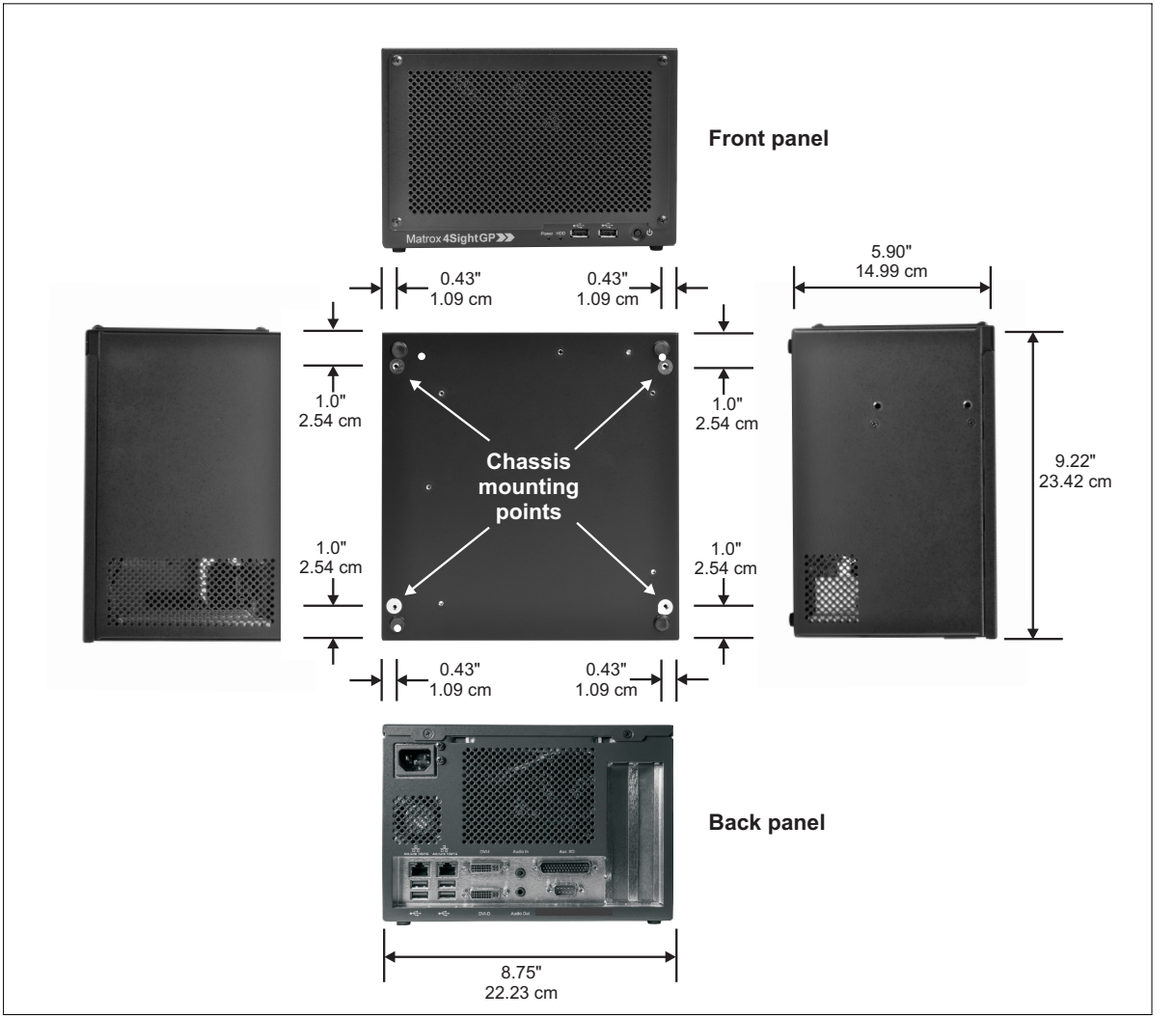
Air filter

The Matrox 4Sight GP unit contains a UL 94 HF-1, UL 900-certified, quadrafoam air filter.

The air filter will need to be cleaned and replaced on a regular basis. If you operate your Matrox 4Sight GP in a dusty environment, you might notice that the unit is overheating, or that the fan is running faster and noisier than usual. These are indicators that the filter needs replacing. For information on how to remove the air filter to clean or replace it, refer to the *Cleaning and replacing the air filter* section, in *Chapter 3: Changing the air filter and adding devices to Matrox 4Sight GP*

Chassis

The Matrox 4Sight GP chassis encloses the Matrox 4Sight GP motherboard, one 2.5 inch storage device (hard disk drive), one or two SO-DIMM memory modules, the power supply, and two fans. Mounting points on the chassis allow the unit to be secured to other equipment.



Important Note that you should use model #6-32 UNC screws (or screws of similar length and specifications) for mounting the Matrox 4Sight GP unit to other equipment. The recommended length of the screws is 1/8" (0.125") or 3.2 mm (0.32 cm).

Power management and temperature control

ACPI technology

Matrox 4Sight GP is compliant with advanced configuration and power interface (ACPI) technology. This technology monitors how the BIOS, operating system, and peripheral devices communicate with each other about power usage. ACPI allows the Matrox 4Sight GP unit to conserve energy by transitioning unused devices into lower power states. ACPI components gather information about power consumption from the unit and pass this information onto the operating system. The operating system then manages power to the unit's different components on an as-needed basis.

The ACPI features implemented in the Matrox 4Sight GP unit include:

- The ability for the unit to perform a complete shut-down, in which it will be powered off automatically.
- Support for an S4 sleeping state, for which the operating system can be enabled or disabled to automatically wake the unit from hibernation mode.
- Support for processor power management.
- Support for temperature management using active and passive cooling techniques.

Enhanced Intel SpeedStep technology

The Intel i7, i5, and Celeron processors use Enhanced Intel SpeedStep technology (EIST) to enable very high performance while also meeting the power-conservation needs of the Matrox 4Sight GP unit. The operating system dynamically adjusts processor voltage and core frequency (CPU speed) based on the CPU's demand for processing power. This results in decreased average power consumption and decreased average heat production.

For more information on configuring ACPI and EIST for the Matrox 4Sight GP unit, refer to *Appendix A: BIOS reference*.

Appendix A: BIOS reference

This appendix describes the BIOS Setup Utility.

Overview

BIOS stands for basic input/output system. It acts as an interface between the operating system and the hardware. When the unit is turned on, it is the BIOS that is responsible for booting up the unit, and loading the operating system that is used to run applications. The computer BIOS is written on a flash memory chip installed on the Matrox 4Sight GP motherboard.

You can change computer BIOS settings by running a program called the BIOS Setup Utility, which can be accessed soon after turning on the unit[1]. When you save these BIOS settings, they are saved to the BIOS flash memory chip.

This appendix shows you how to access and change the settings of the BIOS Setup Utility.

❖ Note that the Matrox 4Sight GP unit uses a BIOS written by Insyde Software Corp. Some of the menu items are not applicable to the supported operating systems of the Matrox 4Sight GP unit.

1. Note that most of the settings of the BIOS Setup Utility have been optimally configured to the specifications of Matrox 4Sight GP. However, you might need to change certain settings if you make additions to the unit.

The BIOS Setup Utility

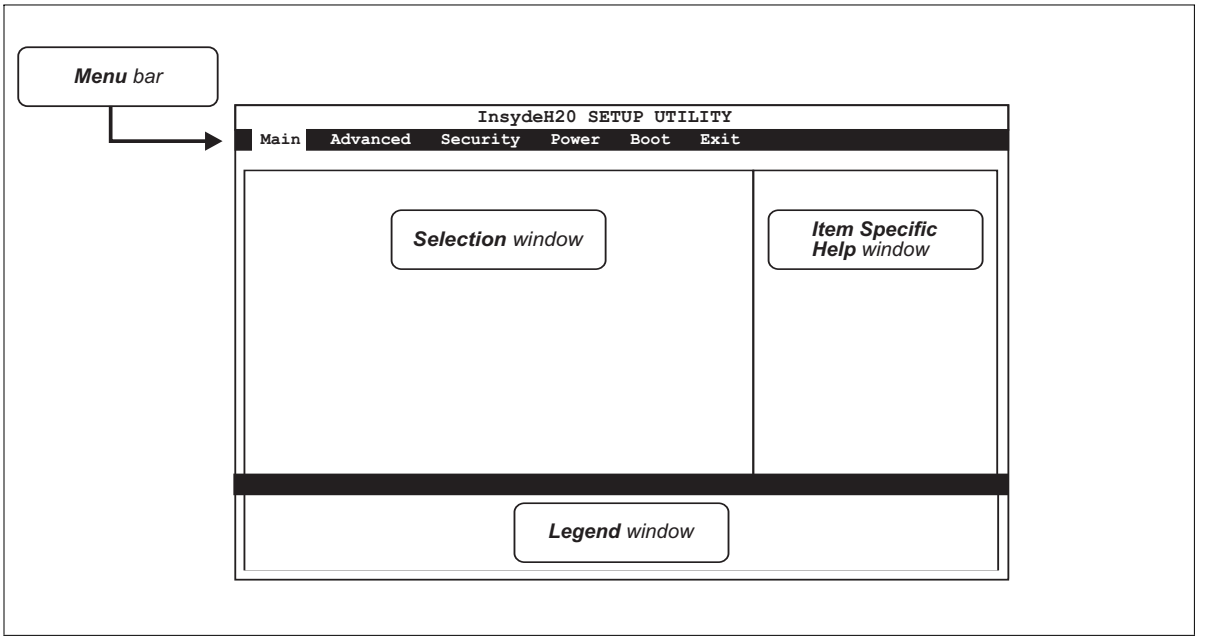
The BIOS Setup Utility allows you to modify certain hardware settings. The default settings are suitable in most cases, but under some circumstances, you might need to change them.

Entering the BIOS Setup Utility

To enter the BIOS Setup Utility, turn on Matrox 4Sight GP and press the **Esc** key during power-on self-test (POST). You only have a few moments to press this key before the boot-up process continues.

On the front page screen, use the arrow keys to highlight the box for SCU (System Configuration Utility), referred to in this manual as the BIOS Setup Utility. Press the **Enter** key to select this box.

Upon entering the BIOS Setup Utility, the items of the **Main** menu are displayed in the workspace. The workspace is divided into four sections: the **Menu** bar, the **Legend** window, the **Selection** window, and the **Item Specific Help** window.



The Menu bar

The **Menu** bar displays the following options:

Menu Bar Options	Description
Main	Configures basic computer properties.
Advanced	Configures advanced computer properties.
Security	Configures access to the BIOS Setup Utility and computer.
Power	Configures the power management options.
Boot	Configures various boot-up properties.
Exit	Saves or discards any new configuration changes.

Each **Menu** bar option represents a different configuration menu. You can choose among the different menus using the **Left** and **Right** arrow keys.

The Legend window

When you choose a specific menu, the **Legend** window provides a list of the keys necessary to navigate through that specific menu and its submenu(s) and items. To access the list of all navigation keys available in the BIOS Setup Utility, press **F1.** The following table lists all the navigation keys and describes their uses:

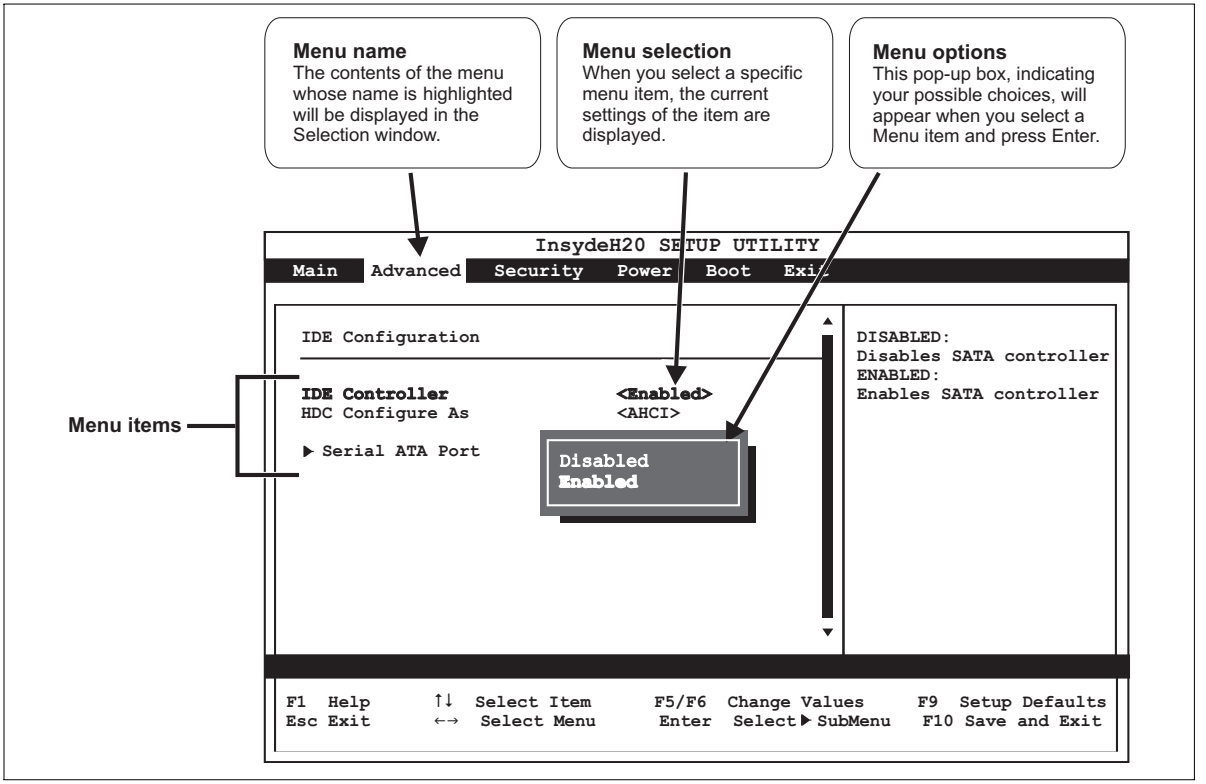
Key	Function
Esc	Performs one of the following, depending on the context: discards changes to a menu item, exits the current menu item, or exits the BIOS Setup Utility.
← or → arrows	Selects a different menu (does not work if you are in a submenu or sub-submenu).
↑ or ↓ arrows	Moves the cursor up or down.
+ or – keys	Increases or decreases the number.
F1	Displays the General Help window.
F5 or F6	Changes the current value.
F9	Loads the optimal default values for all menus.
F10	Saves all changes, exits the BIOS Setup Utility, and reboots the unit.
Enter	Performs one of the following, depending on the context: selects a submenu or sub-submenu, displays all options for the selection, or executes the selected configuration.

The Selection window

When a menu is selected, its name will appear highlighted in the menu bar and its menu items will be displayed with blue text in the **Selection** window. Within each menu, you can use the **Up** and **Down** keys to select the different items of the menu. The selected item will have its name highlighted in white.

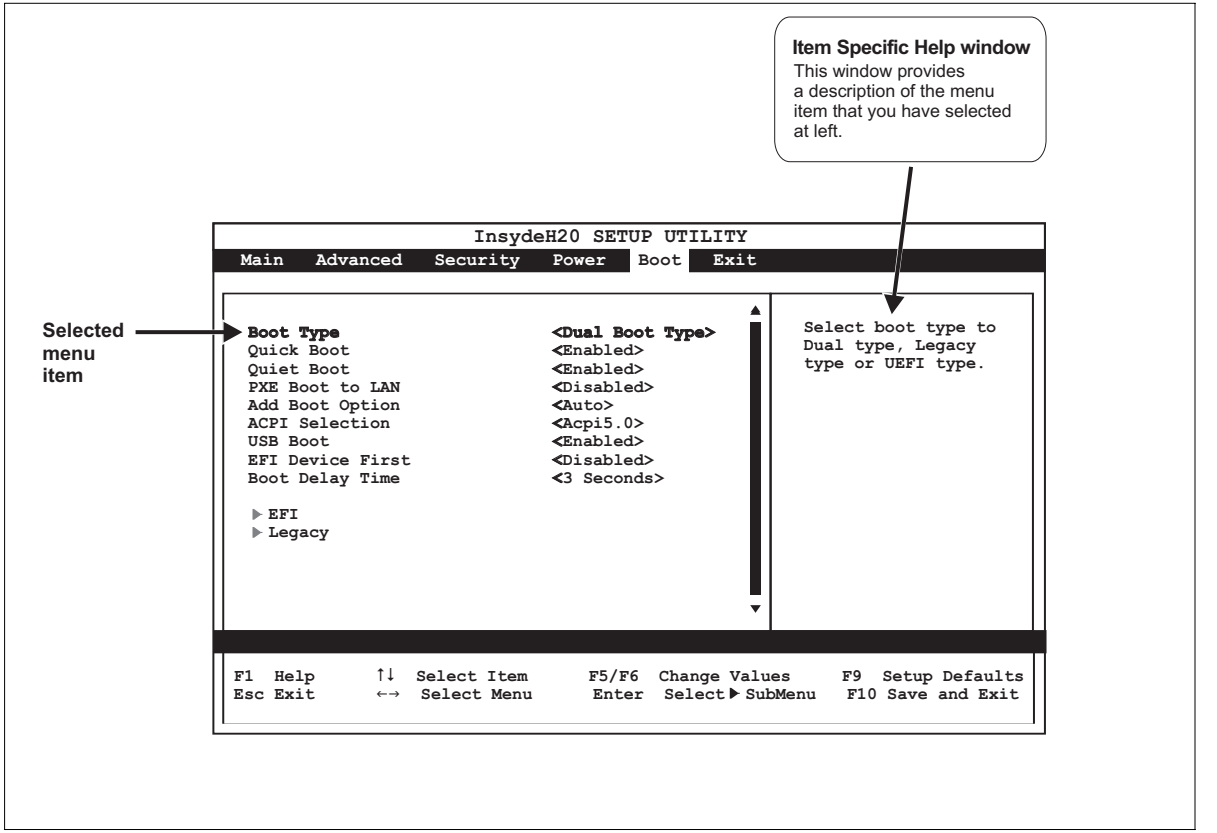
❖ A pointer (▶) next to a menu item marks the presence of a submenu. Press the **Enter** key to access the submenu when it is highlighted.

❖ Menu items in gray cannot be changed by the BIOS Setup Utility (unless otherwise specified in their description); only items in blue can be changed.



The Item Specific Help window

The **Item Specific Help** window provides a description of the selected menu item (the menu item in white), and in less obvious cases provides an explanation of the different settings of this item.



Default options

There are two sets of default options for items in the BIOS Setup Utility: custom defaults and optimal defaults.

For more information about custom defaults and optimal defaults, see the *Exit menu* section later in this appendix.

❖ Note that in the following pages, the optimal default option for a specific item is indicated with an asterisk (*).

Main menu

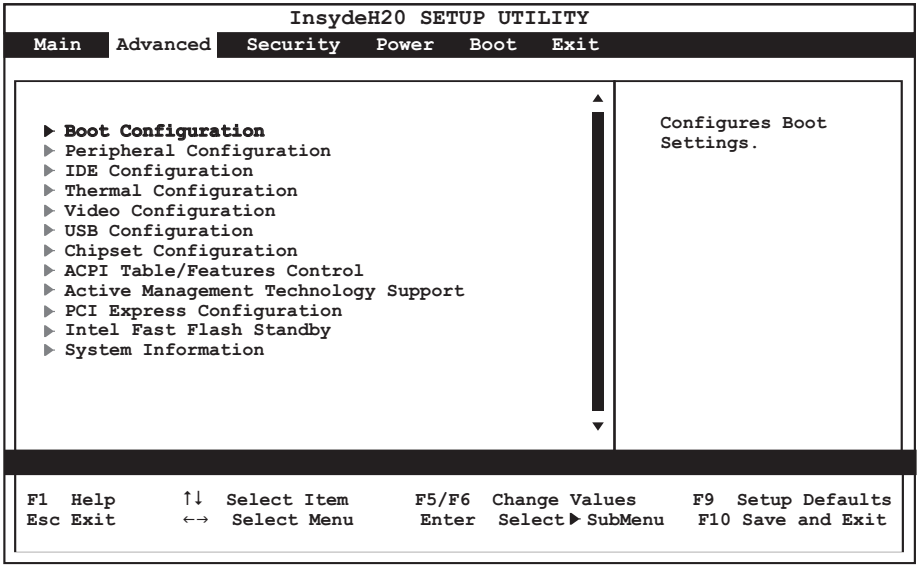
This section describes all the items of the **Main** menu. Refer to the section entitled *The Legend window* for guidelines on navigating within this menu.

Other than **Language**, **System Time,** and **System Date**, the items in this menu cannot be changed in the BIOS Setup Utility.

Item		Meaning
	Options	
InsydeH20 Version		This item reports the Insyde Corporation's Basic Input/Output System (BIOS) version number.
Processor Type		This item reports the processor name, as well as the CPU speed, in GHz.
System Bus Speed		This item reports the system bus speed, in MHz.
System Memory Speed		This item reports the system memory speed, in MHz.
Cache RAM		This item reports the amount of cache RAM, in Kbytes.
Total Memory		This item reports the total RAM installed, in Mbytes.
	Channel A	This item reports the amount of RAM installed in the first slot on the motherboard, in Mbytes. If memory is not installed, it is reported as **[Not Installed].**
	Channel B	This item reports the amount of RAM installed in the second slot on the motherboard, in Mbytes. If memory is not installed, it is reported as **[Not Installed].**
Platform Configuration		This item reports computer information, including the number of processor cores, the number of threads supported, the vBIOS (video BIOS) version, and whether Intel's Virtualization Technologies (Intel Vt-d and Intel VMX), Extension (SMX) Technology and Intel's Trusted Execution Technology (TXT) are supported or not.
Language		This item allows you to change the language used by the BIOS. Changing the BIOS language setting will only affect the BIOS menus. It does not allow you to change the language that the operating system uses.
System Time		This item allows you to change the time in HH:MM:SS format: • To alternate between fields, press the **Enter** key. • To increase the value of each field by 1, press the + key. • To decrease the value of each field by 1, press the - key. You can also set the hour, minute, and second fields by typing in their values.
	HH:MM:SS	
System Date		This item allows you to change the date in MM/DD/YYYY format: • To alternate between fields, press the **Enter** key. • To increase the value of each field by 1, press the + key. • To decrease the value of each field by 1, press the - key. You can also set the month, date, and year fields by typing in their values.
	MM/DD/YYYY	

Advanced menu

This section describes all the items of the **Advanced** menu. Refer to the section entitled *The Legend window* for guidelines on navigating within this menu.



Note that all optimal default options have an asterisk * next to them.

Boot Configuration submenu

The **Boot Configuration** submenu allows you to configure boot settings.

Item		Meaning
	Options	
Numlock		This item allows you to turn NumLock mode on and off. The state of Numlock mode determines whether the numeric keys or the cursor (arrow) keys on the keypad are active after bootup. The **On** option causes the numeric keys on the keypad to be active. The **Off** option causes the arrow keys on the keypad to be active. Note that this item is only an initial setting. After bootup, you can activate or deactivate the numeric keys on the keypad by pressing the numlock key on the keyboard.
	Off On*	
Device Detection Delay		This item allows you to set a delay when detecting devices from which to boot. Matrox 4Sight GP will wait a set amount of time before attempting to detect devices.
	Disabled* 250 ms 500 ms 1 s 2 s	

Peripheral Configuration submenu

The **Peripheral Configuration** submenu allows you to configure the controllers related to various peripheral devices that are connected to Matrox 4Sight GP.

Item		Meaning
	Options	
Azalia		This item allows you to enable or disable the Intel High Definition Audio (HDA) controller.
	Disabled	By selecting **Disabled**, the audio controller will always be disabled.
	Enabled*	By selecting **Enabled**, the audio controller will always be enabled.
	Auto	By selecting **Auto**, the audio controller will be enabled if the controller is installed. Since the Azalia controller is already installed, selecting **Auto** is the same as selecting **Enabled.**

IDE Configuration submenu

The **IDE Configuration** submenu allows you to configure the different settings for the mass storage devices that are connected to the 7-pin SATA connectors on the Matrox 4Sight GP motherboard.

Important

Although the submenu is called "IDE", the items of this submenu control the mass storage devices (connected directly to the motherboard) that have 7-pin SATA connectors.

Item		Meaning
	Options	
IDE Controller		This item allows you to enable or disable the SATA controllers.
	Disabled Enabled*	By selecting **Disabled**, the BIOS and the operating system will not detect mass storage devices connected to the 7-pin SATA connectors. By selecting **Enabled**, you are specifying that the mass storage devices have 7-pin SATA connectors.
HDC Configure As		This item allows you to set the mode of the SATA controller.
	IDE AHCI* RAID	By selecting **IDE**, the SATA controller will operate in legacy (IDE) mode. SATA devices will be emulated as IDE devices. This option should be chosen for older operating systems that do not support AHCI. By selecting **AHCI**, the SATA controller will operate in AHCI mode. Operating systems such as Microsoft Windows XP, Microsoft Windows Vista, and Microsoft Windows Embedded Standard 7 support AHCI; devices will be configured as SATA devices that support AHCI. By selecting **RAID**, the SATA controller will operate in RAID mode. ❖The Matrox 4Sight GP unit comes with a SATA hard drive that supports AHCI; therefore, select **AHCI** (default).
Alternate ID		This item allows you to enable or disable the use of the alternate device ID for the RAID controller, if a RAID device is installed.
	Disabled* Enabled	By selecting **Disabled**, the normal RAID device ID will be used. By selecting **Enabled**, the alternate device ID will be used. This item will only appear in the list if **HDC Configure As** is set to **RAID**.

Serial ATA Port sub-submenus

The Serial ATA Port sub-submenus allow you to configure settings for each hard disk installed in the Matrox 4Sight GP unit.

Item Options	Meaning
Serial ATA Port 0 Serial ATA Port 1 Serial ATA Port 2 Serial ATA Port 3 Serial ATA Port 4 Serial ATA Port 5 Serial ATA Port 6 Serial ATA Port 7	These items report information about the SATA devices connected to the individual SATA ports. If there is no SATA device connected to an individual port, it is reported as **[Not Installed]**. If there is a SATA device connected to a port, the name of the device and the storage capacity of the device are reported. Port 0 is the bottom SATA connector when facing the front panel of the unit. It is the connector closest to the corner of the unit. Port 1 is above the port 0 connector when facing the front panel of the unit. Ports 2 to 7 are not present on the motherboard, and will never report that a device is installed.

Thermal Configuration submenu

The **Thermal Configuration** submenu allows you to configure thermal settings for the unit.

Platform Thermal Configuration sub-submenu

The **Platform Thermal Configuration** sub-submenu allows you to configure thermal settings, such as fan speeds and temperature thresholds.

Item			Meaning
Automatic Thermal Reporting			This item allows you to set whether the **Shut Down Temperature** and **Throttle On Temperature** items are configured automatically. By selecting **Disabled**, you can configure these options manually.
	Disabled Enabled*		
Shut Down Temperature			This item allows you to set the critical trip point. If the unit reaches this temperature, the operating system will shut down. This item only appears when **Automatic Thermal Reporting** is set to **Disabled.**
CPU Low Fan Speed			This item allows you to set the minimum speed of the CPU fan, as a percentage of the absolute maximum speed. For example, if you set this item to 30, the minimum speed that the fan will operate at is 30% of the absolute maximum speed.
CPU High Fan Speed			This item allows you to set the maximum speed of the CPU fan, as a percentage of the absolute maximum speed. For example, if you set this item to 70, the maximum speed that the fan will operate at is 70% of the absolute maximum speed.
CPU Low Fan Speed Temperature			This item allows you to set the lower threshold temperature for the CPU fan. Up to this temperature threshold, the CPU fan will run at its minimum speed (as set in the **CPU Low Fan Speed** item). When the unit's temperature increases past the lower threshold, the CPU fan speed will increase to its maximum speed (as set in the **CPU High Fan Speed** item) either immediately or gradually, depending on the setting of the **CPU Fan Speed Temperature Range** item.
	30 °C 35 °C 40 °C* 45 °C 50 °C	55 °C 60 °C 65 °C 70 °C	
CPU Fan Speed Temperature Range			This item allows you to set the temperature range in which the CPU fan speed will increase linearly from its minimum to its maximum (as set in the **CPU Low Fan Speed** and **CPU High Fan Speed** items, respectively). For example, if you set this item to 32 °C and you have set **CPU Low Fan Speed Temperature** to 40 °C, then the fan speed will increase linearly from its minimum to its maximum as the temperature increases from 40 °C to 72 °C.
	4 °C 5 °C 7 °C 8 °C 10 °C 13 °C 16 °C	20 °C 27 °C 32 °C* 40 °C 53 °C 80 °C	
System Low Fan Speed			This item allows you to set the minimum speed of the front panel fan (fan behind the front panel of the unit), as a percentage of the absolute maximum speed. For example, if you set this item to 30, the minimum speed that the fan will operate at is 30% of the absolute maximum speed.

Item			Meaning
System High Fan Speed			This item allows you to set the maximum speed of the front panel fan, as a percentage of the absolute maximum speed. For example, if you set this item to 70, the maximum speed that the fan will operate at is 70% of the absolute maximum speed.
System Low Fan Speed Temperature			This item allows you to set the lower threshold temperature for the front panel fan. Up to this temperature threshold, the front panel fan will run at its minimum speed (as set in the **System Low Fan Speed** item). When the unit's temperature increases past the lower threshold, the front panel fan speed will increase to its maximum speed (as set in the **System High Fan Speed** item) either immediately or gradually, depending on the setting of the **System Fan Speed Temperature Range** item.
	30 °C	55 °C	
	35 °C	60 °C	
	40 °C*	65 °C	
	45 °C	70 °C	
	50 °C		
System Fan Speed Temperature Range			This item allows you to set the temperature range in which the speed of the front panel fan will increase linearly from its minimum to its maximum (as set in the **System Low Fan Speed** and **System High Fan Speed** items, respectively). For example, if you set this item to 32 °C and you have set **System Low Fan Speed Temperature** to 40 °C, then the fan speed will increase linearly from its minimum to its maximum as the temperature increases from 40 °C to 72 °C.
	4 °C	20 °C	
	5 °C	27 °C	
	7 °C	32 °C*	
	8 °C	40 °C	
	10 °C	53 °C	
	13 °C	80 °C	
	16 °C		
Throttle On Temperature			This item allows you to set the temperature at which the operating system will activate throttling. This item only appears when **Automatic Thermal Reporting** is set to **Disabled.** Specify the temperature in degrees Celsius.
TC1			This item allows you to set the thermal constant TC1 for the Advanced Configuration and Power Interface (ACPI) Passive Cooling (CPU Throttle On) formula: $P[\%] = TC1 * (T_n - T_{n-1}) + TC2 * (T_n - T_t)$ where P[%] is the CPU performance change T_n is the current CPU temperature T_t is the target CPU temperature The operating system uses this formula to determine the reduction in power consumption necessary for a decrease in the unit's temperature.
TC2			This item allows you to set the thermal constant TC2 for the ACPI Passive Cooling (CPU Throttle On) formula.
TSP			This item allows you to set how often the operating system will read the temperature when Passive Cooling is on, in tenths of a second. Passive cooling is activated when the unit's temperature increases to the temperature set with **Throttle On Temperature.**

CPU Thermal Configuration sub-submenu

The **CPU Thermal Configuration** sub-submenu allows you to enable or disable clock throttling.

Item		Meaning
ACPI 3.0 T-States		This item allows you to enable or disable the Advanced Configuration and Power Interface (ACPI) 3.0 t-states (clock throttle states). This item should be set to **Disabled** (default).
	Disabled* Enabled	

Video Configuration submenu

The **Video Configuration** submenu allows you to configure the primary display device. This submenu also allows you to access the **Internal Graphic Device** and **PCIe Graphic Configuration** sub-submenus. These sub-submenus allow you to control settings related to the graphic devices.

Item		Meaning
Primary Display		This item allows you to select which graphics controller will be used to output display data. This item determines where the BIOS messages and the Microsoft Windows logo will be displayed on startup. By selecting **Auto**, the operating system will automatically select the best graphics controller to use. By selecting **IGFX**, the integrated graphics controller (IGFX) of the chipset will be used to output video data to a display device. The IGFX allows you to connect a digital display device to the unit's DVI-D or DVI-I port, and an analog display device to the unit's DVI-I port. By selecting **PEG** (PCI-Express graphics), the graphics controller on a PCIe-connected display board will be used to output video data to a display device. If you do not have a PCIe display board installed in the unit, the IGFX of the chipset will be used. ❖The Matrox 4Sight GP unit will typically not have a PCIe-connected display board installed (since it has an integrated graphics controller); therefore, select **IGFX** (default).
	Auto IGFX* PEG	

Internal Graphic Device sub-submenu

The **Internal Graphic Device** sub-submenu allows you to configure the integrated graphics controller.

Item		Meaning
Internal Graphics Device		This item allows you to enable or disable the integrated graphics controller.
	Auto* Enabled Disabled	
RC6 (Render Standby)		This item allows you to enable or disable render standby. By selecting **Enabled**, the amount of power sent to the integrated graphics controller will be reduced when the computer goes into sleep state. By selecting **Disabled**, the amount of power sent to the integrated graphics controller will not be reduced when the computer goes into sleep state.
	Disabled Enabled*	
Deep Render Standby		This item allows you to enable or disable deep render standby. Deep render standby is not affected by the setting in **RC6 (Render Standby).** If both items are set to **Enabled, Deep Render Standby** will be used. By selecting **Enabled**, the amount of power sent to the integrated graphics controller will be reduced (reduced further than with RC6 render standby) when the computer goes into sleep state. By selecting **Disabled**, the amount of power sent to the integrated graphics controller will not be reduced when the computer goes into sleep state.
	Disabled Enabled*	
IGD - GTT Size		This item allows you to select the size of the graphics translation table (GTT), in Mbytes. ❖This item should not be changed.
	1 MB 2 MB*	
IGD - Aperture Size		This item allows you to select the aperture size, in Mbytes. The aperture size is the amount of PCI memory allocated by the BIOS for the integrated graphics controller.
	128 MB 256 MB* 512 MB	
IGD - DVMT Pre-Allocated		This item allows you to select the amount of memory that will be reserved solely for the integrated graphics controller, in Mbytes.
	32 MB 64 MB* 96 MB 128 MB	
IGD - DVMT Size		This item allows you to select the maximum amount of display memory that can be accessed by the integrated graphics controller, in Mbytes. The amount of display memory required by the display driver will vary. The display driver will request additional memory from the operating system as required, and when the display driver is finished with this memory, it will be freed and returned to the operating system.
	128 MB 256 MB*	

PCI Express Graphic sub-submenu

The **PCIe Express Graphic** sub-submenu allows you to configure settings for a PCIe display board, if one is installed in your Matrox 4Sight GP.

Item		Meaning
PCIe Reset Delay		This item allows you to set the amount of time that the operating system will wait for a PCIe display board to initialize, in msec.
	Disabled 50 ms 100 ms* 200 ms 300 ms	
ASPM		This item allows you to choose whether active state power management (ASPM) is enabled for a PCIe-connected display board. By selecting **Disabled**, ASPM will be disabled for any PCIe-connected display board. By selecting any of the following options, ASPM is enabled. These settings are not recommended. By selecting **L0s**, ASPM will be enabled for a PCIe display board. The PCIe display board will be forced to power-saving state L0. This is the lowest power setting. By selecting **L1**, ASPM will be enabled for the PCIe display board. The PCIe display board will be forced to power-saving state L1. By selecting **L0sL1**, ASPM will be enabled for the PCIe display board. The operating system will set the power-saving state based on whether the slot is active or idle. ❖For Matrox 4Sight GP, it is strongly recommended that you set this item to **Disabled** (default).
	Disabled* L0s L1 L0sL1 Auto	
PEG0 - Gen X PEG1 - Gen X PEG2 - Gen X PEG3 - Gen X		These items allow you to configure the operating speed of a PCIe display board installed in the x16 PCIe slot. **PEG0** corresponds to the x16 PCIe slot. **PEG1**, **PEG2**, and **PEG3** are unused. By selecting **Auto**, the operating system will automatically select the best data transfer speed for the PCIe display board installed in the x16 PCIe slot. By selecting **Gen1**, the PCIe display board will transfer data at the speed of a Gen 1 PCIe board. This option should be selected if you experience problems running old Gen 1 boards. By selecting **Gen2**, the PCIe display board will transfer data at the speed of a Gen 2 PCIe board. By selecting **Gen3**, the PCIe display board will transfer data at the speed of a Gen 3 PCIe board. ❖Note that these items should not be changed.
	Auto* Gen1 Gen2 Gen3	
ASPM L0s		This item allows you to select whether ASPM power state L0 will be enabled on the PCIe integrated graphics controller, the PCIe display board, or both. By selecting **Root port only**, power state L0 will be enabled on the PCIe display controller on Matrox 4Sight GP. By selecting **Endpoint port only**, power state L0 will be enabled on the PCIe-connected display board. By selecting **Root & Endpoint ports**, power state L0 will be enabled on the PCIe-connected display board and on the PCIe display controller of Matrox 4Sight GP. This item only appears when the **ASPM** item is set to **L0s**.
	Root port only Endpoint port only Root & Endpoint ports*	

Item		Meaning
Always Enable PEG		This item allows you to set whether or not you can display using a PCIe display board. By selecting **Disabled**, it will not be possible to output data using a PCIe display board. ❖Matrox 4Sight GP will typically not have a PCIe display board installed (since it has an integrated graphics controller); therefore, select **Disabled** (default).
	Enabled Disabled*	

USB Configuration submenu

The **USB Configuration** submenu allows you to configure settings for the USB ports on the front and back panels of the Matrox 4Sight GP unit.

Item		Meaning
USB Legacy		This item allows you to set whether Matrox 4Sight GP can boot from a USB device. By selecting **Disabled**, the unit will not be able to boot from a USB device. By selecting **Enabled**, the unit will be able to boot from a USB device.
	Disabled Enabled*	
XHCI Pre-Boot Driver		This item allows you to enable or disable the driver for the USB xHCI controller. xHCI is the controller for the USB 3.0 ports on your Matrox 4Sight GP.
	Disabled Enabled*	
XHCI		This item allows you to configure the extensible host controller interface (xHCI). This item affects all USB 3.0 ports (all ports on the back panel of the unit). By selecting **Disabled**, the USB ports will always use EHCI. Selecting **Disabled** overrides the **HS Port Switch** item selection. By selecting **Enabled**, the USB ports will always use xHCI. By selecting **Auto**, the USB ports will use EHCI if the **XHCI Pre-Boot Driver** item is set to **Disabled**, or before the driver has a chance to load (for example, during a reboot). Otherwise, the USB ports will use xHCI. By selecting **Smart Auto**, the USB ports will use xHCI unless the xHCI driver is uninstalled. For Matrox 4Sight GP, selecting **Smart Auto** is the same as selecting **Enabled**.
	Disabled Enabled Auto* Smart Auto	
HS Port Switch 1 HS Port Switch 2 HS Port Switch 3 HS Port Switch 4		These items allow you to choose the type of controller used for each USB 3.0 port: xHCI or EHCI. Port switch 1, 2, 3, and 4 correspond to the top left, bottom left, top right, and bottom right USB ports on the back panel of the unit, respectively. By selecting **Disabled**, the port will always be routed to EHCI. By selecting **Enabled**, the port will always be routed to xHCI, unless the **XHCI** item is set to **Disabled**. Unless specific compatibility issues are noted when using older USB devices, leave this item set to **Enabled** (default).
	For each USB 3.0 Port: Disabled Enabled*	
XHCI Streams		This item allows you to enable or disable xHCI streams. By selecting **Disabled**, high speed data transfer will be disabled on the USB 3.0 ports. By selecting **Enabled**, high speed data transfer will be enabled on the USB 3.0 ports.
	Disabled Enabled*	

Item		Meaning
EHCI 1 EHCI 2		These items allow you to enable or disable each of the EHCI (enhanced Host controller interface) controllers. When EHCI is enabled, USB 2.0 devices can operate at the highest possible speeds. EHCI controller 1 refers to the USB port on the left on the front panel of the unit. EHCI controller 2 refers to the USB port on the right. The operating system installed in your Matrox 4Sight GP (Microsoft Windows Embedded Standard 7) supports EHCI controllers for USB devices. Unless specific compatibility issues are noted when using older USB devices, leave this item set to **Enabled** (default).
	For each controller: Disabled Enabled*	
Per-Port Control		This item allows you to enable or disable individual USB port control. By selecting **Enabled**, you can enable or disable USB ports separately. By selecting **Disabled**, you will not be able to enable or disable USB ports separately.
	Disabled* Enabled	
USB Port 0 USB Port 1 USB Port 2 USB Port 3 USB Port 4 USB Port 5		These items allow you to individually enable or disable each USB port. These items only appear when **Pre-Port Control** is set to **Enabled.** Ports 0, 1, 2, and 3 correspond to the top left, bottom left, top right, and bottom right USB ports on the back of the unit, respectively. Ports 4 and 5 correspond to the left and right USB ports on the front panel of the unit, respectively.
	For each USB port: Enabled* Disabled	
USB RMH Mode		This item reports the state of the **USB RMH1 Enable** item (shown below). Rate matching hub (RMH) mode is either enabled or disabled. RMH mode allows the computer to decrease the power consumed during USB data transmission.
USB RMH1 Enable		This item allows you to enable or disable RMH mode for the USB ports on the Matrox 4Sight GP motherboard.
	Disabled Enabled*	

Chipset Configuration submenu

The **Chipset Configuration** submenu allows you to set advanced chipset options.

Warning Setting the wrong values in the items below might cause the unit to malfunction.

Item		Meaning
	Options	
VT-d		This item allows you to enable or disable virtual machines (running within the operating system of your Matrox 4Sight GP) to have full access to all the peripheral devices connected to your Matrox 4Sight GP.
	Disabled Enabled*	
Interrupt Remapping		This item allows you to enable or disable the remapping of interrupts so that a virtual machine has full access to the interrupt requests generated by its connected I/O devices.
	Disabled* Enabled	
Pass-Through DMA		This item allows you to enable or disable the virtual machine's direct-memory access (DMA) requests.
	Disabled* Enabled	
CHAP DEVICE		This item allows you to enable or disable the CHAP device. This device is used for network communication.
	Disabled* Enabled	
DEVICE 4		This item allows you to enable or disable the secondary thermal device.
	Disabled* Enabled	
Scrambler		This item allows you to enable or disable scrambling (encoding) when sending messages over the network.
	Disabled Enabled*	
Memory Frequency		This item allows you to set the operating speed of DDR3 memory modules, in MHz. If a fixed speed is set and the memory module and/or the processor don't support such speeds, your unit might be unusable or might not function reliably. ❖For Matrox 4Sight GP, it is strongly recommended that you set this item to **Auto** (default).
	Auto* 1067 1333 1600 1867 2133	

Item		Meaning
	Options	
AC Lost Control		This item allows you to select the unit's response when power is re-applied to the unit after a power loss (for example, an unplugged power cable). By selecting **Off,** the unit will stay powered off when power is re-applied after a power failure. By selecting **On,** the unit will power on when power is re-applied after a power failure. By selecting **Last state,** the unit will return to its last state when power is re-applied after a power failure. If power had been on before the power failure, the unit will power on. If power had been off before the power failure, the unit will stay powered off.
	On Off Last State*	
Max TOLUD		This item allows you to set the maximum value of TOLUD. TOLUD is the amount of RAM below the PCI memory-mapped range. The higher TOLUD is, the more RAM is available to the operating system, if the operating system is a 32-bit operating system. By selecting **Dynamic,** TOLUD automatically adjusts, based on the memory range reserved for I/O devices in the chipset's integrated graphics controller. Selecting **Dynamic** allows the operating system to access the most RAM possible (up to 4 Gbytes). This is the recommended setting. If your operating system is a 32-bit operating system, and if you set **Max TOLUD** below the amount of MIL non-paged reserved memory, you will encounter problems. The version of Windows Embedded Standard installed in Matrox 4Sight GP is a 64-bit operating system, therefore **Max TOLUD** will not affect the MIL reserved memory.
	Dynamic* 1 GB 1.25 GB 1.5 GB 1.75 GB 2 GB 2.25 GB 2.5 GB 2.75 GB 3.0 GB 3.25 GB	

ACPI Table/Features Control submenu

The **ACPI Table/Features Control** submenu allows you to control hibernation mode and set options of the Advanced Configuration and Power Interface (ACPI).

Item		Meaning
	Options	
FACP - RTC S4 Wakeup		This item allows you to enable or disable the timer-controlled wake up from sleep mode S4. S4 mode is also known as hibernation, sleep state S4, or suspend to disk. By selecting **Disabled**, it will not be possible to wake the operating system from S4 sleep mode using an operating system alarm. By selecting **Enabled**, the operating system will wake up from S4 sleep mode at the time set in the operating system alarm.
	Disabled Enabled*	
APIC - IO APIC Mode		This item allows you to enable or disable the use of the input/output ACPI advanced programmable interrupt controller (APIC). APIC provides more IRQs and faster interrupt handling. ❖APIC is supported by Microsoft Windows Embedded Standard 7, and it is recommended that users of this operating system set this item to **Enabled** (default).
	Disabled Enabled*	
TCO WatchDog Support		This item allows you to enable or disable the Intel chipset watchdog. The watchdog automatically reboots your computer when, for some reason, your computer hangs for longer than a predetermined amount of time. You cannot set the chipset watchdog timer. ❖This item should be set to **Enabled** (default).
	Disabled Enabled*	
WatchDog ACPI Table		This item allows you to enable or disable the watchdog ACPI table (WDAT). This table contains information that the operating system uses to locate and correctly utilize the watchdog timer hardware.
	Disabled Enabled*	

Active Management Technology Support submenu

The **Active Management Technology Support** submenu allows you to configure settings for Intel's Active Management Technology. This technology is used to connect to a computer remotely, in order to configure computer or BIOS settings, to debug issues, or to initiate events or applications. For more information on AMT, or the following BIOS options, search Intel's website (http://www.intel.com/) for Active Management Technology.

Item	Options	Meaning
Intel AMT Support		This item allows you to enable or disable Intel Active Management Technology (AMT) support. ✥Note that the AMT hardware is always enabled. This item enables and disables the use of Intel AMT.
	Disabled Enabled*	
Intel AMT Setup Prompt		This item allows you to enable or disable the prompt that will appear on POST. This prompt allows the user to press a key, to enter the AMT setup.
	Disabled Enabled*	
MEBx Selection Screen		This item allows you to enable or disable the Management Engine BIOS Extension (MEBx) selection screen.
	Disabled* Enabled	
Verbose MEBx Output		This item allows you to enable or disable verbose MEBx output.
	Disabled Enabled*	
Hide Un-Configure ME Confirmation		This item allows you to enable or disable the password prompt after resetting MEBx using **Un-Configure MEBx**.
	Disabled* Enabled	
MEBx Debug Message Output		This item allows you to enable or disable the output of MEBx debug messages.
	Disabled* Enabled	
Un-Configure MEBx		This item allows you to reset the MEBx configuration. By selecting **Enabled**, MEBx configuration settings will be reset.
	Disabled* Enabled	
Intel AMT Password Write		This item allows you to lock the password for Intel AMT. By selecting **Enabled**, you can edit the password. By selecting **Disabled**, the password will be locked.
	Disabled Enabled*	
AMT Wait Timer		This item allows you to set a delay, in seconds, that the BIOS waits before sending an ASF_GET_BOOT_OPTIONS message to AMT.
	0 seconds*	

Item		Meaning
	Options	
AMT CIRA Request Trig		This item allows you to enable or disable a Client Initiated Remote Access (CIRA) boot.
	Disabled* Enabled	
USB Configure		This item allows you to enable or disable configuration of AMT via a USB flash memory device.
	Disabled Enabled*	
PET Progress		This item allows you to enable or disable receiving Platform Event Trap (PET) events.
	Disabled Enabled*	
AMT CIRA Timerout		This item allows you to set the time that the operating system will wait for an MPS (Management Presence Server) connection to be established before timing out.
ASF Support		This item allows you to enable or disable alert specification format (ASF). If you select **Disabled,** some aspects of AMT will become unavailable.
	Disabled Enabled*	
Watchdog Support		This item allows you to enable or disable the watchdog timer.
	Disabled* Enabled	
OS Timer		This item reports the amount of time, in seconds, used by the watchdog timer when the operating system executes. This item is not settable.
BIOS Timer		This item reports the amount of time, in seconds, used by the watchdog timer when the BIOS executes. This item is not settable.

PCI Express Configuration submenu

The **PCI Express Configuration** submenu allows you to access the **PCI Express Root Port** sub-submenus. There is a sub-submenu for each PCI port.

Item	Options	Meaning
PCIe Port assigned to LAN		This item reports the PCIe port that is assigned to the LAN.

PCI Express Root Port sub-submenu

The **PCI Express Root Port** sub-submenu allows you to set options for the x8 PCIe slot, the auxiliary I/O connector, and the Ethernet controller.

Item	Options	Meaning
PCI Express Root Port 1 PCI Express Root Port 5 PCI Express Root Port 6 PCI Express Root Port 8	For each port: Disabled Enabled*	These items allow you to enable or disable the specified port. If a specific port is disabled, you cannot transmit/receive data on that port. Port 1 corresponds to the x8 PCIe connector. Port 5 is unused. Port 6 corresponds to the auxiliary I/O connector. Port 8 corresponds to the Ethernet controller. ❖Note that these items should not be changed.
Automatic ASPM	For each port: Disabled* L0s L1 L0sL1 Auto	This item allows you to enable or disable ASPM (active state power management) for the specified connector. By selecting **Disabled**, ASPM will be disabled for the connector. By selecting any of the following options, ASPM is enabled. These settings are not recommended. By selecting **L0s**, ASPM will be enabled for the connector. The connector will be forced to power-saving state L0 when the connector is idle. This is the lowest power setting. By selecting **L1**, ASPM will be enabled for the connector. The connector will be forced to power-saving state L1 when the connector is idle. By selecting **L0sL1**, ASPM will be enabled for the connector. The operating system will set the power-saving state based on whether the connector is active or idle. ❖For Matrox 4Sight GP, it is strongly recommended that you set this item to **Disabled** (default).
PCIe Speed	For each port: Auto* Gen1 Gen2	This item allows you to configure the speed of a PCIe-connected board. This is only applicable to the x8 PCIe slot (port 1). By selecting **Auto**, Matrox 4Sight GP will automatically configure the speed at which the PCIe board can transfer data. By selecting **Gen1**, the PCIe board will transfer data at the speed of a Gen 1 PCIe board. This option should be selected if you experience problems running old Gen 1 boards. By selecting **Gen2**, the PCIe board will transfer data at the speed of a Gen 2 PCIe board. ❖Note that this item should not be changed.

Intel Fast Flash Standby submenu

The **Intel Fast Flash Standby** submenu allows you to enable or disable the Intel Fast Flash Standby (IFFS) feature. Intel Fast Flash Standby decreases the amount of time required to boot from sleep and hibernation modes. It also enables the operating system to wake for brief periods of time during sleep modes to download updates.

Item		Meaning
iFFS Support		This item allows you to enable or disable the iFFS feature.
	Enabled Disabled*	
Entry on S3 RTC Wake		This item allows you to enable or disable iFFS startup after the operating system wakes from sleep state S3. Sleep state S3 is also known as standby, sleep, or suspend to RAM.
	Enabled* Disabled	
Entry After		This item allows you to set the amount of time that the operating system will remain in S3 sleep state, before transitioning to Flash Standby mode.
	Immediately 1 minute 2 minutes 5 minutes 10 minutes* 15 minutes 30 minutes 1 hour 2 hours 12 hours 24 hours	
Active Page Threshold Support		This item allows you to enable or disable Intel's Rapid Storage Technology (RST). RST utilizes RAID technology to protect and improve performance of the hard drives.
	Disabled* Enabled	
Active Memory Threshold		This item allows you to set the size of the active memory threshold, in Mbytes. When the partition is smaller than this threshold, RST will not be supported. By selecting **0**, RST will be supported, independent of the size of the partition, unless **Active Page Threshold Support** is set to **Disabled**.
	0*	

System Information submenu

The **System Information** submenu reports data about the Matrox 4Sight GP motherboard, the BIOS version, and similar data. The data in this submenu cannot be changed.

Item	Meaning
BIOS Version	This item reports the current BIOS version.
PCB Number	This item reports the PCB identification number.
Motherboard Serial Number Motherboard Lot Number Motherboard BOM Number Date Manufactured	These items report information about the motherboard: its serial number, lot number, build of materials (BOM) number, and date of manufacture.
Initial BIOS Version	This item reports the initial version of the BIOS.
Initial FPGA Version	This item reports the initial firmware version number.
Product Model Id System Serial Number	These items report the Matrox 4Sight GP model identifier ("4SightGP"), and the system serial number (assembly serial number of the unit).
Hardware variation	This item reports the Matrox 4Sight GP hardware variation number.
Customer Id	This item reports the customer identification number.

Security menu

This section describes all the items of the **Security** menu. This menu allows you to set up or change the supervisor password. The supervisor password can protect the BIOS Setup Utility. Refer to the section entitled *The Legend window* for guidelines on navigating within this menu.

Item		Meaning
	Options	
Supervisor Password		This item reports the status of the supervisor password: **Installed** or **Not Installed**. **Installed** means that a supervisor password has been established. Use the **Set Supervisor Password** item to create, change, or uninstall the password.
Set Supervisor Password		This item allows you to create the supervisor password (if you haven't created it yet), change the previously-existing supervisor password, or uninstall the supervisor password. If you want to uninstall the supervisor password, select the **Set Supervisor Password** item, and press the **Enter** key when prompted for a new password. You must save all changes and exit the BIOS Setup Utility to permanently change the supervisor password; you can do this by pressing the **F10** key.
	Enter	
Power on Password		This item allows you to set whether you will be prompted for the password during POST. By selecting **Enabled**, you will be prompted for the password each time the operating system reboots. By selecting **Disabled**, you will only be prompted for the password when entering the BIOS Setup Utility.
	Enabled Disabled*	

Power menu

This section describes all the items of the **Power** menu. Refer to the section entitled *The Legend window* for navigation guidelines.

Item		Meaning
	Options	
Auto Wake on S5		This item allows you to set a timer that will boot the operating system from S5 sleep mode. Both **Auto Wake on S5** and **Wake on LAN** are useful for booting Matrox 4Sight GP remotely. For example, you can use **Auto Wake on S5** to boot Matrox 4Sight GP every day at the same time to run your application (the application would have to be scheduled to run with the Scheduled Tasks program in Windows). By selecting **Disabled,** this timer will be disabled. By selecting **By Every Day,** the operating system will boot automatically at the same time each day. Once you have selected **By Every Day,** press the **Down** arrow to select **Wake on S5 Time.** The time is entered in HH:MM:SS format. • To alternate between fields, press the **Enter** key. • To increase the value of each field by 1, press the + key. • To decrease the value of each field by 1, press the - key. You can also set the hour, minute, and second fields by typing in their values. By selecting **By Day of Month,** the operating system will boot automatically at the same time, on the same day of the month, every month. You can set the time at which you would like the operating system to boot, as explained above, for **By Every Day.** To set the day of the month, select **Day of Month,** and use the + and - keys to set the number between 0 and 31. When the number is set to 31 and the current month has fewer than 31 days, the operating system will boot on the last day of the month.
	Disabled*	
	By Every Day	
	Wake on S5 Time	
	By Day of Month	
	Wake on S5 Time	
	Day of Month	
Wake on LAN		This item allows you to enable or disable waking on LAN. By selecting **Disabled,** the operating system will not wake up if a message is sent over LAN. By selecting **Enabled,** the operating system will wake up from hibernation or sleep mode if it receives a message sent over the network. This message must be a packet that contains 6 bytes of FFh (FF in hexadecimal) followed by 16 copies of Matrox 4Sight GP's Ethernet address.
	Disabled	
	Enabled*	

Advanced CPU Control submenu

The **Advanced CPU Control** submenu allows you to configure various advanced CPU options.

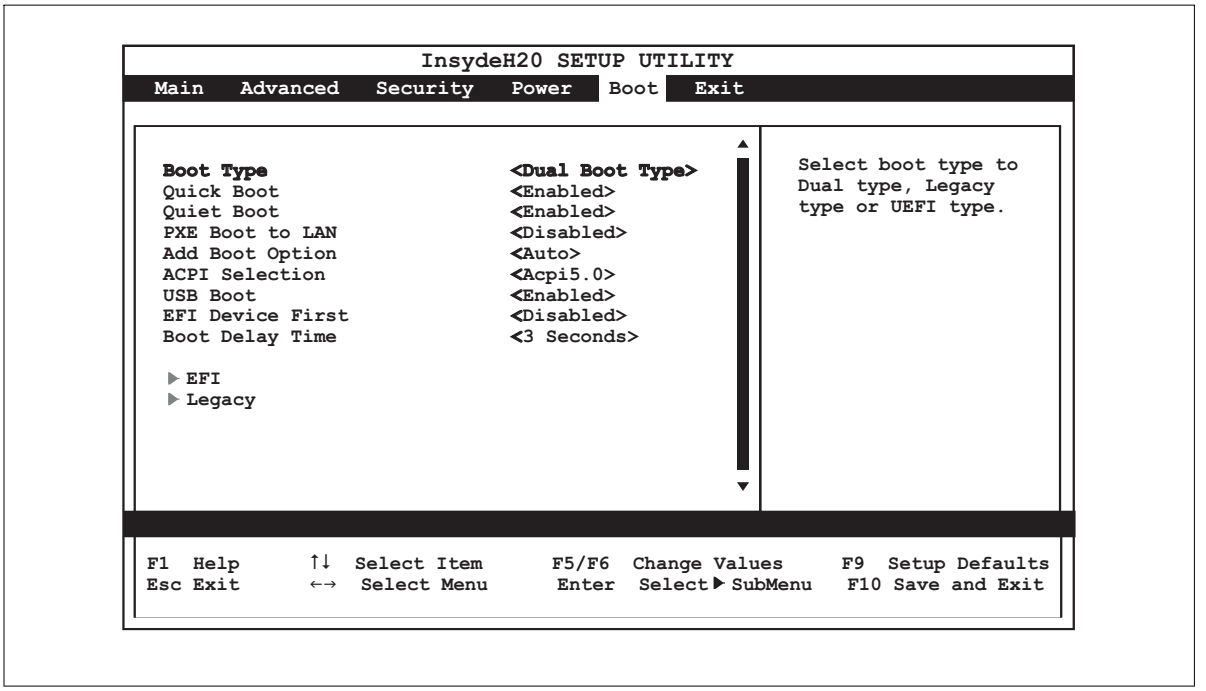
Item	Options	Meaning
AES		This item allows you to enable or disable advanced encryption standards (AES).
	Enable* Disable	
P-States(IST)		This item allows you to enable or disable processor performance states (P-States). ❖For Matrox 4Sight GP, it is strongly recommended that you set this item to **Enabled** (default).
	Disabled Enabled*	
Boot Performance Mode		This item allows you to select the performance state. By selecting **Max Power Saving**, the unit will be run in a way so as to minimize power consumption. By selecting **Max Performance**, the unit will be run in a way so as to maximize performance.
	Max Power Saving Max Performance*	
Active Processor Cores		This item allows you to select the number of processor cores available to your operating system and/or processing applications. By selecting **All Core**, all processor cores of the CPU are enabled. ❖Note that the default setting of this value is optimized for Matrox 4Sight GP.
	All Core* 1 Core 2 Core 3 Core	
HT Support		This item allows you to enable or disable hyper-threading for the operating system. Hyper-threading allows the processor core to execute two separate software streams (threads) at the same time. By selecting **Auto**, hyper-threading will be used when necessary. By selecting **Disabled**, hyper-threading will be disabled.
	Auto* Disabled	
Use XD Capability		This item allows you to enable or disable XD. XD is a CPU feature that helps prevent malicious software programs from overflowing buffers.
	Disabled Enabled*	
VT Support		This item allows you to enable or disable Intel virtualization technology (VT) support.
	Disabled Enabled*	
Hardware Prefetcher		This item allows you to enable or disable the hardware prefetcher option of the processor. Prefetching allows the processor to fetch instructions and/or data from memory into the cache well before the processor needs it, therefore improving the load-to-use latency and increasing processor performance. The hardware prefetcher operates transparently, without programmer intervention, to fetch streams of data and instructions from memory into the second-level (L2) cache. ❖Note that the default setting of this value is optimized for Matrox 4Sight GP.
	Disabled Enabled*	

Item	Options	Meaning
AdjacentCacheLine Prefetch		This item allows you to enable or disable the adjacent cache line prefetch option of the processor. When set to **Enabled**, the CPU will fetch two adjacent cache lines (each cache line is 64 bytes) when updating the cache, rather than fetching a single cache line. Like the Hardware Prefetcher item above, the adjacent cache line prefetch works transparently, without programmer intervention. When set to **Disabled**, this item can reduce bus traffic. Note that the default setting of this value is optimized for Matrox 4Sight GP.
	Disabled Enabled*	
Max CPUID Value Limit		This item allows you to enable or disable the maximum CPUID value limit. Older operating systems (such as Microsoft Windows 95/98/ME) do not support the values returned by CPUID instructions of newer processors. This item can be used to limit the value returned by the CPUID instruction to 03h, so that older operating systems work with newer CPUs. Note that the default setting of this value is optimized for Matrox 4Sight GP.
	Disabled* Enabled	
C-States		This item allows you to enable or disable processor idle power-saving states (C-states). The higher the C-state, the more power-saving capabilities; however, the higher the C-state, the more time that is required to enter and exit that state.
	Disabled Enabled*	
Enhanced C-States		This item allows you to enable or disable enhanced C-states.
	Disabled Enabled*	
Enable C3		This item allows you to enable or disable the C3 power-saving state. The C3 power-saving state causes the CPU cores to flush their L1 instruction cache, L1 data cache, and L2 cache to the L3 shared cache. Clocks are then shut off on each CPU core.
	Disabled Enabled*	
Enable C6		This item allows you to enable or disable the C6 power-saving state. The C6 power-saving state causes the CPU cores to save their architectural state (such as, the contents of various control and general purpose registers) before their power is turned off.
	Disabled Enabled*	
Enable C7s		This item allows you to enable or disable the C7s power-saving state. The C7s power-saving state is similar to the C6 state, with the addition of the level 3 cache being flushed immediately when entering this state.
	Disabled* Enabled	
Enable C7r		This item allows you to enable or disable the C7r power-saving state. The C7r power-saving state is similar to the C7s state, however there is a longer delay when entering this state, while the level 3 cache is progressively flushed.
	Disabled* Enabled	
C-State Auto Demotion		This item allows you to enable or disable the automatic demotion of C-states. By selecting **Disabled**, the CPU will always enter the state as per the operating system's request. If **C-State Auto Demotion** is enabled for one or more states, when the CPU receives a request to enter a power-saving state, it will always attempt to enter a state of a lower number. It will enter the lower state if that lower state is enabled, and if the CPU detects that entering the lower state will be more efficient (faster) to enter and exit the state (which is typically the case with lower states).
	Disabled C1 only C3 only C1 and C3*	

Item		Meaning
	Options	
C-State Auto Un-demotion		This item allows you to enable or disable the automatic un-demotion of C-states. By selecting **Disabled**, the CPU will stay in a C-state with a lower number, even if it receives a request to enter a higher C-state. If **C-State Auto Un-demotion** is enabled for one or more states, it will be possible for the CPU to enter a requested higher C-state, after entering a lower state.
	Disabled C1 only C3 only C1 and C3*	
Turbo Mode		This item allows you to enable or disable turbo mode. Turbo mode can run the processing cores faster than the marked frequency when at least part of the CPU is operating either under power, temperature, or other current specifications limits, as designated by the hardware.
	Disabled Enabled*	

Boot menu

This section describes all the items of the **Boot** menu. The **Boot** menu allows you to configure the different options available during unit startup. Refer to the section entitled *The Legend window* for guidelines on navigating within this menu.



Note that all optimal default options have an asterisk * next to them.

Item		Meaning
	Options	
Boot Type		This item allows you to select the boot type.
	Dual Boot Type* Legacy Boot Type UEFI Boot Type	By selecting **Dual Boot Type,** the operating system will be able to boot from both legacy and UEFI boot devices. By selecting **Legacy Boot Type,** the operating system will only attempt to boot from a legacy boot device. By selecting **UEFI Boot Type,** the operating system will only attempt to boot from a UEFI boot device.
Quick Boot		This item allows you to skip certain tests while booting the unit. By selecting **Enabled**, you will decrease the time required to boot the unit.
	Enabled* Disabled	
Quiet Boot		This item allows you to boot in Text Mode.
	Enabled* Disabled	By selecting **Enabled,** the BIOS will display a full-screen logo on boot-up. The normal POST messages will be hidden. By selecting **Disabled,** the BIOS will display the POST messages, instead of the logo. This option decreases the time required to boot the unit.
PXE Boot to LAN		This item allows you to enable or disable loading instructions from a PXE device that contains pre-boot execution environment (PXE) instructions that enable your unit to boot from your network. By selecting **Enabled,** the PXE device requests an IP address (from a DHCP server on your network) and downloads an operating system (a kernel, using FTP from a server on your network), and then boots your Matrox 4Sight GP using the downloaded operating system. Additional steps are required to boot your Matrox 4Sight GP from a network device. Once this item is enabled, you must save the BIOS settings, reboot, and then re-enter the BIOS settings and verify that the network device is the first in the list of potential boot devices in the Boot menu. If it is not, set it as the first device, save the BIOS settings, and reboot. If using unified extensible firmware interface (UEFI) devices instead of PXE, enable the Network Stack option instead. For more information on the Network Stack option, refer to the Network Stack submenu subsection of the Advanced menu section, earlier in this appendix.
	Disabled* Enabled	
PXE Boot Capability		This item allows you to set the PXE boot mode: UEFI (Unified Extensible Firmware Interface) or Legacy.
	UEFI: IPv4* UEFI: IPv6 UEFI: IPv4/IPv6 Legacy	
Add Boot Options		This item allows you to set where in the boot order newly detected devices will be placed.
	First Last Auto*	By selecting **First,** a newly detected device will boot first. By selecting **Last,** a newly detected device will boot last. By selecting **Auto,** a newly detected device will be automatically placed in the boot order.
ACPI Selection		This item allows you to set the version of the Advanced Configuration and Power Interface (ACPI) to use.
	Acpi1.0B Acpi3.0 Acpi4.0 Acpi5.0*	By selecting **Acpi1.0B,** ACPI version 1.0 will be used. By selecting **Acpi3.0,** ACPI version 3.0 will be used. By selecting **Acpi4.0,** ACPI version 4.0 will be used. By selecting **Acpi5.0,** ACPI version 5.0 will be used.

Item		Meaning
	Options	
USB Boot		This item allows you to enable or disable booting from a USB device.
	Enabled* Disabled	
EFI Device First		This item allows you to set whether to try to boot first from an EFI device. On Matrox 4Sight GP, there is at least one EFI device available: the flash memory device on which the BIOS is stored. If booting from this device, the internal EFI shell is used to boot. If other third-party EFI devices are available, you can see their boot order using the **EFI** submenu. By selecting **Enabled**, the operating system will try to boot first from an EFI device. By selecting **Disabled**, the operating system will try to boot first from a legacy device.
	Disabled* Enabled	
Boot Delay Time		This item allows you to set the time that POST will wait before booting, in seconds. This gives the user more time to press **Esc** to enter the BIOS Setup Utility, before the unit boots.
	0 Second 3 Seconds* 5 Seconds 10 Seconds	

EFI submenu

The **EFI** submenu reports the available EFI devices from which your BIOS can boot. The order in which the EFI devices are listed presents the boot order priority, with the highest priority listed first. If the operating system fails to boot from the first EFI device, it will re-attempt using the next available EFI device from the list, until the system boots or there are no more EFI devices available. The following EFI device is always present, but is not necessarily listed first.

Item		Meaning
	Options	
Internal EFI Shell		This item represents the flash-memory device on which the BIOS is stored. If booting from this device, the internal EFI shell is used to boot. This internal EFI shell will always be available.

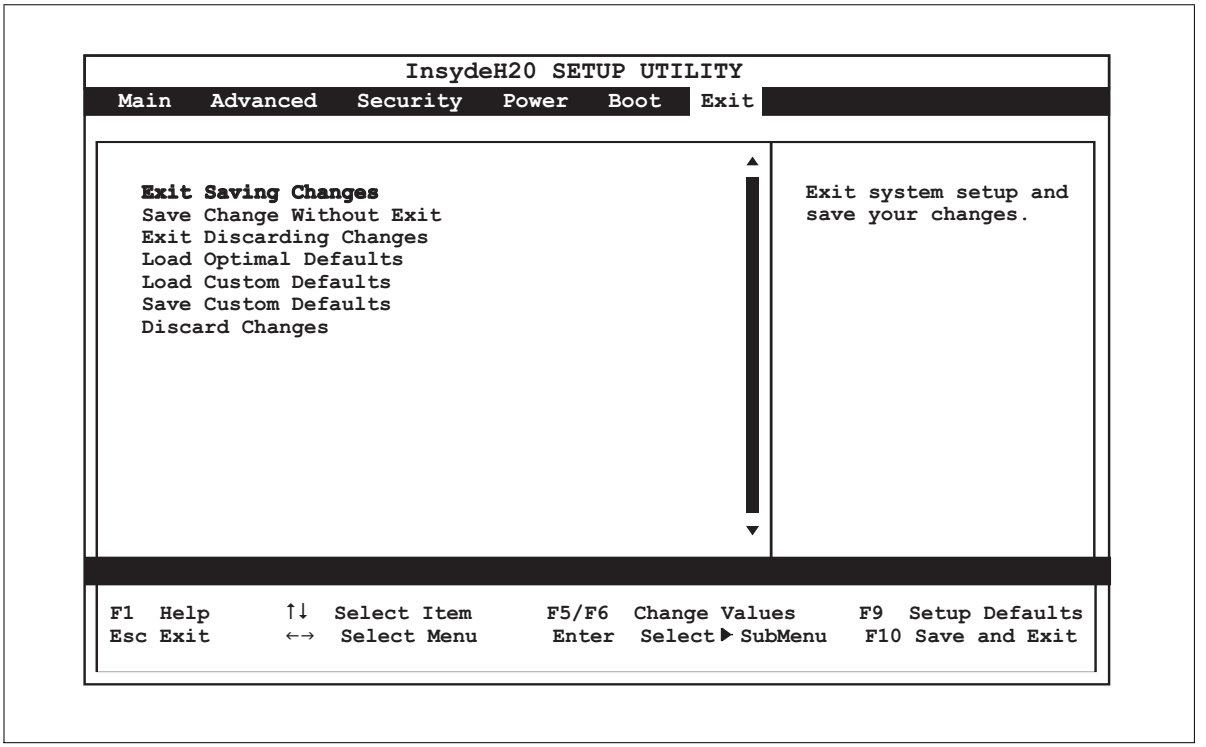
Legacy submenu

This submenu allows you to access boot priority options. The *Legacy* submenu will only appear if you have a legacy boot device connected to your Matrox 4Sight GP.

Item		Meaning
	Options	
Normal Boot Menu		This item allows you to toggle between normal and advanced boot settings.
Boot Type Order		This sub-submenu allows you to set the boot order of available boot device categories. To move an item up or down, use the + and - keys, respectively. Highlight the item that you want to move. Press the + key to move it up, or press the - key to move it down. ❖The default order: Floppy Drive Hard Disk Drive CD/DVD-ROM Drive USB Others

Exit menu

This section describes all the items of the **Exit** menu. Refer to the section entitled *The Legend window* for navigation guidelines.



Item	Meaning
Exit Saving Changes	This item saves your changes and exits the BIOS Setup Utility. You can also press the **F10** key to select this item. Before exiting, an **Setup Confirmation** dialog box will appear, asking you to confirm that the changes made should be saved. Using the **Left** and **Right** keys, select either **Yes** or **No** and press the **Enter** key to continue. You can also press the **Esc** key to return to the **Exit** menu. The changes will be saved, and the Matrox 4Sight GP unit will automatically reboot.
Save Change Without Exit	This item saves your changes without exiting the BIOS Setup Utility. Before exiting, a **Setup Confirmation** dialog box will appear, asking you to confirm that the changes made should be saved. Using the **Left** and **Right** keys, select either **Yes** or **No** and press the **Enter** key to continue. You can also press the **Esc** key to return to the **Exit** menu. The changes will be saved, and you will return to the **Exit** menu.
Exit Discarding Changes	This item discards your changes and exits the BIOS Setup Utility. You can also press the **Esc** key to select this item. If configuration changes have been made, a **Setup Confirmation** dialog box will appear, asking you to confirm that the changes made should not be saved. Using the **Left** and **Right** keys, select either **Yes** or **No** and press the **Enter** key to continue. You can also press the **Esc** key to return to the **Exit** menu. ***Important:*** If you select **Yes**, all the changes that you have made in the BIOS Setup Utility will be discarded.
Load Optimal Defaults	This item loads the optimal default configuration into the BIOS Setup Utility. You can also press the **F9** key to select this item. This will replace each setup item in the BIOS Setup Utility with its optimal default value. The **Exit** menu will remain open. Before loading, a **Setup Confirmation** dialog box will appear, asking you to confirm that you have chosen to load your optimal default configuration. Using the **Left** and **Right** keys, select either **Yes** or **No** and press the **Enter** key to continue. You can also press the **Esc** key to return to the **Exit** menu. ***Important:*** The optimal defaults are designed for maximum performance (speed), but might not work best for all applications.
Load Custom Defaults	This item loads the custom default configuration into the BIOS Setup Utility. This will replace each setup item in the BIOS Setup Utility with its custom default value. The **Exit** menu will remain open. Before loading, a **Setup Confirmation** dialog box will appear, asking you to confirm that you have chosen to load your custom default configuration. Using the **Left** and **Right** keys, select either **Yes** or **No** and press the **Enter** key to continue. You can also press the **Esc** key to return to the **Exit** menu.
Save Custom Defaults	This item saves the current BIOS settings as the custom default configuration, consequently overriding the previous custom default settings. The **Exit** menu will remain open. Before loading, a **Setup Confirmation** dialog box will appear, asking you to confirm that you have chosen to save the current BIOS settings as the custom default configuration. Using the **Left** and **Right** keys, select either **Yes** or **No** and press the **Enter** key to continue. You can also press the **Esc** key to return to the **Exit** menu.
Discard Changes	This item discards the changes that you have made in the BIOS Setup Utility. The program will then load the previous settings. The **Exit** menu remains open after the settings are loaded. Before loading the previous settings, a **Setup Confirmation** dialog box will appear, asking you to confirm that you have chosen to load the previous Setup configuration. Using the **Left** and **Right** keys, select either **Yes** or **No,** and press the **Enter** key to continue. You can also press the **Esc** key to return to the **Exit** menu.

Overriding the device sequence

When you turn on the unit, the BIOS checks the boot-devices for an operating system, according to the specific sequence in the **Boot** menu. However, it is possible to override this sequence and have the BIOS check a device that you specify, regardless of its position in the **Boot** menu. This is possible using the Boot Manager utility.

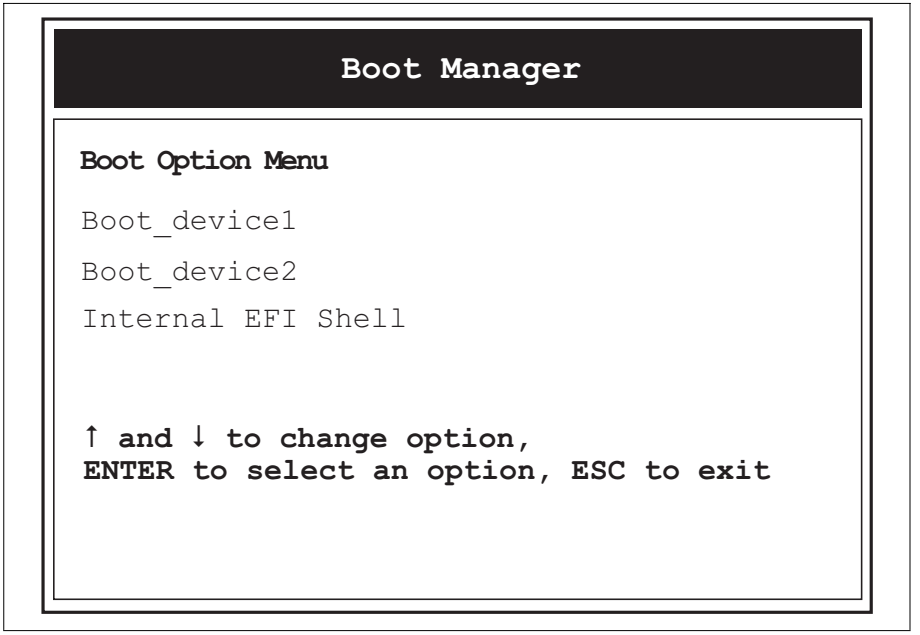
Boot Manager utility

Overriding the boot-device sequence is useful in cases when you occasionally need to boot the operating system from another device. The Boot Manager utility overrides the BIOS settings for the current boot, but returns to the original settings for any subsequent boot. The advantage of this utility is that you do not have to enter the BIOS Setup Utility to change the settings, and then enter the program a second time to change these settings back to their original configuration.

The procedure to execute this utility is as follows:

1. During POST, press the **Esc** key.

   On the front page screen, select Boot Manager utility. The Boot Manager utility menu will appear. Displayed in this menu is a list of devices from which the operating system can be booted.



2. Using the **Up** and **Down** arrow keys, select the device from which you will load the operating system.

3. When the device is selected, press the **Enter** key.

   This will override the existing boot sequence (saved in the BIOS Setup Utility) for this boot only, and the operating system will be booted using the selected device.

   If the BIOS cannot find the selected device, an error message will be generated.

   If the operating system cannot be loaded from the selected device, the BIOS will revert to the boot sequence saved in the BIOS Setup Utility.

4. To exit the Boot Manager utility and return to the front page screen, press the **Esc** key.

Appendix B: Technical reference

This appendix summarizes the key features of the Matrox 4Sight GP unit. In addition, this appendix provides pinout descriptions for external and internal connectors of the Matrox 4Sight GP unit.

Overview

This appendix describes the technical specifications of the Matrox 4Sight GP unit.

Motherboard

- Mini-ITX based form factor, 6.693" x 7.493" (17.00 cm x 19.03 cm).
- Integrates processing, display, storage, networking, and I/O functionality.
- Processor is one of the following:
  - Intel i7-3770 processor (Ivy bridge).
  - Intel i5-3550S processor (Ivy bridge).
  - Intel Celeron G540 processor (Sandy bridge).
- Chipset is a combined northbridge and southbridge in an Intel Platform Controller Hub (PCH) Q77 Express chipset. The PCH provides control for both I/O and graphics.

- Internal connectors:
  - One x16 PCIe 3.0 slot.
  - One x8 PCIe 2.0 slot. This slot is electrically wired as a x4 PCIe slot, so x8 PCIe boards will operate at a maximum of x4 PCIe.
  - Two 204-pin SO-DIMM slots.
  - Two SATA 7-pin hard disk drive connectors.
  - One 10-pin USB header.[1]
  - One RS-232 COM port header.
- BIOS: Stored on flash memory.

Environmental specifications

- Ambient operating temperature: 0 to 50°C.
- Storage temperature: -40 to 85°C.
- Operating altitude: -300 to 3000 meters.
- Operating humidity: 10 to 90% (non-condensing).
- Storage humidity: 5 to 95% (non-condensing).

1. The USB header is internally connected to the two USB 2.0 connectors on the front panel.

RAM

Two 204-pin SO-DIMM slots, each of which supports one PC3-12800, unbuffered DDR3 SDRAM SO-DIMM module, up to 8 Gbytes in size.

Note that the Intel processor installed in your Matrox 4Sight GP only supports 1.5 V I/O signaling. Therefore, you must use memory modules that can be powered at 1.5 V.

Hard disk drive

- Minimum storage capacity: 250 Gbytes.
- 2.5 inch platter.

  Note that hard disk drive specifications are subject to change without notice.

Power supply

- Input:
  - 100-240 V_{ac} (+/- 10% tolerance).
  - Frequency range: 47-63 Hz.
  - Active power factor correction.
- Output:
  - 300 W total, which is used to power all components connected to the motherboard, including any PCIe boards that you install.
  - Processor consumption: 77 W (TDP).
- Protected by a non-resettable fuse.

Chassis

- Length: 9.22" (23.42 cm).
- Width: 8.75" (22.23 cm).
- Height: 5.90" (14.99 cm).

Fans

The fans' speeds are controlled by the on-board fan controller, based on the temperatures of the processor and the motherboard.

Battery

- Used to maintain time and date settings of the motherboard's real-time clock.
- Chemistry: Lithium/Manganese Dioxide (Li/MnO_2) system.
- Capacity: 225 mAh.
- Battery voltage: 3 V.
- Diameter (max): 20 mm.

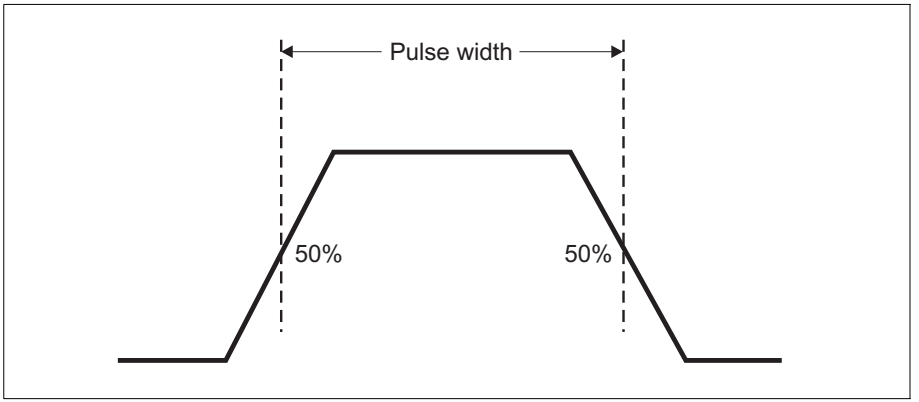
Auxiliary I/O interface

- 16 independent auxiliary output signals that can be used to transmit application-specific user output and 16 independent auxiliary input signals that can be used to receive application-specific user input.
- Input signals have interrupt-generation capabilities.
- Can connect to NPN-compatible PLC devices, PNP-compatible PLC devices, inductive load devices, lighting devices, and TTL devices.

Characteristics of the auxiliary I/O signals

The auxiliary I/O signals of Matrox 4Sight GP have the following characteristics:

- **Pulse width**. The pulse width is determined to be from the mid-point of the rise time to the mid-point of the fall time.



Mode	Total voltage (Vcc)	Current load (Icc)	Minimum
Input	5 V		16.67 µsec
	24 V		16.67 µsec
Output	24 V	100 mA	8.33 µsec
		5 mA	8.33 µsec
	5 V	100 mA	8.33 µsec
		5 mA	8.33 µsec

- **Maximum frequency.**
  Input mode: The maximum frequency is the maximum input sampling rate (the number of times the input is sampled per second).
  Output mode: The maximum frequency is the maximum output refresh rate.

Mode	Total voltage (Vcc)	Current load (Icc)	Maximum
Input	5 V		30 kHz
	24 V		30 kHz
Output	24 V	100 mA	60 kHz
		5 mA	60 kHz
	5 V	100 mA	60 kHz
		5 mA	60 kHz

- **Power characteristics**. The power characteristics describe the minimum and maximum voltage and current for input and output signals.

Mode	Description	Minimum	Maximum
Input	Voltage range for the Matrox 4Sight GP unit to interpret voltage on the auxiliary I/O input signals as a “1”.	2.4 V	24 V
	Voltage range for the Matrox 4Sight GP unit to interpret voltage on the auxiliary I/O input signals as a “0”.	0 V	0.8 V
Output	Allowable voltage range on the Matrox 4Sight GP auxiliary I/O output signals (sink to ground, 100 mA, fuse protected).	0 V	24 V
	Allowable current range on the Matrox 4Sight GP auxiliary I/O output signals.	5 mA	100 mA

Pinout descriptions of external connectors

The Matrox 4Sight GP unit features the following external connectors: Gigabit Ethernet, auxiliary input/output, USB, audio, power and video output connectors.

Front panel connectors
A USB ports
B Power button

Back panel connectors
C Gigabit Ethernet connectors (each with two LEDs)
D USB ports
E DVI-I connector
F DVI-D connector
G Audio In connector
H Audio Out connector
I Auxiliary I/O connector
J RS-232 COM port connector
K Slot for optional add-on board
L Slot for optional add-on board
M Power connector

Front panel connectors

- Two USB connectors (USB 2.0 and 1.1 compatible).

Back panel connectors

- Four USB connectors (USB 3.0, 2.0 and 1.1 compatible).
- Two Gigabit Ethernet connectors (10/100/1000 BaseT).
- One DVI-I connector and one DVI-D connector.
- Audio input (top) and audio output (bottom) connectors.
- One auxiliary I/O connector.
- One RS-232 COM port connector.
- One power connector (AC outlet).

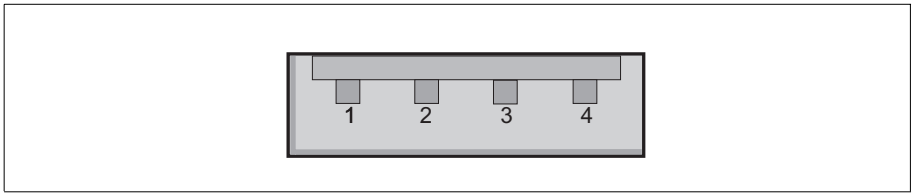
Available separately

- Full-height, half-length PCIe boards (from Matrox or a third party) can be installed in the Matrox 4Sight GP unit. Connectors on the brackets of the PCIe boards will be accessible via the back panel.

USB 2.0 connectors

The two USB 2.0 connectors on the front panel are standard rectangular, Series "A", 4-pin receptacles. The pinout of these standard connectors is described in the USB Specification v2.0 from the USB Implementers Forum.

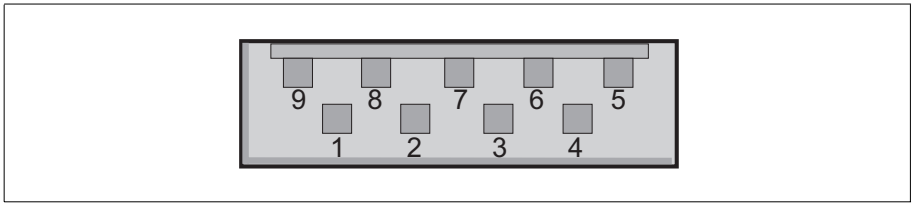
- Operating voltage and maximum current: 5 V, 500 mA.
- Auto-resettable fuse: Yes.



USB 3.0 connectors

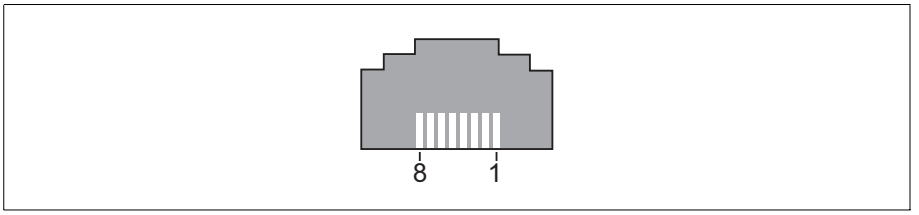
The four USB 3.0 connectors on the back panel are standard rectangular, Series "A", 9-pin receptacles. These connectors are backwards compatible with USB 2.0/1.1. The pinout of these USB 3.0 connectors is described in the USB Specification v3.0 from the USB Implementers Forum.

- Operating voltage and maximum current: 5 V, 900 mA.
- Auto-resettable fuse: Yes.



Gigabit Ethernet connectors

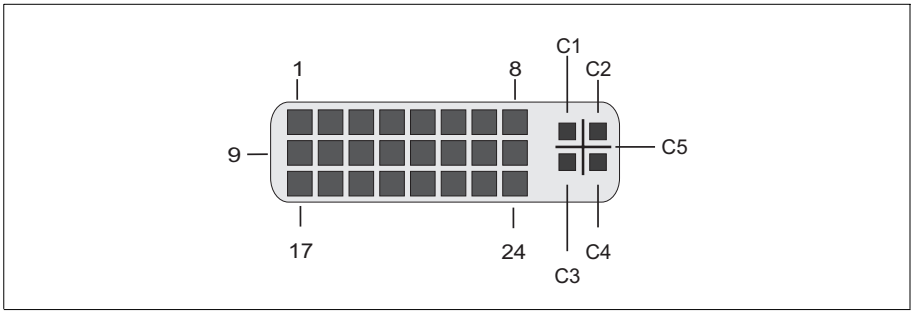
The two Gigabit Ethernet connectors are identical 8-pin, RJ45 connectors. The pinout of these connectors follows the 1000 BaseT Gigabit Ethernet standard found in the IEEE 802.3-2002 standard.



DVI-I connector

The DVI-I connector is a 29-pin female connector. This connector is used for digital or analog video output. The connector's pinout is outlined in the following table.

- Output voltage and maximum current: 5 V, 0.75 A.
- Auto-resettable fuse: Yes.



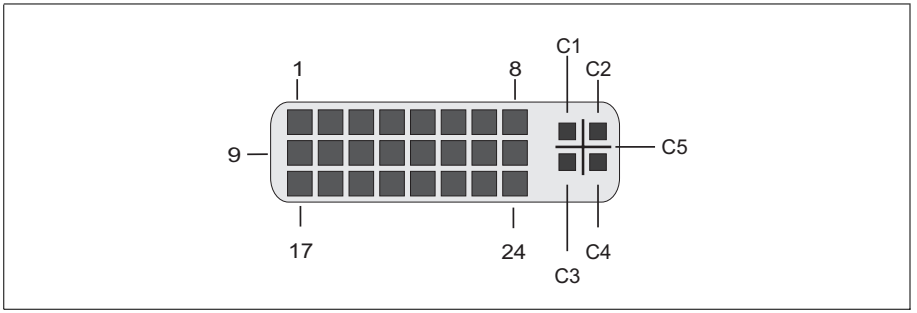
Pin	Signal	I/O	Description
1	TX2-	O	Transmission Data Line 2-.
2	TX2+	O	Transmission Data Line 2+.
3	GND	-	Ground.
4-5	NC	-	Not connected.
6	SCLK	I/O	DDC data clock line.
7	SDATA	I/O	DDC serial data line.
8	VSYNC	O	Vertical synchronization.

Pin	Signal	I/O	Description
9	TX1-	O	Transmission Data Line 1-.
10	TX1+	O	Transmission Data Line 1+.
11	GND	-	Ground.
12-13	NC	-	Not connected.
14	+5V	O	+5 V_{dc}
15	GND	-	Ground.
16	HPD	I/O	Hot-plug detect.
17	TX0-	O	Transmission data line 0-.
18	TX0+	O	Transmission data line 0+.
19	GND	-	Ground.
20-21	NC	-	Not connected.
22	GND	-	Ground.
23	TXC+	O	Transmission data line Clock+.
24	TXC-	O	Transmission data line Clock-.
C1	RED	O	Red.
C2	GREEN	O	Green.
C3	BLUE	O	Blue.
C4	HSYNC	O	Horizontal synchronization.
C5	GND	-	Ground.

DVI-D connector

The DVI-D connector has the same pinout as the DVI-I connector, except that 5 pins (C1 to C5) are not connected. It is a 29-pin female connector, with pins 1 to 24 used for digital video output. The connector's pinout is outlined in the following table.

- Output voltage and maximum current: 5 V, 0.75 A.
- Auto-resettable fuse: Yes.



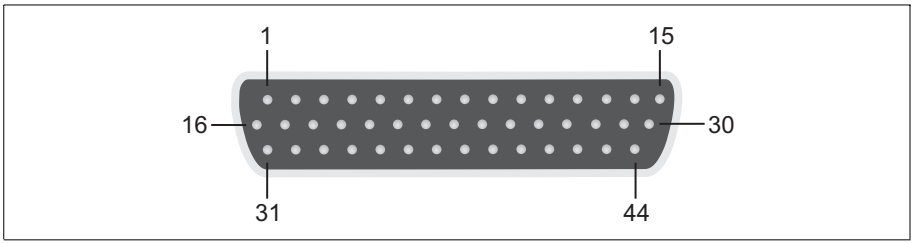
Pin	Signal	I/O	Description
1	TX2-	O	Transmission Data Line 2-.
2	TX2+	O	Transmission Data Line 2+.
3	GND	-	Ground.
4-5	NC	-	Not connected.
6	SCLK	I/O	DDC data clock line.
7	SDATA	I/O	DDC serial data line.
8	VSYNC	O	Vertical synchronization.
9	TX1-	O	Transmission Data Line 1-.
10	TX1+	O	Transmission Data Line 1+.
11	GND	-	Ground.
12-13	NC	-	Not connected.
14	+5V	O	+5 V_{dc}
15	GND	-	Ground.
16	HPD	I/O	Hot-plug detect.
17	TX0-	O	Transmission data line 0-.
18	TX0+	O	Transmission data line 0+.
19	GND	-	Ground.

Pin	Signal	I/O	Description
20-21	NC	-	Not connected.
22	GND	-	Ground.
23	TXC+	O	Transmission data line Clock+.
24	TXC-	O	Transmission data line Clock-.
C1	NC	-	Not connected.
C2	NC	-	Not connected.
C3	NC	-	Not connected.
C4	NC	-	Not connected.
C5	NC	-	Not connected.

Auxiliary I/O connector

The auxiliary I/O connector is a high-density D-subminiature 44-pin (DBHD-44[1]) male connector. Its pinout is outlined in the following table.

Note that all the auxiliary input and output signals can only be configured as user signals.



Pin	Hardware signal name	MIL constant for auxiliary signal*	Description
1	AUX(USER)_IND_OUT17	M_AUX_IO1	Industrial auxiliary signal (output), which supports user output (M_USER_BIT1).
2	AUX(USER)_IND_OUT19	M_AUX_IO3	Industrial auxiliary signal (output), which supports user output (M_USER_BIT3).
3	AUX(USER)_IND_OUT21	M_AUX_IO5	Industrial auxiliary signal (output), which supports user output (M_USER_BIT5).
4	AUX(USER)_IND_OUT23	M_AUX_IO7	Industrial auxiliary signal (output), which supports user output (M_USER_BIT7).
5	AUX(USER)_IND_OUT25	M_AUX_IO9	Industrial auxiliary signal (output), which supports user output (M_USER_BIT9).
6	AUX(USER)_IND_OUT27	M_AUX_IO11	Industrial auxiliary signal (output), which supports user output (M_USER_BIT11).
7	AUX(USER)_IND_OUT29	M_AUX_IO13	Industrial auxiliary signal (output), which supports user output (M_USER_BIT13).
8	AUX(USER)_IND_OUT31	M_AUX_IO15	Industrial auxiliary signal (output), which supports user output (M_USER_BIT15).
9	AUX(USER)_TTL_IN1	M_AUX_IO17	Industrial auxiliary signal (input), which supports user input.
10	AUX(USER)_TTL_IN3	M_AUX_IO19	Industrial auxiliary signal (input), which supports user input.
11	AUX(USER)_TTL_IN7	M_AUX_IO23	Industrial auxiliary signal (input), which supports user input.

1. More accurately known as DB-44.

Pin	Hardware signal name	MIL constant for auxiliary signal*	Description
12	AUX(USER)_TTL_IN9	M_AUX_IO25	Industrial auxiliary signal (input), which supports user output.
13	AUX(USER)_TTL_IN11	M_AUX_IO27	Industrial auxiliary signal (input), which supports user input.
14	AUX(USER)_TTL_IN13	M_AUX_IO29	Industrial auxiliary signal (input), which supports user input.
15	AUX(USER)_TTL_IN15	M_AUX_IO31	Industrial auxiliary signal (input), which supports user input.
16	GND		Ground.
17	GND		Ground.
18	GND		Ground.
19	GND		Ground.
20	PWR_5V		DC-OUT, 5 V, 0.5 A auto-resettable fuse.
21	GND		Ground.
22	GND		Ground.
23	GND		Ground.
24	AUX(USER)_TTL_IN0	M_AUX_IO16	Industrial auxiliary signal (input), which supports user input.
25	GND		Ground.
26	AUX(USER)_TTL_IN5	M_AUX_IO21	Industrial auxiliary signal (input), which supports user input.
27	GND		Ground.
28	AUX(USER)_TTL_IN10	M_AUX_IO26	Industrial auxiliary signal (input), which supports user input.
29	GND		Ground.
30	PWR_5V		DC-OUT, 5 V, 0.5 A auto-resettable fuse.
31	AUX(USER)_IND_OUT16	M_AUX_IO0	Industrial auxiliary signal (output), which supports user output (M_USER_BIT0).
32	AUX(USER)_IND_OUT18	M_AUX_IO2	Industrial auxiliary signal (output), which supports user output (M_USER_BIT2).
33	AUX(USER)_IND_OUT20	M_AUX_IO4	Industrial auxiliary signal (output), which supports user output (M_USER_BIT4).
34	AUX(USER)_IND_OUT22	M_AUX_IO6	Industrial auxiliary signal (output), which supports user output (M_USER_BIT6).
35	AUX(USER)_IND_OUT24	M_AUX_IO8	Industrial auxiliary signal (output), which supports user output (M_USER_BIT8).

Pin	Hardware signal name	MIL constant for auxiliary signal*	Description
36	AUX(USER)_IND_OUT26	M_AUX_IO10	Industrial auxiliary signal (output), which supports user output (M_USER_BIT10).
37	AUX(USER)_IND_OUT28	M_AUX_IO12	Industrial auxiliary signal (output), which supports user output (M_USER_BIT12).
38	AUX(USER)_IND_OUT30	M_AUX_IO14	Industrial auxiliary signal (output), which supports user output (M_USER_BIT14).
39	AUX(USER)_TTL_IN2	M_AUX_IO18	Industrial auxiliary signal (input), which supports user input.
40	AUX(USER)_TTL_IN4	M_AUX_IO20	Industrial auxiliary signal (input), which supports user input.
41	AUX(USER)_TTL_IN6	M_AUX_IO22	Industrial auxiliary signal (input), which supports user input.
42	AUX(USER)_TTL_IN8	M_AUX_IO24	Industrial auxiliary signal (input), which supports user input.
43	AUX(USER)_TTL_IN12	M_AUX_IO28	Industrial auxiliary signal (input), which supports user input.
44	AUX(USER)_TTL_IN14	M_AUX_IO30	Industrial auxiliary signal (input), which supports user input.

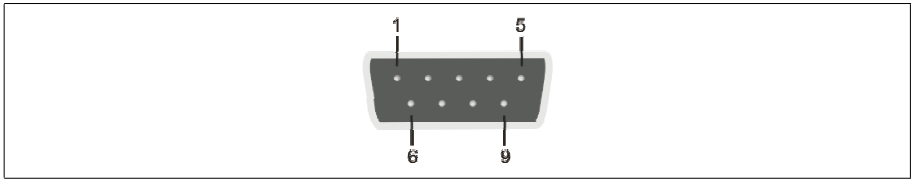
*. These MIL constants represent the signals as of MIL 10. The output signals that were previously represented by user-defined signal #n became represented by M_AUX_IOn (where the value of n remained the same between the constants). The input signals that were previously represented by user-defined signal #n became represented by M_AUX_IOm (where the value of m is equal to the value of n+16). For a complete list of changes between previous MIL versions and MIL 10, see *MIL4SIGHT* within the *MIL Release Notes*.

To interface with this connector, you will need to build your own cable. To build it, you can purchase the following part

Attribute	Description
Type of connector needed	DB-44 female connector
Manufacturer	Amphenol
Part number	17HD-044S
Plastic shell number	77D B25M or 177D B25M

RS-232 COM port

The RS-232 COM port is a standard D-subminiature 9-pin (DB-9[1]) male connector; its pinout is outlined in the following table. The pins on this 9-pin DB-9 connector are connected to the 10-pin, IDS male, dual row, RS-232 COM port header on the motherboard.



Pin	Signal	Description
1	CD	Carrier detect.
2	RXD	Receive data.
3	TXD	Transmit data.
4	DTR	Data terminal ready.
5	GND	Ground.
6	DSR	Data set ready.
7	RTS	Request to send.
8	CTS	Clear to send.
9	RI	Ring indicator.

1. More accurately known as DE-9.

Audio input and audio output connectors

Matrox 4Sight GP supports an audio interface, with one 24-bit stereo audio input and one 24-bit stereo audio output connector. You can connect a stereo audio device to the audio input and output connectors, using a 1/8” mini audio input/output plug. The audio interface is only designed for line input/output operations. Since there is no output amplifier or input preamplifier, the interface does not support speakers or microphones.

AC power connector

The Matrox 4Sight GP unit has an internal power supply. The power supply connector is a standard AC power connector, and the appropriate power cord is included with the Matrox 4Sight GP unit.

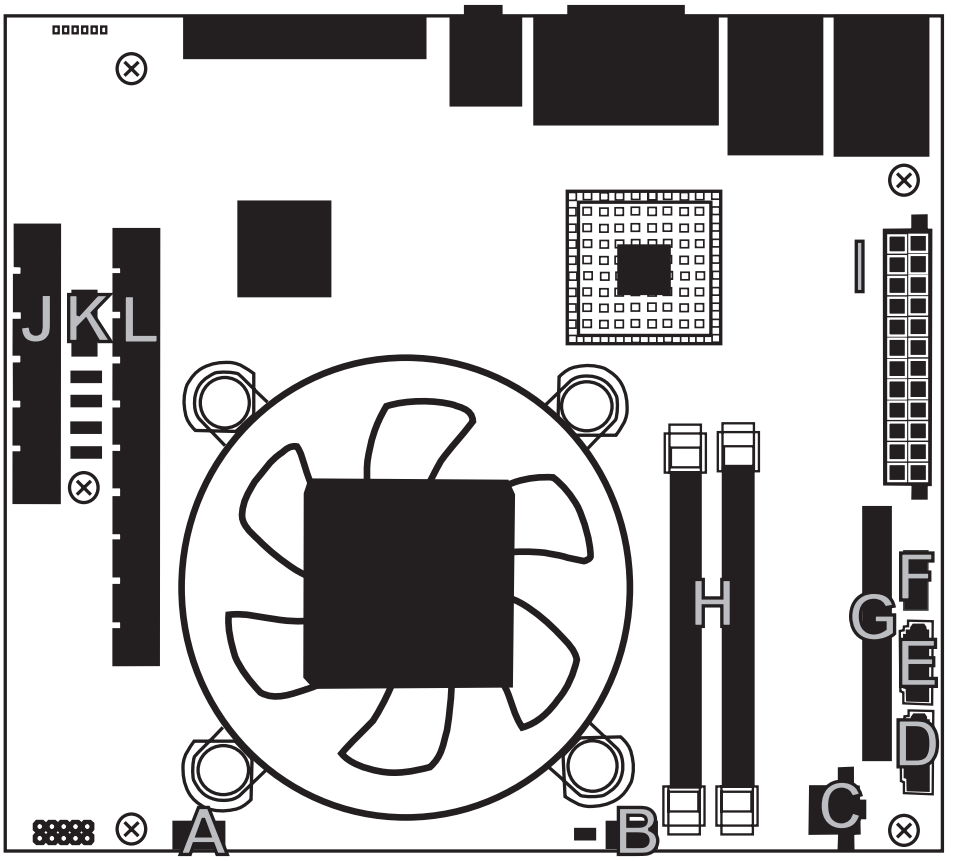
Pinout descriptions of internal connectors

Inside the unit (on the motherboard) are the following connectors and switches:

- Two PCIe connectors.
- One USB header.[1]
- Two SO-DIMM slots for system memory modules.
- Two SATA connectors for mass storage devices.
- Two power supply connectors for peripheral devices (fans).
- One RS-232 COM port header.

1. This USB header is internally connected to the two USB 2.0 connectors on the front panel.

Matrox 4Sight GP motherboard internal connectors



A CPU fan connector
B System fan connector
C CPU 12V connector (4-pin)
D SATA connector 0 (port 0)
E SATA connector 1 (port 1)
F USB header
G Auxiliary I/O header
H DDR3 SO-DIMM memory slots
I ATX power supply connector
J x8 PCIe 2.0 connector
K RS-232 COM port header
L x16 PCIe 3.0 connector

PCIe connectors

On the Matrox 4Sight GP motherboard, there are two PCIe connectors. The first connector is a PCIe 2.0 connector, to which you can at

a full-height, half-length x1, x4, or x8[1] PCIe board. The second connector is a PCIe 3.0 connector, to which you can attach a full-height, half-length x1, x4, x8, or x16 PCIe board.

Internal USB header

There is a standard 10-pin USB header on the Matrox 4Sight GP motherboard. The USB header is connected to the two 4-pin USB devices on the front panel of the chassis.

The pinout for the USB port is available at the website of the USB Implementers Forum, http://www.usb.org.

SO-DIMM slots for system memory modules (DDR3)

There are two SO-DIMM slots on the motherboard. Each slot allows you to connect one DDR3 SO-DIMM memory module up to 8 Gbytes in size, for a total of 16 Gbytes. The DDR3 SO-DIMM memory modules that you use must support 1.5 V signaling. You can use low voltage 1.35 V SO-DIMM memory modules, as long as they can be powered at 1.5 V.[2]

The pinout for the SO-DIMM slot is available at the website of the Joint Electron Device Engineering Council (JEDEC): http://www.jedec.org.

SATA connectors for mass storage devices

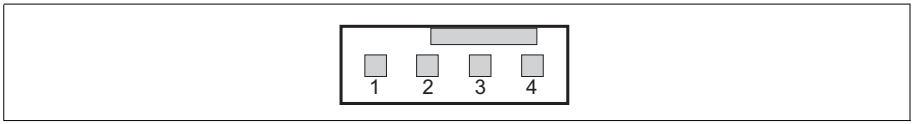
There are two 7-pin SATA male connectors for mass storage devices on the motherboard: port 0 and port 1. Note that port 0 is below port 1 when facing the front panel. The pinout for the SATA connector is available at the website of the Serial ATA International Organization, http://www.sata-io.org.

---

1. The x8 PCIe 2.0 connector supports x1 or x4 electrical connections. If you install a x8 PCIe board in the x8 slot, the board will operate at a maximum of x4 PCIe.
2. The maximum SO-DIMM speed supported is 1333 MHz (PC3-10600) with Sandy Bridge (Celeron G540), and 1600 MHz (PC3-12800) with Ivy Bridge (i7-3770 and i5-3550S).

Power supply connectors for peripheral devices (fans)

There are two 4-pin power supply male connectors for peripheral devices, such as additional fans, on the motherboard.



Pin	Description
1	Ground.
2	+12 V.
3	Indicates the speed of the fan (tachometer input).
4	Controls the speed of the fan, using pulse-width modulation (PWM).

RS-232 COM port header

There is one COM port header on the motherboard. This connector is a standard 10-pin, IDS male, dual row, RS-232 COM port connector. This connector is connected to the external DB-9 connector. Use the external DB-9 connector instead; see the *RS-232 COM port* subsection of the *Pinout descriptions of external connectors* section, in *Appendix B: Technical reference*.

Appendix C: Operating system recovery

This appendix provides instructions on how to restore or backup your operating system.

Matrox rescue utility

Matrox 4Sight GP comes with a Matrox rescue utility offering 3 choices of operation to recover or backup your unit:

- Restore the operating system to its factory default settings or to an image of the current customized operating system.

- Backup the current customized operating system to a hidden partition (for future recovery).

- Create a backup of the factory default or current customized operating system on a USB storage device (for future recovery).

Creating a backup of the operating system (factory default or customized image) is recommended, in case you lose or damage the default configuration on your hard drive; this can happen if the system files get corrupted, or are accidentally overwritten or deleted.

Warning

When restoring an operating system, the Matrox rescue utility will reformat and ***erase all data*** currently on your hard drive (except the data stored in the hidden partition). If you have two hard drives in your Matrox 4Sight GP unit, make sure to select the correct hard drive on which you want to restore the operating system; alternatively, we recommend to disconnect all other hard drives to prevent data from being erased by accident.

You must manually restore all personal data files and/or software applications that were not provided by Matrox. If possible, backup all data and software applications before proceeding.

For the latest information on this topic, refer to the ***WINReadme.txt*** file, available in the following file on your Matrox 4Sight GP: *<MTX4SGP>:\Drivers and Utilities\SystemDriverAndUtilities.zip*

- Note that the Matrox 4Sight GP hard drive has 3 partitions labeled as follows: RECOVERY, MTX4SGP, and DATA. In normal operation with only one SATA-connected hard disk drive and without any external devices plugged in, (such as a CD/DVD drive or USB storage device), the partition labeled as MTX4SGP is assigned to the C: drive, the DATA partition is assigned to the D: drive, and the RECOVERY partition (which is the hidden partition) is not assigned to any drive. While operating in system recovery mode, the RECOVERY partition is assigned to the C: drive, the MTX4SGP partition is assigned to the D: drive, and the DATA partition is assigned to the E: drive.

Restore to factory default settings

The Matrox 4Sight GP unit uses Microsoft Windows Embedded Standard (WES) 7 (64-bit version). However, both the 64-bit and 32-bit WES 7 recovery OS images are included in the hidden partition. The Matrox rescue utility will restore the original operating system, device drivers, and any other software provided by Matrox. To restore a factory image of your operating system (in either 32-bit or 64-bit), perform the following steps:

1. Reboot your unit and press **F6** during power-on self-test (POST) to launch the **System Recovery Options** dialog box. Note that you only have a few moments to press this key before the boot-up process continues.

2. Select your keyboard input method, and then click on the **Next** button.

3. Log on using your user name and password.

4. Select the **Matrox Imaging Rescue Utility** option from the menu.

5. Select the **Restore OS** option from the menu.

6. Follow all on-screen instructions.

Backup current customized image

To backup the current customized image of your operating system to a hidden partition, so that you can restore it later using the Matrox rescue utility (**Restore OS** option), perform the following:

1. As administrator, run the *<MTX4SGP>:\Matrox\resealImage.bat* file.

2. Reboot your unit and press **F6** during power-on self-test (POST) to launch the **System Recovery Options** dialog box. Note that you only have a few moments to press this key before the boot-up process continues.

3. Select your keyboard input method, and then click on the **Next** button.

4. Log on using your user name and password.

5. Select the **Matrox Imaging Rescue Utility** option from the menu.

6. Select the **Backup OS** option from the menu.

7. Follow all on-screen instructions.

   - Note, do not save the backup image to the *<MTX4SGP>* and *<DATA>* partitions. We suggest that you use the following folder in the hidden partition: *<RECOVERY>:\XImages.* Note that the hidden partition is accessible while using the **Matrox Imaging Rescue Utility**.

Create a backup on a USB storage device

A backup can be created on a USB storage device (for example, an external hard drive, or a flash drive such as a USB key). A minimum of 16 Gbytes of free space is required on the USB storage device.

Warning

The USB storage device will be formatted; *all data* on the USB storage device *will be erased*.

To create a backup on a USB storage device, perform the following steps:

1. Reboot your unit and press **F6** during power-on self-test (POST) to launch the **System Recovery Options** dialog box. Note that you only have a few moments to press this key before the boot-up process continues.
2. Select your keyboard input method, and then click on the **Next** button.
3. Log on using your user name and password.
4. Select the **Matrox Imaging Rescue Utility** option from the menu.
5. Select the **Create a backup on a USB storage device** option from the menu.
6. Follow all on-screen instructions.

Appendix D: Hardware glossary

This appendix defines some of the specialized terms used in the Matrox 4Sight GP documentation.

Glossary

- **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.

- **BIOS.**

  Basic input/output system. The interface between the operating system and the hardware. It is also responsible for booting the operating system when a unit is turned on.

- **Blocking cache.**

  A type of cache that allows for one information request at a time. If the cache does not contain the information needed by the processor, it will be "blocked," or unavailable for use until the required information is obtained from memory.

  See also *cache* and *non-blocking cache*.

- **Bus.**

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

- **Cache.**

  A memory area of the processor. The processor can access data from its cache faster than it can access data from system RAM or mass storage devices.

  Many processors have a *primary* cache and a *secondary* cache. When searching for information, the processor first refers to the primary cache. If it cannot find the required information, it will then refer to the secondary cache.

  See also *blocking cache* and *non-blocking cache*.

- **Color component.**

  One of the components that make up a color space. 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.

- **Contiguous memory.**

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

- **DCF.**

  Digitizer configuration format. A format that defines the input data format and, for example, how to accept or generate video timing signals, such as horizontal synchronization, vertical synchronization, and pixel clock.

  Such files have a .dcf extension.

- **DDR3 SDRAM.**

  Double data rate three synchronous dynamic random access memory. A type of RAM used for image capture and processing.

  See also *RAM*.

- **DHCP.**

  Dynamic host configuration protocol. A DHCP server automatically assigns IP addresses to clients who log onto a TCP/IP network. It eliminates the need to manually assign and manage unique IP addresses for all of the machines on a network.

- **Digitizer configuration format.**

  See *DCF.*

- **Display memory.**

  Display memory is a dedicated storage area used for displaying data. Since a computer sends out data faster than a screen can display it, the data is temporarily stored in display memory.

- **Driver.**

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

- **Ethernet.**

  The most common standard for the physical wiring and signalling on a local area network (LAN). The Gigabit Ethernet LAN supports data transfer at rates of 10, 100, or 1000 Mbits/sec.

  See also *LAN*.

- **Ethernet cable.**

  A wire similar to a telephone cable that carries the signals between Ethernet devices.

- **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.

- **FPGA.**

  Field-programmable gate array. An array of digital electronic components that can be programmed to perform a specific function. An FPGA can contain logic gates, lookup tables, flip-flops, and programmable interconnect wiring. This combination of customizability and functionality allows for the same FPGA to be used in a variety of projects.

- **Frame.**

  A single image grabbed from a video source.

- **Full-duplex mode.**

  A communication method that involves sending and receiving information simultaneously. For example, a switch can operate in full-duplex mode.

- **Grab.**

  To acquire an image from a video source.

- **Half-duplex mode.**

  A communication method that involves sending or receiving information. However, this cannot be done simultaneously. For example, all hubs operate in half-duplex mode.

- **Horizontal synchronization signal.**

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

  See also *vertical synchronization signal*.

- **Host.**

  In general, Host refers to the principal processor in one's computer.

- **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.

- **IP address.**

  Internet protocol address. The electronic address of a computer (station) on a TCP/IP network, which is unique for every client and server station. Client workstations have either a permanent or dynamically assigned address. The IP address is a dot address that is written as four sets of numbers separated by periods, also called dotted quad notation (for example, 203.142.62.2). The TCP/IP packet uses 32 bits to hold the IP address.

- **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 surface transparent so that corresponding areas of the underlay 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*.

- **LAN.**

  Local area network. A LAN is a group (or network) of computers and other devices that are connected together to share the resources (files, printers, devices, and other services such as internet access) of a single workstation or server within a small geographical area. The main LAN connection technology used is Ethernet cable, which connects users (clients) to the LAN's server. Clients download applications and/or services from the server, and then run or use them from their local computer.

- **LVDS.**

  Low-voltage differential signaling. LVDS offers a general-purpose, high-bandwidth interface standard for serial and parallel data interfaces that require increased bandwidth at high speed, with low noise and power consumption.

- **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.

- **Node controller.**

  Responsible for control of data-taking activities within a partition.

- **Non-blocking cache.**

  A type of cache that can handle multiple information requests. If the cache does not contain the information needed by the processor, it can handle ensuing requests while the processor accesses the memory.

  See also *cache* and *blocking cache*.

- **PCIe.**

  Peripheral Component Interconnect Express. The standard used for the computer bus that acts as an interface between hardware devices, such as Matrox 4Sight GP, and your computer.

- **POST.**

  Power-on self test. This test is performed by the BIOS, as soon as the computer is turned on. POST gathers information about what the unit contains, and ensures that everything is working properly. It works by performing a list of tasks related to testing the RAM, the on-board hardware, the expansion boards, the keyboard, the hard disk drives, and other installed components. If all the tasks are completed, the BIOS will proceed to boot the operating system. If a task cannot be completed, POST will report an error to the BIOS, and a message will be displayed.

- **Progressive scanning.**

  Describes a scan mode in which the video source transfers rows of source data sequentially to the destination.

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

- **Protocol.**

  A set of standards (rules/formats) for transmitting information "packets" between computer software and hardware devices. Information packets are structured according to the standards of a protocol. On a network, the data link or Media Access Control protocol standard, such as the CSMA/CD standard, provides the access method, and TCP/IP provides the control and routing method to transmit (move) information packets.

- **RAM.**

  Random access memory. RAM is memory in which the operating system, application programs, and data in current use are stored so that they can be accessed by the processor. Information stored in RAM is lost when power is cut off. RAM chips can be typically installed on a memory module (such as a SO-DIMM memory module) that is plugged into the motherboard.

  See also *SO-DIMM*.

- **RAMDAC.**

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

- **Real-time processing.**

  The processing of an image at the same speed or faster than the speed at which images are grabbed. Real time processing ensures that no frames are missed.

  Also known as *live processing*.

- **RGB.**

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

- **Root controller.**

  See *node controller.*

- **SO-DIMM.**

  Small outline dual in-line memory module. A SO-DIMM is a memory module with integrated circuitry.

  See also *RAM.*

- **Subnet mask.**

  The sequence of numbers that the router uses to determine which parts of the 32-bit IP address is specific to the subnetwork (that is, common to all of the machines on the network) and should be used for transmitting the information "packet" to the subnetwork. This mask saves the router from having to handle the entire 32-bit IP address; instead, it can look at only the bits enabled (set to "1") by the mask. For example, if the network and subnet addresses are contained in the upper 24 bits, and the specific Host address is contained in the lower 8 bits, then you can convey this information to the router to allow quicker transmission to the subnet by passing the following mask value: 255.255.255.0 (11111111.11111111.11111111.00000000).

- **TCP/IP.**

  Transmission control protocol/internet protocol. The basic communication protocol (or language) of the internet that has become the global standard for network communications since it ensures faithful data transmission. TCP/IP uses the *client-server* communication model, in which a computer user (client) makes requests and is provided services by a network computer (server).

  TCP/IP is a multi-layered protocol. In the transport layer, TCP ensures delivery of the entire file/message. TCP manages the assembly of files/messages into "packets" that are transmitted to and received by another TCP layer. That TCP

layer then reassembles the packets into its original format. In the network layer, IP routes the data to different destinations (LANs or WANs) based on the network address. TCP/IP is a routable protocol, which ensures that all messages contain the address of both the destination computer (station) and destination network. This makes it possible for messages to be transmitted to multiple networks.

- **TDP.**

  Thermal design power. The maximum amount of power that the processor's cooling system can dissipate.

- **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 by the digitizer.

  - Next valid frame/field mode. If your digitizer supports and uses this mode, the digitizer will grab the next valid frame or field.

- **Vertical synchronization signal.**

  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 synchronization signal*.

- **Vpp.**

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

Appendix E: Listing of Matrox 4Sight GP imaging computers

This appendix lists the key feature changes for specific versions and revisions of the Matrox 4Sight GP imaging computers.

Key feature changes

Part number	Version	Description
4GPI7M8*	22	Addition of the DB-9 (RS-232 COM) connector.
4GPI5M8*	22	Addition of the DB-9 (RS-232 COM) connector.
4GPCM4*	22	Addition of the DB-9 (RS-232 COM) connector.

Index

!

10/100/1000 BaseT mode 56

A

ACPI 61
active cooling 61
Active Management Technology 51
activity/link LED 32
advanced configuration and power interface (ACPI) 61
air filter 58
  cleaning 34
  replacing 34
AMT 51
analog display
  connector 21
  device 21
audio
  devices, connecting 30, 120
  input/output connectors 30, 120
  interface 57
auxiliary I/O
  connecting external devices 23
  interface 57

B

battery 107
BIOS
  changing configurations 65
  communicating with OS and devices 61
  description 54, 64
  memory 53
  settings 54
  Setup utility 65
    advanced menu 70
    boot menu 93
    exit menu 97
    main menu 69
    power menu 89
    security menu 88
boot devices
  Boot-Device Selection utility 99
  overriding the boot sequence 99
Boot-Device Selection utility 99
bus
  DMI 51
  LPC 51
  PCIe 50
  SPI 51
  USB 55

C

cables
  Ethernet
    CAT5e 22
    UTP5/UTP3 22
caches 52
cameras 30
CAT5e cables 22
CD/DVD drive 41
changing, date and time 69
chassis 58, 60
  dimensions 107
  removing 38
chipset 50
clock 50
connecting devices. See devices
connectors
  audio input/output 30, 120
  auxiliary I/O 23, 116
  DVI-D 21, 112, 114
  Ethernet 22, 112
  LAN 22, 112
  motherboard 13, 36
  PCIe 30, 45–46
  SO-DIMM slot 43, 105–106
  USB 22, 111
CPU. See processor

D

date, changing 69
DDR2 SDRAM 43, 53
devices
  audio 30, 120
  auxiliary I/O devices 23
  cameras 30
  CD/DVD drives 41
  displays 21
  hard disk drives 41, 54, 106
  keyboards 22
  memory modules (RAM) 43
  mouse 22
  PCIe full-height, half-length boards 30, 45–46
  printers 22
  USB devices 22, 41
  video in devices on faceplate 30
digital display device 21
digital visual interface (DVI-D) 53
  connector 53, 112, 114
  transition minimized differential signaling 53
display capabilities 12, 21, 53
  TMDS transmitter 53
  video encoder 53
display devices 21
DMI interface 51
DVI-D. See digital visual interface (DVI-D)

E

EEPROM 54
encoder, video 53
Enhanced Intel Speedstep technology (EIST) 61
Ethernet
  connector 22, 112
  interface 56

F

fans 58–59, 107
flash memory BIOS settings 53
form factor 48

G

Gigabit
  Ethernet mode 56
  LED 31

H

handling precautions 15
hard disk drive 41, 54, 106
HDD LED 31
hibernation mode 61
high-resolution monitor 21

I

I/O capabilities 55
inductive load devices, connecting to 27
Intel
  Celeron G540 50
  i5-3550S 50
  i7-3770 50
  PCH
    Ethernet controller 56
Intel Quick Sync Video technology (QSV) 52
interfaces
  audio 57
  auxiliary I/O 57, 107
  Ethernet 56
  USB 55
internal
  motherboard components 11

K

keyboard 22

L

LAN
  cables 22
  controller 50
LEDs
  activity/link 32
  Gigabit 31
  HDD 31
lighting devices, connecting to 28
location of components and connectors 13
LVTTL
  signals 57

M

master
drive assignments 42
mode 42
Matrox 4Sight GP
additional components 15
chassis 60
package contents 14—15
shutting down 18
memory
RAM 53
removing and installing RAM 43
MIL 52
MIL Configuration utility 44
MilConfig. See MIL Configuration utility
Mini-ITX based form factor 104
MMX technology 51
modes of storage devices
primary master 42
secondary master 42
monitors. See display devices
motherboard
chipset 104
components 11—12
connectors 36
CPU/processor 50, 104
environmental specifications 105
features 12
mouse 22

N

network
capabilities 56
connections 22
NPN-compatible PLC devices, connecting to 25

O

open collector output signals 23
operating system
supported operating systems 10

P

package contents 14—15
passive cooling 61
PCIe
bus 50
interface 12, 50
PCIe full-height, half-length boards
considerations when connecting 30, 45—46
pinout. See connectors
PNP-compatible PLC devices, connecting to 26
POST 137
power
management 50, 61
power-off immediate 18
supply 58, 106
primary master 42
printer 22
processor 12, 50—51
Ivy bridge 51
MMX technology 51
power management 61
Sandy bridge 51
SSE technology 51

Q

QSV 52

R

RAM
flash memory chip 53
removing and installing 43
RAMDAC 53
removing
chassis 38
memory module (RAM) 43
RJ-45 connector 22, 112
RS-232 COM port 119, 124

S

S4 sleeping state 61
SATA devices
    connecting to motherboard 41
    drive assignments 42
SDVO 53
secondary master 42
Serial Digital Video Out (SDVO) port 53
shutting down Matrox 4Sight GP 18
SO-DIMM 43, 53
SPI bus 51
SSE technology 51
storage
    hard disk drive 54
    SATA devices 13
Streaming SIMD extension (SSE) technology 51
strobe devices, connecting to 28
support
    Matrox web site 16
    technical support 16
supported operating systems 10

T

temperature
    control 61
time, changing 69
TMDS transmitter 53
TTL devices, connecting to 29
turning off Matrox 4Sight GP 18

U

universal serial bus. See USB
USB
    connectors 22, 111
    header 55
    interface 55
utility
    BIOS Setup utility 65
    Boot-Device Selection utility 99

V

video
    encoder 53
    input devices on faceplate 30
    memory
        flash memory 53

W

website, support 16
Windows, supported operating systems 10

Regulatory Compliance

FCC Compliance Statement

Warning

Changes or modifications to these units 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 connections of these devices to other peripherals is required to meet the regulatory requirements.

Note

These devices comply with Part 15 of 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.

This equipment has been tested and found to comply with the limits for Class A digital devices, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of these devices in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his/her own expense.

Industry Canada Compliance Statement

These digital apparatuses do not exceed the Class A limits for radio noise emission from digital apparatuses set out in the Radio Interference Regulations of Industry Canada.

Ces appareils numériques n'émettent pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de Classe A prescrites dans le Règlement sur le brouillage radioélectrique édicté par Industrie Canada.

EU Notice (European Union)

WARNING: These are class A products. In a domestic environment these products may cause radio interference in which case the user may be required to take adequate measures.

AVERTISSEMENT: Ces appareils sont des produits informatiques de Classe A. Lorsque ces appareils sont utilisent dans un environnement résidentiel, ces produits peuvent entraîner des interférences radioélectriques. Dans ce cas, l'usager peut être prié de prendre des mesures correctives appropriées.

This device complies with EC Directive 89/336/EEC for Class A digital devices. They have been tested and found to comply with EN55022/CISPR22 and EN55024/CISPR24 when installed in a typical class A compliant host system. It is assumed that these devices will also achieve compliance in any Class A compliant system.

Ces unités sont conformes à la Directive communautaire 89/336/EEC pour les unités numériques de Classe A. Les tests effectués one prouvé qu'elles sont conformes aux normes EN55022/CISPR22 et EN55024/CISPR24 lorsqu'elles sont installées dans un système hôte typique de la Classe A. On suppose qu'ils présenteront la même compatibilité dans tout système compatible de la Classe A.

Directive on Waste Electrical and Electronic Equipment (WEEE)

Europe

(English) European user's information – Directive on Waste Electrical and Electronic Equipment (WEEE)

Please refer to the Matrox Web site (**www.matrox.com/environment/weee**) for recycling information.

(Français) Informations aux utilisateurs Européens – Règlementation des déchets d'équipements électriques et électroniques (DEEE)

Se référer au site Web de Matrox (**www.matrox.com/environment/weee**) pour l'information concernant le recyclage.

(Deutsch) Information für europäische Anwender – Europäische Regelungen zu Elektro- und Elektronikaltgeräten (WEEE)

Bitte wenden Sie sich an dem Matrox-Website (**www.matrox.com/environment/weee**) für Recycling Informationen.

(Italiano) Informazioni per gli utenti europei – Direttiva sui rifiuti di apparecchiature elettriche ed elettroniche (RAEE)

Si prega di riferirsi al sito Web Matrox (**www.matrox.com/environment/weee**) per le informazioni di riciclaggio.

Limited Warranty

Refer to the warranty statement that came with your product.