VMIOMAX-8450
Industrial Automation
PC-Based Controller System

Product Manual

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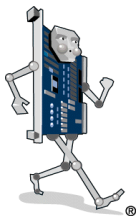

(I/O man figure)

(IOWorks man figure)

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Introduction

The VMIOMAX-8450 PC-Based Controller System is a complete, high-performance system that is just one in a series of cost-effective, PC-based systems offered by VMIC. With its extensive line of IOMAX I/O boards, PC-based controller systems and software, VMIC provides turnkey solutions for applications ranging from high-speed process control to data acquisition to industrial automation. Additionally, the VMIOMAX-8450's DIN rail mounting enables it to be easily located with your current industrial I/O boards. The VMIOMAX-8450's functionality comes in a package the size of a program logic controller, but is much faster.

Read this document first so you can verify system operation and troubleshoot any problems. The "Overview" summarizes features provided by your controller package. If you are already familiar with PC-based control concepts and are ready to get started, skip to Chapter 2, Hardware Installation on page 59.

Feature Summary

The VMIOMAX-8450 controller rolls the PC's power and connectivity in with the universality of a DIN rail mounted platform. This platform is ideal for a variety of applications ranging in complexity, and allows easy integration of VMIC and third-party I/O products.

VMIC uses the latest technology to develop both the hardware and software components comprising the VMIOMAX-8450. Its all-in-one construction saves space, and its powerful features bring productivity and savings to even the most cost-conscious control applications. Enclosed in a tiny industrial class aluminum chassis, the controller CPU has a high-performance 300 MHz CPU. The CPU comes standard with 32 Mbyte of SDRAM. Interfaces offered via its 10/100 Base-T Ethernet connector can be Modbus, GeniusBus, Profibus-DP and DeviceNet, to name a few. To ensure there is plenty of room for data access and storage, you can purchase an IBM Microdrive with up to 1 GBytes of storage.

The main features provided by the VMIOMAX-8450 are described below.

- **Pre-loaded with IOWorks.** You can order your controller with an IOWorks system pre-loaded at the factory. The IOWorks PC-based control software provides the project management, programming environment and run-time tools necessary for PLC-like functionality.
- **Integrated solution and support.** You can purchase the target controller, software, remote I/O and other add-ons from a single vendor, VMIC. This *one-stop* shopping makes ordering, integration and technical support easy and convenient. If you have a question about the controller or its components, you can call VMIC for assistance. See Contacting VMIC on page 72.
- **All-in-one casing**. Achieve substantial installation savings through reduction in wiring and labor by locating the controller near the sensors and controlled devices. The VMIOMAX-8450 chassis is designed for DIN rail mount applications, or you can set it up as a benchtop system.
- **Plug and play installation**. For an operational system, simply (1) connect the common PC support peripherals such as the keyboard and mouse; and (2) connect the controller to your local area network (LAN).
- **Standard network communication**. Ethernet and Fast Ethernet are the supported network topologies. Networked users, at all levels of organization in a plant, can get access to real-time data. In addition, data can be transferred between any connected PLCs and the controller simultaneously.
- **Hard real-time deterministic solutions**. Time-critical data exchange can be built with the Wind River® VxWorks operating system running on your controller.

- **Open IOMAX standard for remote I/O**. VMIC offers one of the widest selections of I/O boards in the industry. In addition, the VMIOMAX-8450 enables you to connect third-party I/O systems and other fieldbuses.
- **Flexible programming options**. Use Ladder Logic and Function Block IEC 61131-3 languages, or C\C++ languages to create control applications.

Available VMIOMAX-8450 Models

The VMIOMAX-8450 is available with the following memory sizes and storage options:

VMIOMAX-8450 - A B C D	
A = Processor Speed / Memory	
Option	Description
0	300 MHz (Minimum) with 32 Mbyte SDRAM
1	300 MHz (Minimum) with 64 Mbyte SDRAM
2	300 MHz (Minimum) with 128 Mbyte SDRAM
B = Power Supply Option	
Option	Description
0	DC / DC 25 W Power Supply Unit
C = Case-Style (Mounting Options)	
Option	Description
0	DIN Rail Mounting
D = Storage Options	
Option	Description
0	16 MByte Flash Memory
1	32 MByte Flash Memory
2	64 MByte Flash Memory
3	128 MByte Flash Memory
4	512 MByte Microdrive
5	1 Gbyte Microdrive

About PC-Based Control

PC-based controllers use standard communication software and hardware technologies. Instead of using a dedicated, closed architecture implemented in PLCs, a PC-based controller distributes basic controller functions and responsibilities among standard PC "plug-and-play" components. You have the flexibility to upgrade your environment as well as mix-and-match products to use the most current and cost-effective technologies.

Controller Requirements

VMIC has more than 13 years of experience in the controller industry and knows that to compete successfully in the growing PC-based controller market, the following issues *must* be addressed:

- Real-time control
- Modular software and hardware
- System speed and throughput
- Power failure and recovery
- Quick program-development
- Monitor and on-line debug
- High capacity CPU disk and memory
- Durable casing in a factory environment
- Third-party fieldbus connectivity

These requirements enable this PC-based controller to be a viable solution as either an alternative to PLCs, or as a system to work in tandem with your current PLC(s).

Basic Concepts

As a PC-based controller, your VMIOMAX-8450 can be used as a remote target controller in a distributed system. In a distributed system, a *host* CPU connects to your VMIOMAX-8450 CPU via Ethernet. A host CPU contains the program development tools and runs under the Windows NT 4.0, MS-DOS or Linux operating systems. The host encapsulates the utility functions of the controller as listed below.

- Provides the user interface for program development, configuration and control
- Contains compiler to build programs
- Supports multiple logical ports

Target controllers represent the run-time functionality of a controller to execute the control programs developed on the host. The *target controller* in a distributed system provides the program execution and run-time functionality. A remote target controller off-loads computing responsibilities from the host CPU.

A few of the remote target controller functions are listed below.

- Maintains the internal file system for target controller configuration, startup and recovery
- Manages real-time target controller data
- Enables on-line editing
- Schedules program execution for real-time control

NOTE: The VMIOMAX-8450 was certified as compliant with FCC and CE Class A Industrial Automation standards using shielded Ethernet and RS-232 serial port cables. The serial port cables also comply with the recommended standard RS-232C cable length of 50 feet.

Using this Document

This manual provides procedures to install, verify and troubleshoot your VMIOMAX-8450 system.

Intended Audience

The manual is written for users with an intermediate to advanced knowledge of:

- PLC architecture
- CPU hardware configuration
- Ethernet networking and setup

Conventions

This section describes the type conventions used throughout this guide.

Table 1 Conventions List

Type	Represents...
Italic type	Emphasized text and document titles are italicized.
“quotation marks”	Chapters and sections within a document are enclosed in quotation marks.
bold type	Windows NT and other graphical user interface elements are in bold type.
`monospace type`	Text, function names, parameters, and program code.
`bold, monospace type`	User response: key-in text.
SMALL, UPPERCASE	Keyboard names.

WARNING: Informs the operator that a practice or procedure should *not* be performed. Actions could result in injury or death to personnel, or could result in damage to or destruction of part or all of the system.

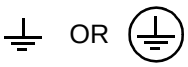
CAUTION: Denotes a hazard. It calls attention to an operating procedure, a practice, or a condition, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the system.

NOTE: Denotes important information. It calls attention to a procedure, a practice, a condition or the like, which is essential to highlight.

Safety Symbols Used in this Manual

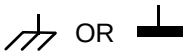
More information on safety usage is provided in the Safety Summary on page 21.

Indicates dangerous voltage (terminals fed from the interior by voltage exceeding 1,000 V are so marked).



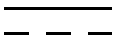
Protective conductor terminal. For protection against electrical shock in case of a fault. Used with field wiring terminals to indicate the terminal which must be connected to ground before operating equipment.

Low-noise or noiseless, clean ground (earth) terminal. Used for a signal common, as well as providing protection against electrical shock in case of a fault. Before operating the equipment, terminals marked with this symbol must be connected to ground in the manner described in the installation (operation) manual.



Frame or chassis terminal. A connection to the frame (chassis) of the equipment which normally includes all exposed metal structures.

Alternating current (power line).



Direct current (power line).

Direct current (power line) and Alternating or direct current (power line).

Document Organization

Chapters in this guide are organized as described below.

Chapter 1 “System Functional Specifications.” This chapter contains technical information about the components that make up the VMIOMAX-8450.

Chapter 2 “Hardware Installation.” This chapter contains step-by-step instructions on setting up your system and connecting it to your LAN.

Chapter 3 “Post Installation: Setup and Troubleshooting.” This chapter contains guidelines on connecting remote I/O boards to your IOMAX CPU, as well as providing troubleshooting information to resolve installation or configuration problems.

Related Documents

VMEbus

VMEbus Specification - contains the specifics on the VMEbus. Available from:

VITA
VMEbus International Trade Association
7825 East Gelding Dr., No. 104
Scottsdale, AZ 85260
(480) 951-8866
FAX: (480) 951-0720
Internet: www.vita.com

Wind River

For information about the VxWorks operating system, see the Wind River website:

www.wrs.com

Physical Description and Specifications

Refer to Specification 800-318450-000 available from:

VMIC
12090 South Memorial Pkwy.
Huntsville, AL 35803-3308
(256) 880-0444
(800) 322-3616
Fax: (256) 882-0859

Safety Summary

The following general safety precautions must be observed during all phases of the operation, service and repair of this product. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture and intended use of this product.

VMIC assumes no liability for the customer's failure to comply with these requirements.

Ground the System

To minimize shock hazard, the chassis and system cabinet must be connected to an electrical ground. A three-conductor AC power cable should be used. The power cable must either be plugged into an approved three-contact electrical outlet or used with a three-contact to two-contact adapter with the grounding wire (green) firmly connected to an electrical ground (safety ground) at the power outlet.

Do Not Operate in an Explosive Atmosphere

Do not operate the system in the presence of flammable gases or fumes. Operation of any electrical system in such an environment constitutes a definite safety hazard.

Keep Away from Live Circuits

Operating personnel must not remove product covers. Component replacement and internal adjustments must be made by qualified maintenance personnel. Do not replace components with power cable connected. Under certain conditions, dangerous voltages may exist even with the power cable removed. To avoid injuries, always disconnect power and discharge circuits before touching them.

Do Not Service or Adjust Alone

Do not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present.

Do Not Substitute Parts or Modify System

Because of the danger of introducing additional hazards, do not install substitute parts or perform any unauthorized modification to the product. Return the product to VMIC for service and repair to ensure that safety features are maintained.

Dangerous Procedure Warnings

Warnings, such as the example below, precede only potentially dangerous procedures throughout this manual. Instructions contained in the warnings must be followed.

WARNING: Dangerous voltages, capable of causing death, are present in this system. Use extreme caution when handling, testing and adjusting.

CHAPTER
1

System Functional Specifications

Contents

Introduction

This chapter describes the features of the VMIOMAX-8450 system.

The VMIOMAX-8450 System

The VMIOMAX-8450 (see Figure 1-1 below) is an all-in-one CPU module with an onboard 10/100BaseT Ethernet interface and graphics acceleration. The CPU is a 300MHz, x86-compatible 64-bit microprocessor with sixth generation features. Memory is standard at 32 Mbytes with 3.3V SDRAM SODIMMs.

The graphic interface supports a variety of LCD and TFT Flat Panels, and meets ordinary SVGA standards. It includes 2 Mbytes of graphic memory, with a maximum resolution of 1280 x 1024 and 16.7 million colors. Other interfaces include a PanelLink interface located on the bottom side of the CPU board and an Audio interface located on the connector board with two inputs, two outputs and a microphone line.

The CPU board, as well as other hardware that make up the module, are enclosed within the unit's aluminum case.

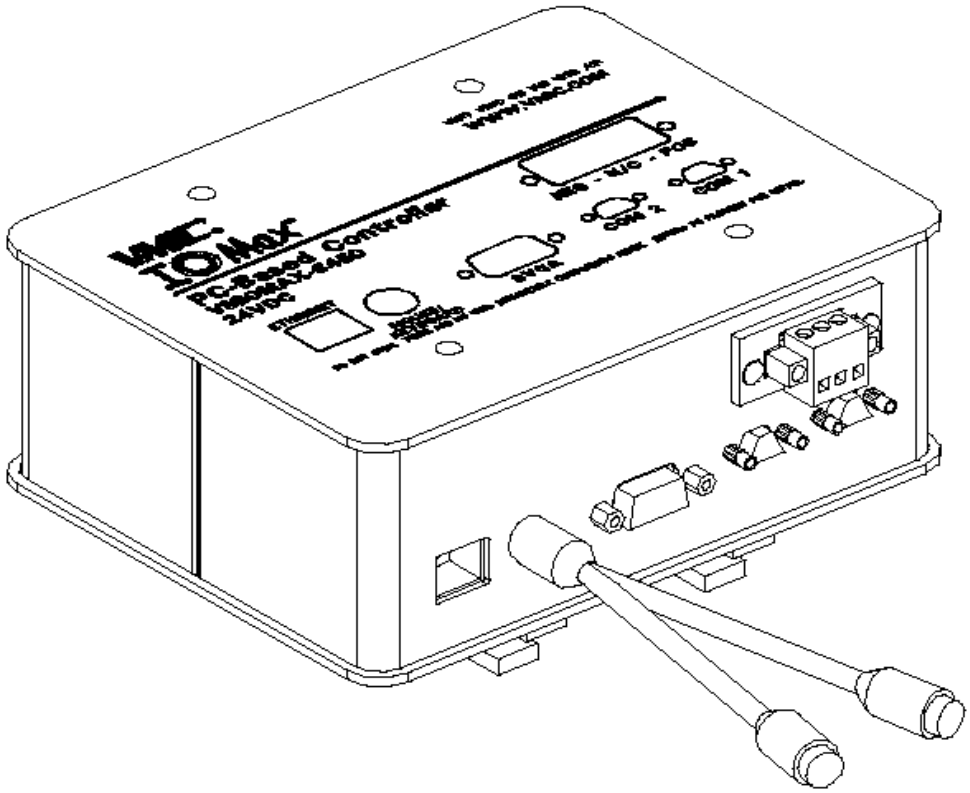


Figure 1-1 VMIOMAX-8450

VMIOMAX-8450 Functional Block Diagram

The following is a functional block diagram that illustrates the main components and features of the VMIOMAX-8450.

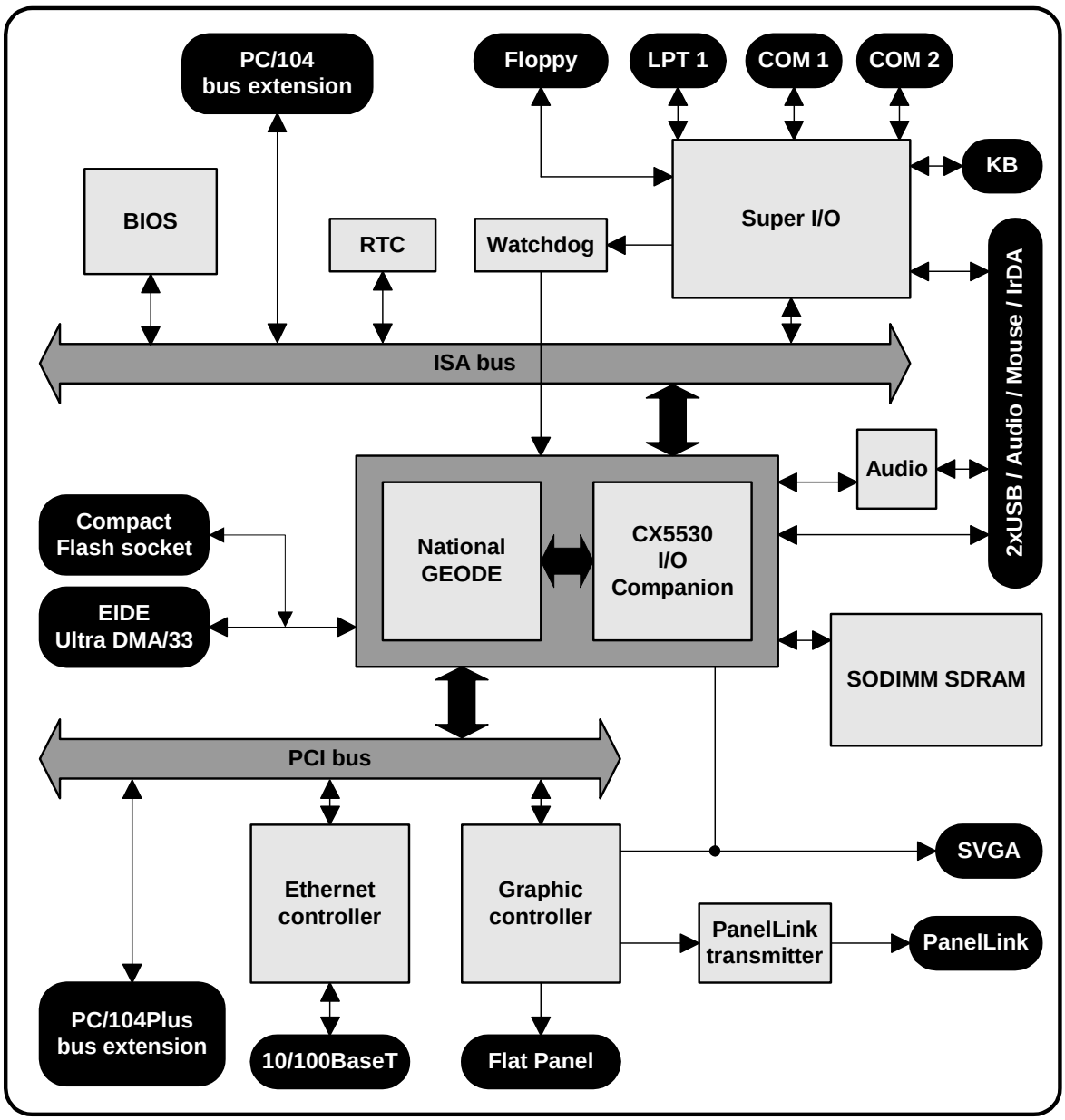


Figure 1-2 VMIOMAX-8450 Functional Block Diagram

VMIOMAX-8450 Motherboard Specifications

The following are the technical specifications of the VMIOMAX-8450 motherboard.

Mechanical:

- Dimensions (LxW): 95.9mm x 115.6mm (including I/O extension)
- Height: 15mm
- Weight: 140g (including Battery and 32Mbyte RAM Module)
- Four Mounting Holes

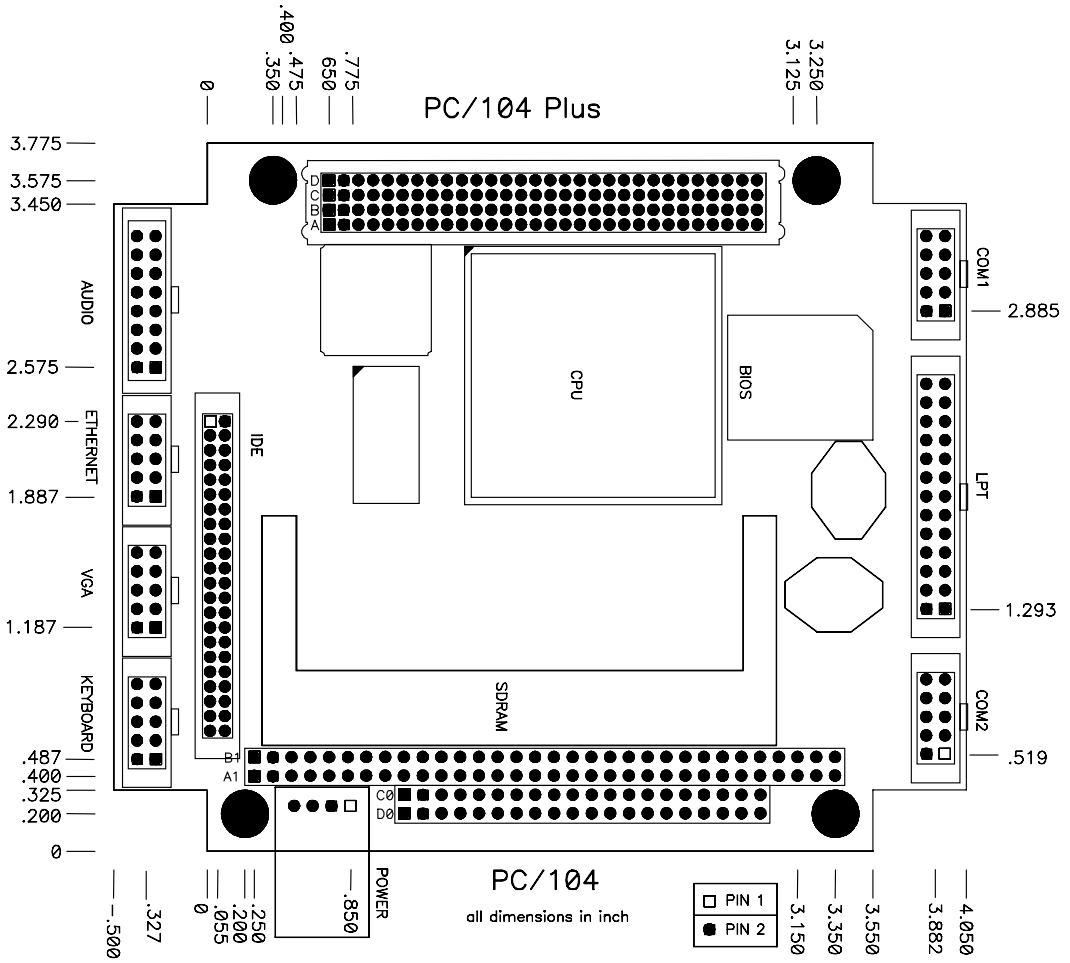


Figure 1-3 Top View of VMIOMAX-8450 Motherboard

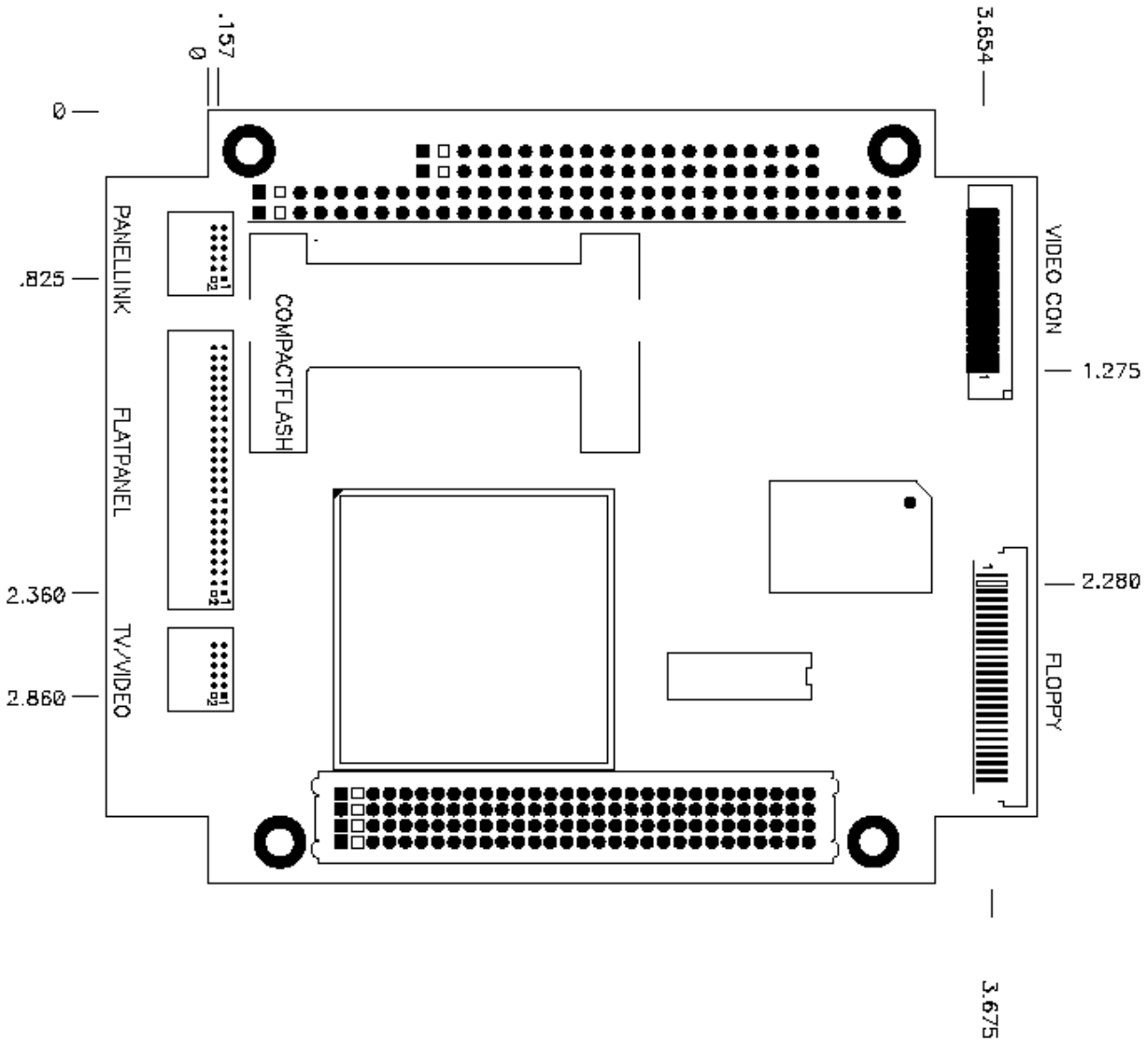


Figure 1-4 Bottom View of VMIOMAX-8450 Motherboard

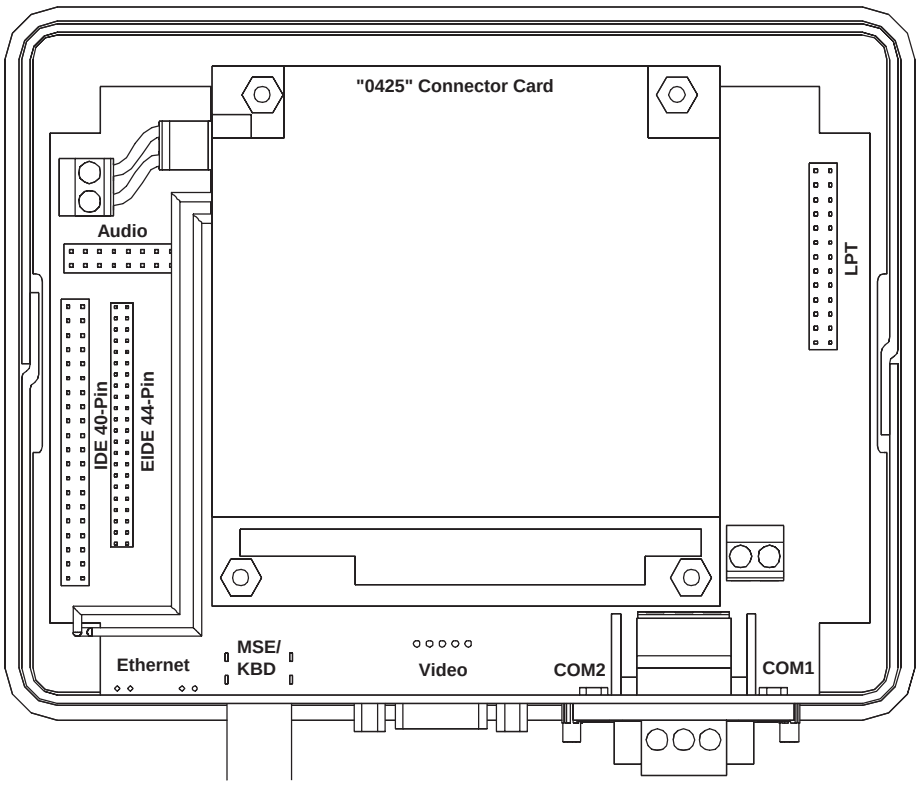


Figure 1-5 "0425" Connector Card

Electrical:

- Supply voltage: +5V
- Supply voltage ripple: +/- 5 %
- Supply current: Varies according to CPU frequency
- BIOS setup backup battery: 2.8V / 49 mAh

Environmental:

- Temperature range: 0..60 °C
- Humidity (relative): 10...90 %
- Pressure: 450 to 1100 hPa

CPU:

- National Geode MMX with I/O Companion CX5530

Cache Memory:

- 16 KB unified L1 Write-Back Cache
- No L2 cache subsystem can be installed

Main Memory:

- Supports a 64-bit memory bank using single- or double-sided 144-pin SO DIMM modules up to 128MB SDRAM

Power Supply:

- 8-30V DC / DC Power Supply (25 Watt)

Supported Interfaces:

- Power supply
- PS / 2 Keyboard
- One parallel port
- Two serial ports
- PS / 2 Mouse
- Two USB ports
- IrDa
- Floppy
- EIDE
- SVGA monitor
- Flat Panel
- Compact Flash socket
- PC / 104 Bus
- PC / 104-Plus Bus

Extension Slots:

- 1x 32-bit PC / 104-Plus slot
- 1x 16-bit PC / 104 slot

Options:

- Ethernet — 10/100BaseT Intel 82559ER Ethernet controller
- Sound — AC97 Sound Codec National LM4548, Line-In (left/right), Line-Out (left/right), Microphone-In
- PanelLink — Panel Link Transmitter SIL140
- Compact flash cards
- Driver software:
  - — Graphic
  - — Ethernet
  - — Sound

These specifications are described in detail in the following sections.

NOTE: The VMIOMAX-8450 was certified as compliant with FCC and CE Class A Industrial Automation standards using shielded Ethernet and RS-232 serial port cables. The serial port cables also comply with the recommended standard RS-232C cable length of 50 feet.

VMIOMAX-8450 Chipset

The VMIOMAX-8450 chipset is comprised of two components:

- A National Geode MMX 64-bit CPU
- A CX5530 I/O Companion PCI-to-ISA bridge

The following features are provided by the chipset:

- x86 compatibility and support of MMX instruction set extension
- Full 2D graphics acceleration
- Synchronous memory interface
- PCI bus controller (PCI 2.1 compatible)
- ISA interface
- Ultra DMA/33 (ATA-4) support
- EIDE interface
- Two-port USB interface
- AT compatibility
- SMM power management
- Full VGA and VESA video
- 16-bit stereo sound
- MPEG2 assist
- AC97 Version 2.0 compatibility

CPU

The National Geode MMX is an advanced 64-bit x86 compatible processor featuring high performance, fully-accelerated 2D graphics, a 64-bit synchronous DRAM controller and a PCI bus controller, all on a single chip. It also supports the MMX™ instruction set extension for the acceleration of multimedia applications.

This processor utilizes a split rail design with a 300MHz processor of 3.3V I/O and 1.6 to 2.6V Core voltage. The core uses integer and floating point execution units based on sixth-generation technology. The integer core contains a single, six-stage execution pipeline with advanced features such as operand forwarding, branch target buffers and extensive write buffering. A 16Kbyte write-back L1 cache is accessed in a method that eliminates pipeline stalls to fetch operands that hit in the cache.

A separate on-chip video buffer enables >30FPS MPEG1 video playback in conjunction with the CX5530™ I/O Companion chip. Graphics and system memory accesses are supported by a tightly-coupled synchronous DRAM memory controller. This joint memory subsystem eliminates the need for an external L2 cache. Software handler routines for XpressGRAPHICS™ and XpressAUDIO™ are included in the BIOS and provide compatible VGA and 16-bit industry standard audio emulation.

I/O Companion

The CX5530 I/O Companion is a PCI-to-ISA bridge (South Bridge), ACPI-compatible chipset that provides AT/ISA functionality. The device also contains state-of-art power management, enabling notebook as well as “Deep Green” implementations. Hardware support for the Cyrix Virtual System Architecture™ (VSA™) is provided, enabling Microsoft® PC97 and PC98-compatible audio. The integrated bus master EIDE controllers support two ATA-compatible devices. A two-port Universal Serial Bus (USB) provides high speed, Plug & Play expansion for a variety of peripheral devices, such as digital cameras.

BIOS

The VMIOMAX-8450 motherboard is delivered with a standard PC BIOS. By default, all setup settings are performed to enable you to have a “ready to run” system, even without a BIOS setup backup battery. To change any of the pre-defined BIOS settings, access setup by pressing the <DEL> key on power up. The BIOS is located in a flash prom and can be easily updated under DOS.

All changes to BIOS settings are stored in the CMOS RAM of the real time clock. A copy of the CMOS RAM, excluding date and time data, is stored in the flash ROM. This means that even if the backup battery runs out of power, no CMOS settings are lost except date and time, which are reset to default values.

When in use, the backup battery is designed to last approximately ten years. The battery should be disconnected if the motherboard is to be stored.

NOTE: The default BIOS values can be automatically loaded by pressing down and holding the <0 / INSERT> key on the number pad and then booting the system.

Super I/O Controller

The VMIOMAX-8450's Super I/O Controller provides the following:

- PC-AT keyboard/mouse interface
- Floppy disk interface on FFC connector (on the CPU board inside the VMIOMAX-8450 case)
- COM1 and COM2 connectors
- LPT1 (on the connector board inside the VMIOMAX-8450 case)
- IrDa interface (on the connector board inside the VMIOMAX-8450 case)
- General purpose pins are used for the short- and long-time Watchdog Timer functions

PC-AT Mouse/Keyboard Interface

The keyboard interface is labeled **Mouse / Keyboard** and is located on the bottom of the aluminum case.

NOTE: See "Mouse/Keyboard Connector Pin Definition" on page 79 for information on pin signals.

The PS/2 mouse signals (MCLK and MDAT) are located on the motherboard's KB/mouse connector. It is labeled **Mouse / Keyboard** and is located on the bottom of the aluminum case.

PS/2 mouse function can be disabled or enabled by entering **BIOS features Setup** and then choosing **PS/2 mouse function control**.

The interface is programmable in BIOS. To program the interface:

1. Press down and hold the <DEL> key while booting the system.

   The **CMOS Setup Utility** screen displays.

2. Using the arrow keys, select **BIOS Features Setup**, and then press <ENTER>.

   The **BIOS Features Setup** screen displays.

3. Using the arrow keys, select **PS / 2 mouse function control**.

4. Using the <Page Up> and <Page Down> arrow, program the interface.

   The following settings are available when configuring the interface:

   - **Enabled**
   - **Disabled**

5. Press <ESC> to return to the **CMOS Setup Utility** screen. Then, use the arrow keys to select **Save & Exit Setup** and press <ENTER> when you are finished.

   The BIOS settings are saved and the computer boots.

NOTE: See "PS/2 Mouse / USB / IrDa / Audio Connector Pin Definition" on page 82 for information on pin signals.

Floppy Disk Interface

The floppy interface connector on the CPU motherboard inside the aluminum case is built for a “micro” slim line floppy disk drive with a flat ribbon cable connector. An optional adapter connector is needed to connect a conventional floppy disk drive.

NOTE: See "Floppy Connector Pin Definition" on page 84 for information on pin signals.

Serial Ports COM1 and COM2

The serial ports are labeled **COM1** and **COM2** and are located on the bottom of the aluminum case. These ports are RS-232C compliant and support the imposed standard cable length of 50 feet, maximum, in order to meet the requirements of EN61000-4-5 for CE Mark. This meets requirements for the GE Fanuc EMC Test Plan VMIOMAX-8450, DIN Rail Mount PC Controller System.

The ports are programmable in BIOS. To program the serial ports:

1. Press down and hold the <DEL> key while booting the system.

   The **CMOS Setup Utility** screen displays.

2. Using the arrow keys, select **Integrated Peripherals**, and then press <ENTER>.

   The **Integrated Peripherals** screen displays.

3. Using the arrow keys, select **Onboard Serial Port 1** or **Onboard Serial Port 2**.

4. Using the <Page Up> and <Page Down> keys, program the serial port.

   The following settings are available when configuring COM1 and COM2:

   - **Auto**
   - **3F8 / IRQ4 (base address / interrupt channel)**
   - **3F8 / IRQ3 (base address / interrupt channel) (COM1 Only)**
   - **2F8 / IRQ3 (base address / interrupt channel) (COM2 Only)**
   - **3E8 / IRQ4 (base address / interrupt channel)**
   - **2E8 / IRQ3 (base address / interrupt channel)**
   - **Disabled (COM 2 Only)**

5. Press <ESC> to return to the **CMOS Setup Utility** screen. Then, use the arrow keys to select **Save & Exit Setup** and press <ENTER> when you are finished.

   The BIOS settings are saved and the computer boots.

NOTE: See "COM1 and COM2 Port Connector Pin Definitions" on page 77 for information on pin signals.

Parallel Port LPT1

The parallel port is labeled **LPT** on the connector card inside the VMIOMAX-8450 case.

The port is programmable in BIOS. To program the parallel port:

1. Press down and hold the <DEL> key while booting the system.

   The **CMOS Setup Utility** screen displays.

2. Using the arrow keys, select **Integrated Peripherals**, and then press <ENTER>.

   The **Integrated Peripherals** screen displays.

3. Using the arrow keys, select **Onboard Parallel Port**.

4. Using the <Page Up> and <Page Down> keys, program the parallel port.

   The following settings are available when configuring the parallel port:

   - **Disabled**
   - **3BC/IRQ7 (base address / interrupt channel)**
   - **378/IRQ7 (base address / interrupt channel)**
   - **278/IRQ5 (base address / interrupt channel)**

   If you select **Disabled**, go to Step 7.

   If you select any other option, continue to Step 5.

5. Using the <Page Up> and <Page Down> arrow keys, select a parallel port mode.

   The following modes are available:

   - **Normal**
   - **EPP 1.7+SPP**
   - **ECP+EPP 1.7**
   - **SPP**
   - **EPP 1.9+SPP**
   - **ECP**
   - **ECP+EPP 1.9**

   If you select **ECP**, **ECP+EPP 1.7** or **ECP+EPP 1.9** as the parallel port mode, continue to Step 6.

   If you select any other parallel port mode, go to Step 7.

6. Using the <Page Up> and <Page Down> arrow keys, select a DMA access channel.

   The following channels are available:

   - **1**
   - **3**

7. Press <ESC> to return to the **CMOS Setup Utility** screen. Then, use the arrow keys to select **Save & Exit Setup** and press <ENTER> when you are finished.

   The BIOS settings are saved and the computer boots.

NOTE: See "LPT1 Port Connector Pin Definition" on page 78 for information on pin signals.

Audio Interface

NOTE: The speaker signal is located inside the case on the connector card labeled “audio.” Standard PC stereo speakers can be connected between the signals on pin 13 (Line Out L) and pin 14 (Line Out R) and pin 16 (Audio GND).

The Audio port is Soundblaster16-compatible under MS-DOS. A driver package is available for the Windows 95 and 98 platforms. An adapter cable with standard audio connectors is also available.

The interface is programmable in BIOS. To program the interface:

1. Press and hold the <DEL> key while booting the system.

   The **CMOS Setup Utility** screen displays.

2. Using the arrow keys, select **Integrated Peripherals**, and then press <ENTER>.

   The **Integrated Peripherals** screen displays.

3. Using the arrow keys, select **Build in CPU Audio**.

4. Using the <Page Up> and <Page Down> keys, program the interface.

   The following settings are available when configuring the interface:

   - **Enabled**
   - **Disabled**

   If you select **Disabled**, go to Step 6.

   If you select **Enabled**, continue to Step 5.

5. Using the <Page Up> and <Page Down> arrow keys, select the address modes for the interface.

   The following modes are available:

   Audio I/O Base Address

   - **220H**
   - **240H**
   - **260H**
   - **280H**

   MPU-401 I/O Base Address

   - **300H**
   - **330H**
   - **Disabled**

   Audio IRQ Select

   - **IRQ5**
   - **IRQ7**
   - **IRQ10**
   - **Disabled**

   Audio Low DMA Select

   - **DMA0**
   - **DMA1**
   - **DMA3**
   - **Disabled**

   Audio High DMA Select

   - **DMA5**
   - **DMA6**
   - **DMA7**
   - **Disabled**

6. Press <ESC> to return to the **CMOS Setup Utility** screen. Then, use the arrow keys to select **Save & Exit Setup** and press <ENTER> when you are finished.

   The BIOS settings are saved and the computer boots.

NOTE: See "PS/2 Mouse / USB / IrDa / Audio Connector Pin Definition" on page 82 for information on pin signals.

IrDa Interface

NOTE: An external transmitter, such as the Hewlett-Packard HSDL-1100 Infrared Transceiver, must be connected at the IrDa signals to use the IrDa interface.

The IrDa interface signals (IRRx and IRTx) are located on the connector board header labeled “audio.” The IrDa interface is available as Onboard Serial Port 2. This and other settings can be programmed under BIOS setup. When using Serial Port 2 as the IrDa interface, it cannot be used by any other interface or port.

The pin connections are as follows:

Pin 1 = IRRx
Pin 2 = IRTx

NOTE: For information on programming Onboard Serial Port 2, see "Serial Ports COM1 and COM2" on page 35.

To program the interface:

1. Press and hold the <DEL> key while booting the system.

   The **CMOS Setup Utility** screen displays.

2. Using the arrow keys, select **UART2 Mode**, and then press <ENTER>.

   The **UART2 Mode** screen displays.

3. Using the <Page Up> and <Page Down> arrow keys, select one of the following modes:

   - **Standard**
   - **IrDa 1.0**
   - **ASK-IR**

   If you select **Standard**, go to Step 5.

   If you select **IrDa 1.0** or **ASK-IR**, the **Duplex Select** and **TxD,RxD Active** items display. Continue to Step 4.

4. Using the arrow keys, select **Duplex Select**. Then, using the <Page Up> and <Page Down> keys, select one of the following options if you want to use Dulplex communication:

   - **Half** — Half duplex
   - **Full — Full duplex**

   - or -

   Using the arrow keys, select **TxD,RxD Active**. Then, using the <Page Up> and <Page Down> keys, select one of the following options to enable it:

   - **Hi,Lo** — Data transmission
   - **Lo,Hi** — Data reception
   - **Hi,Hi** — Data transmission and reception
   - **Lo,Lo** — No data communication

5. Press <ESC> to return to the **CMOS Setup Utility** screen. Then, use the arrow keys to select **Save & Exit Setup** and press <ENTER> when you are finished.

   The BIOS settings are saved and the computer boots.

USB Ports

Two USB ports are located on the connector board header labeled “audio.” These ports enable you to use a USB keyboard under DOS without special driver software once USB legacy support is enabled in BIOS.

The two USB port pin connections are as follows:

Pin 5 = USB 0+
Pin 6 = USB 0-
Pin 7 = USB 1+
Pin 8 = USB 1-

To enable a USB port:

1. Press and hold the <DEL> key while booting the system.

   The **CMOS Setup Utility** screen displays.

2. Using the arrow keys, select **Integrated Peripherals**, and then press <ENTER>.

   The **Integrated Peripherals** screen displays.

3. Using the arrow keys, select **Chipset Features Setup**.

4. Using the <Page Up> and <Page Down> keys, select **USB Controller**:**Enabled**.

5. Using the <Page Up> and <Page Down> keys, select **USB Legacy Support:Enabled** to enable a USB port.
6. Press <ESC> to return to the **CMOS Setup Utility** screen. Then, use the arrow keys to select **Save & Exit Setup** and press <ENTER> when you are finished.

   The BIOS settings are saved and the computer boots.

NOTE: See "PS/2 Mouse / USB / IrDa / Audio Connector Pin Definition" on page 82 for information on pin signals.

On-Board Power Supply

The on-board power supply generates all necessary voltages from a single 5V supply voltage. The 3.3V voltage generated by (and available on) the PC/104-Plus and Flat Panel connectors must **not** be used to supply power to external electronic devices with high power consumption, such as other PC/104 boards or displays.

NOTE: See "Power Connector Pin Definition" on page 76 for information on pin signals.

IDE Port

An IDE (Intelligent Drive Electronics) port is provided by the chipset to connect to intelligent drives that integrate the controller (hard disk, CD-ROM, etc.). This port supports the LBA (Logic Block Addressing) that allows the use of hard disks larger than 512 Mbytes. To enhance the performance, this port supports DMA F type of transfer. The IDE port is located on a standard 40-pin header (2mm) for 2.5” hard disks and the compact flash connector. An adapter cable is available to connect standard IDE devices with a 40-pin IDC header. See "IDE Connector Pin Definition" on page 92 for pin assignments.

NOTE: The IDE and EIDE ports can be used simultaneously. For example, one can be connected to a CD-ROM drive while the other is connected to an external hard disk drive.

EIDE Port

An EIDE (Extended Intelligent Drive Electronics) port is provided by the chipset to connect to intelligent drives that integrate the controller (hard disk, CD-ROM, etc.). This port supports the LBA (Logic Block Addressing) that allows the use of hard disks larger than 512 Mbytes. To enhance the performance, this port supports DMA F type of transfer. The EIDE port is located on a standard 44-pin header (2mm) for 2.5” hard disks and the compact flash connector. An adapter cable is available to connect standard EIDE devices with a 44-pin IDC header. See "EIDE Connector Pin Definition" on page 83 for pin assignments.

NOTE: The IDE and EIDE ports can be used simultaneously. For example, one can be connected to a CD-ROM drive while the other is connected to an external hard disk drive.

Compact Flash Connector

A compact flash connector, which utilizes compact flash cards instead of a mechanical hard disk, is located on the bottom side of the board. This socket is also connected to the primary EIDE port of the chipset. Care must be taken when using a compact flash card and another EIDE device on the EIDE at the same time. The compact flash card is always the master device, so the device on the EIDE port must be set up as a slave device. Compact flash cards are available as solid state disks from 4 to 300 MByte, and also as IBM Microdrive up to 1 GByte.

CRT / LCD Graphic Controller

The VMIOMAX-8450 uses the Chips&Technologies (Intel) CT69000 graphics controller, which combines state-of-the-art flat panel controller capabilities with low-power, high-performance integrated memory.

The CT69000 incorporates 2Mbytes of proprietary integrated SDRAM memory for the graphics / video frame buffer, which can support operating speeds up to 83MHz. This rate of speed has the result of increasing the available memory bandwidth for the graphics subsystem. It also enables support for additional high color / high resolution graphics modes combined with real-time video acceleration. The additional bandwidth allows more flexibility in other graphically-intensive functions utilized in Graphical User Interfaces (GUIs), such as Microsoft Windows NT.

A wide variety of monochrome and color Single-Panel, Single-Drive (SS) and Dual-Panel, Dual-Drive (DD), standard and high resolution, passive STN and active matrix TFT / MIM LCD and EL panels are supported. Up to 256 grayscale colors are supported on passive STN LCDs. Up to 16.7M different colors can be displayed on passive STN LCDs and up to 16.7M colors on 24-bit active matrix LCDs.

The CT69000 uses independent multimedia capture and display systems on-chip. The capture system places data in display memory. The display system places the data in a window on the screen.

The capture system can receive data from the system bus (PCI) in either RGB or YUV format. The input data can be scaled down before it is stored in display memory. Captured input data may also be double-buffered for smoothing and to prevent image tearing. To better support MPEG2 (DVD) video decompression, the CT69000 includes a line buffer that directly supports native format 720-pixel-wide MPEG2 data.

Image mirroring and rotation for camera support are also supported. This feature is important for applications such as video teleconferencing because it allows image movement to appear on the display as it actually occurs. The image and movement is not a mirror image of what is actually taking place. The display system can independently place RGB or YUV data from anywhere in display memory into an on-screen window of any size and located at any pixel boundary.

NOTE: YUV data is converted to RGB “on-the-fly” on output.

The CT69000 graphics engine is designed to support high-performance graphics and video acceleration for all supported display resolutions, display types and color modes. There is no loss of performance when operating in 8-, 16- or 24- bit-per-pixel color modes, thus allowing true acceleration and the display of up to 16.7M colors.

Vertical centering and stretching are supported for handling modes with less than 480 lines on 480-line panels. Horizontal and vertical stretching capabilities are also available for text and graphics modes, which allow optimal display of VGA text and graphics modes on 800x600, 1024x768 and 1280x1024 panels.

Non-rectangular windows are supported via color keying. Output data can be incrementally zoomed-in up to 8x magnification, and can be horizontally and vertically interpolated. Both interlaced and non-interlaced data are supported in the capture and display systems.

The internal logic of the CT69000 is optimized for 3.3V operation with bus and panel interfaces, but can operate at a maximum rate of 5V.

Specifying a Display Mode

The following display modes are supported:

Table 1-1 VMIOMAX-8450 Supported Display Modes

Resolution	Color (bpp)	Refresh Rates (Hz)
640x480	8	60, 75, 85
640x480	16	60, 75, 85
640x480	24	60, 75, 85
800x600	8	60, 75, 85
800x600	16	60, 75, 85
800x600	24	60, 75, 85
1024x768	8	60, 75, 85
1024x768	16	60, 75, 85
1280x1024	8	60

The CT69000 supports CRT and many other displays, such as STN DSTN, EL and TFT. A total of 16 different display modes are supported in the VGA BIOS.

The display mode used by the CT69000 is programmable in BIOS. To specify a display mode:

1. Press and hold the <DEL> key while booting the system.

   The **CMOS Setup Utility** screen displays.

2. Using the arrow keys, select **Special Features Setup**, and then press <ENTER>.

   The **Special Features Setup** screen displays.

3. Using the arrow keys, select **CT69000 Display Device.**

4. Using the <Page Up> and <Page Down> arrow keys, select one of the following modes:

   • **CRT**
   • **LCD**
   • **simultaneous**

   If the display device you select is CRT, go to Step 6.

   If the display device you select is LCD or simultaneous, continue to Step 5.

5. Using the arrow keys, select **read pins PS0-PS3 on panel connector** from the **LCD Panel Select**. Selecting this option chooses the display type by connecting the panel select signals PS0 – PS3 on the LCD connector to GND.

TIP: Ensure PS0 – PS3 are connected on the panel connector if you are using this option.

- or -

Select **#01:1024x768 DSTN Col** from the **LCD Panel Select**. Selecting this option enables BIOS to choose the appropriate display type.

The panels shown in Table 1-2 on page 46 are supported in the standard BIOS.

Table 1-2 Supported Panels in Standard BIOS

LCD Panel	Resolution	Type	Manufac-turer	Part No.	Alternatively Connect PS0	PS1	PS2	PS3
#01	320 x 240	STN Monochrom	Hitachi	LMG 7520	GND	GND	GND	GND
#02	1280 x 1024	TFT color			N.C.	GND	GND	GND
#03	640 x 480	EL Monochrom	Planar	EL640, 480-AG1	GND	N.C.	GND	GND
#04	800 x 600	DSTN color			N.C.	N.C.	GND	GND
#05	640 x 480	TFT color	Sharp	LQ084V1DG21 LQ10D421	GND	GND	N.C.	GND
#06	640 x 480	TFT color	NEC	NL6448AC33-24	N.C.	GND	N.C.	GND
#07	1024 x 768	TFT color	Sharp	LQ12X12	GND	N.C.	N.C.	GND
#08	800 x 600	TFT color	Hosiden	HLD1210-010000	N.C.	N.C.	N.C.	GND
#09	800 x 600	TFT color			GND	GND	GND	N.C.
#10	800 x 600	TFT color			N.C.	GND	GND	N.C.
#11	800 x 600	DSTN color			GND	N.C.	GND	N.C.

Table 1-2 Supported Panels in Standard BIOS (Continued)

LCD Panel	Resolution	Type	Manufac-turer	Part No.	Alternatively Connect PS0	PS1	PS2	PS3
#12	800 x 600	DSTN color			N.C.	N.C.	GND	N.C.
#13	1024 x 768	TFT color			GND	GND	N.C.	N.C.
#14	1280 x 1024	DSTN color			N.C.	GND	N.C.	N.C.
#15	1024 x 600	DSTN color			GND	N.C.	N.C.	N.C.
#16	1024 x 600	TFT color			N.C.	N.C.	N.C.	N.C.

NOTES: N.C. = Leave pin open.
The above VGA BIOS table information may vary from that in the actual BIOS table, since product improvement updates may have been incorporated. The actual supported displays are displayed in the BIOS menu.

It is only necessary to connect PS0-PS3 on the panel connector if the **LCD Panel Select** option is set to read pins PS0-PS3 on the Panel Connector.

This option is useful if you want to automatically select the proper display type through the display cable.

6. Press <ESC> to return to the **CMOS Setup Utility** screen. Then, use the arrow keys to select **Save & Exit Setup** and press <ENTER> when you are finished.

   The BIOS settings are saved and the computer boots.

Voltages for LCD Backlight Converter

The VMIOMAX-8450 motherboard's backlight converter supply voltages (normally 12V or 5V) and display supply voltage (normally 5V or 3.3V) can be overridden. This is necessary to ensure the correct power sequence of the display. The following signals are used on the panel connector:

Table 1-3 Signals Used on the VMIOMAX-8450 50-Pin Flat Panel Connector

Signal Name	Pin	Description	Maximum Ratings
VDD-SRC	37	Display Power Supply Source	+5V / 1A
SW-VDD	36	Switched Power Supply	+5V / 1A
VBKL-SRC	39	Display Backlight Supply Source	+12V / 1A
SW-VBKL	38	Switched Backlight Supply	+12V / 1A

NOTE: The panel connector also has a 3.3V signal, which is generated by the on-board power supply from the board's 5V supply voltage. This 3.3V signal has high power-consumption levels and must **not** be used to supply power to connected displays.

PanelLink

In addition to the standard display connection, the VMIOMAX-8450 enables you to connect several display types via PanelLink functionality. Displays can be used up to 15 meters away from the board. The display range varies from VGA to High Refresh XGA (25-86MHz).

PanelLink utilizes the Silicon Image SiI 140 chipset, which supports true color panels of up to 24 bit / pixel, 16.7M colors in one pixel clock mode. The SiI 140 also features an inter-pair skew tolerance up to one full input clock cycle and utilizes a highly jitter-tolerant PLL design.

Signals are located on a 12-pin IDC header (1.27 mm) on the CPU board.

NOTE: See "PanelLink Connector Pin Definition" on page 85 for information on pin signals.

TV-Out

The TV-OUT option allows you to connect directly to a TV. The VGA signals (RGB) are converted on-board to a BAS signal (COMP) and an S-VHS signal (LUMA and CRMA). The signals are located on a 12-pin IDC header (1.27 mm).

TV-OUT can be used with a CRT monitor, or as a stand-alone. For proper timing of the TV signals, a special VGA BIOS has to be used, depending on NTSC or PAL timing. If a CRT monitor is used simultaneously, it must tolerate this timing.

Ethernet Controller

The VMIOMAX-8450 utilizes the Intel 82559ER, a fully-integrated 10/100Base-TX LAN 32-bit PCI Ethernet controller that consists of the Media Access Controller (MAC) and the physical layer (PHY) interface.

This controller provides enhanced scatter-gather bus mastering capabilities, which enables it to perform high speed data transfers over a PCI bus. Its bus master capabilities enable the controller to process high-level commands and perform multiple operations, which lowers CPU utilization by off-loading communication tasks from the CPU. Two 3Kbyte transmit and receive FIFOs help prevent data underruns and overruns when the controller is waiting for bus accesses, enabling it to transmit data with minimum interframe spacing (IFS).

The 82559ER can operate in either full duplex or half duplex mode. In full duplex mode, the 82559ER adheres to the IEEE 802.3x Flow Control specification. Half duplex performance is enhanced by a proprietary collision reduction mechanism.

The CSMA/CD unit provides connection to either a 10 or 100 Mbps Ethernet network. This unit performs all of the functions of the 802.3 protocol such as frame formatting, frame stripping, collision handling, deferral to link traffic, etc. When placed in full duplex mode, the unit can simultaneously transmit and receive frames.

The PHY unit supports Auto-Negotiation for 10BaseT-/100BaseTX Half Duplex and 10BaseT-/100BaseTX Full Duplex.

The Ethernet controller signals are located on the connector board and are accessed via the **Ethernet** connection on the back of the plastic case.

NOTE: See "10/100BaseT Connector Pin Definition" on page 81 for information on pin signals.

Watchdog

The VMIOMAX-8450 motherboard has two independent Watchdog Timer systems which are programmed through the Super I/O Controller — a short-term and a long-term.

To use the watchdog function of the Super I/O, you must program the registers using I/O addresses 370h (index-register location) and 371h (data-register location). To change or read the registers, the Super I/O controller must be in configuration mode; thus, data byte 55h must be written to I/O address 370h. Once configured, exit configuration mode by writing AAh to I/O address 370h. Reading from or writing to a register works as follows:

OUT (0x370, 0x55)

OUT (0x370, register-index)

OUT (0x371, register-data), or IN (0x371, register-data)

OUT (0x370, 0xAA)

The DOS programs SMCW.EXE (write) and SMCR.EXE (read) are available to program the registers.

NOTE: When using SMCW.EXE and SMCR.EXE, the hex-letters "a" through "f"' must be entered as lowercase letters.

To change a register, type:

```
SMCW <register-index (in hex)> <register-data (in hex)>
```

For example:

```
SMCW e2 0a
```

results in replacing register e2 with 0a.

To read a register, type:

```
SMCR <register-index (in hex)>
```

For example:

```
SMCR e2
```

results in reading register e2. (i.e., `INDEX e2 VALUE a` is read for the change register example on the previous page.)

The Super I/O Controller is divided in functional groups. Before the value of a register of a functional group can be changed, the functional group must be selected by writing the number of the corresponding functional group to index register 07.

For example, the registers for the General Purpose Pins of the controller have 8 as the number of their functional group. To select this group, enter the following:

```
SMCW 07 08
```

To read a register, type:

```
SMCR <register-index (in hex)>
```

For example, entering:

```
SMCR e2
```

results in the following output to the screen:

```
INDEX e2 VALUE a
```

The following is a description of each Watchdog Timer system.

Short-Time Watchdog Timer

The VMIOMAX-8450 includes a short-time Watchdog Timer with a Maxim 691 Reset / Watchdog circuit and trigger time of 400ms. The timer is accessible via the Super I / O Controller using functional group 8. To activate the timer, set the contents of register 0xE2 to 00. To trigger the timer, the contents of register 0xE2 must be changed within 400ms from 00 to 02, or from 02 to 00. If there is no register change within 400ms, the timer releases and generates a full hardware reset.

The following is example code for the short-time Watchdog Timer:

Code

```
SMCW 07 08
SMCW E2 00
SMCW E2 02
SMCW E2 00
...
...
…
SMCW E2 02
...
SMCW E2 00
…
```

The status of the timer can be read using register F6, Bit1 of the Super I / O Controller (Bit 0 and Bit 2 through Bit 7 are not used). A low level at this pin indicates that a watchdog time-out has occurred.

Long-Time Watchdog Timer

In addition to a short-time Watchdog Timer, the VMIOMAX-8450's Super I/O Controller also includes a long-time Watchdog Timer. The time-out status bit may be mapped to an interrupt, or a time out may be performed as a hardware reset. Both options must be programmed to the corresponding configuration registers of the Super I/O Controller.

The time-out ranging of this timer is 1 to 255 minutes with one minute resolution, or 1 to 255 seconds with one second resolution. When activated, the timer begins counting down from the loaded value. Upon reaching zero, the counter stops and sets the watchdog time-out status bit. Regardless of the current state of the Watchdog Timer, the time-out status bit can be directly set or cleared by the host CPU.

The following three system events can reset the Watchdog Timer:

- Keyboard interrupts
- Mouse interrupts
- I/O reads/writes to address 0x201

The Watchdog Timer can be enabled or disabled for each of the system events described on the previous page. When a system event is enabled, an occurrence of the event will cause the Watchdog Timer to reload the stored value and reset the Watchdog Timer time-out status bit if it has been set. If all three system events are disabled, the Watchdog Timer will eventually time out.

The Watchdog Timer may be configured to generate an interrupt on the rising edge of the time-out status bit. A Watchdog Timer interrupt is mapped to an interrupt channel through a configuration register. When mapped to an interrupt, the interrupt request pin reflects the value of the Watchdog Timer time-out status bit.

The Super I/O Controller registers used with the long-term Watchdog Timer are described in the following table:

Table 1-4 Super-I/O Controller Registers for the Long-Time Watchdog Timer

Index/Register	Data	Action	Program
0x07	0x08	Select functional group 08	SMCW 07 08
0xf1 (default=00)	0x00	Timer unit in minutes	SMCW f1 00
0xf1	0x80	Timer unit in seconds	SMCW f1 80
0xf2 (default=00)	0x00	Time-out disabled	SMCW f2 00
0xf2	0x01	Time-out = 1 min/sec	SMCW f2 01
...	...	...	...
0xf2	0xff	Time-out = 255 min/sec	SMCW f2 ff

Table 1-4 Super-I/O Controller Registers for the Long-Time Watchdog Timer (Continued)

Index/Register	Data	Action	Program
0xf3 (default=00)	Bit [0] = 0	WDT is not affected upon I/O read/write of I/O port 0x201	SMCW f3 x0
0xf3	Bit [0] = 1	WDT is reset upon I/O read/write of I/O port 0x201	SMCW f3 x1
0xf3	Bit [1] = 0	WDT is not affected by keyboard interrupts	SMCW f3 x0
0xf3	Bit [1] = 1	WDT is reset upon a keyboard interrupt	SMCW f3 x2
0xf3	Bit [2] = 0	WDT is not affected by mouse interrupts	SMCW f3 x0
0xf3	Bit [2] = 1	WDT is reset upon a mouse interrupt	SMCW f3 x4
0xf3	bit [3] = reserved	...	...
0xf3	bit [7...4] = 0	WDT interrupt mapping disable	SMCW f3 0x
0xf3	bit [7...4] = 1	WDT interrupt mapping to IRQ 1	SMCW f3 1x
0xf3	bit [7...4] = 2	Invalid	...
0xf3	bit [7...4] = 3	WDT interrupt mapping to IRQ 3	SMCW f3 3x
0xf3	bit [7...4] = 4	WDT interrupt mapping to IRQ 4	SMCW f3 4x
...	...	...	...
0xf3	bit [7...4] = f	WDT interrupt mapping to IRQ 15	SMCW f3 fx
0xf4 (default=00)	Bit [0] = 0	WD timer counting	SMCR/W f4 x0
0xf4	bit [0] = 1	WD timer occurred	SMCR/W f4 x1
0xf4	bit [1] = 0	Reserved	...
0xf4	bit [2] = 1	Forces time-out event (self-clearing)	SMCR/W f4 x4
0xf4	bit [3] = 0	Reserved	...
0xf4	bit [7...4] = 0	Reserved	...
0xe2	0x0a	Hardware reset upon WDT time-out	SMCW e2 0a

The following is example code for the long-time Watchdog Timer:

Code	Description
`SMCW 07 08`	Select functional group
`SMCW f1 80`	Time unit in seconds
`SMCW f2 1e`	Time-out in 30 timer units
`SMCW f3 04`	WDT reset upon mouse interrupt
`SMCW e2 0a`	Hardware reset upon WDT time-out

The status of the timer can be read using register F6, Bit1 of the Super I/O Controller (Bit 0 and Bit 2 through Bit 7 are not used). A low level at this pin indicates that a watchdog time-out has occurred, and the watchdog has generated a reset.

PC/104 Bus Interface

The PC/104 bus is a modification of the industry standard (ISA) PC bus specified in IEEE P996. The PC/104 bus differs from the P966 to allow module-stacking.

The following is a list of the PC/104's main features:

- Supports programmable extra wait state for ISA cycles
- Supports I/O recovery time for back-to-back I/O cycles

The PC/104 bus specification is available from the PC/104 Consortium (www.PC104.org).

NOTES:
See "PC/104 Bus Pin Definition" on page 90 for information on pin signals.
The current size of the aluminum case does not permit access to the PC/104 bus at this time.

PC/104-Plus Bus Interface

The PC/104-Plus bus is a modified version of a standard PC/104 PCI bus. It incorporates all standard features of the PC/104 bus, but has been enhanced to provide faster speeds.

The following is a list of the PC/104-Plus' main features:

- A PC/104-Plus bus slot which is totally compatible with PCI version 2.1 specifications
- An integrated PCI arbitration interface (32 bits wide, 3.3V)
- A 33 MHz PCI clock
- Translates PCI cycles to the ISA bus
- Translates ISA master initiated cycles to PCI
- Supports burst read/write from the PCI master

The PC/104 bus supports signal levels at 3.3V **only**. Thus, any adapter boards used with the PC/104-Plus bus must be 3.3V-compatible; however, bus pins are not supplied by the internal DC/DC converter. Signal levels of 5V are **not** allowed.

The following is a list of slot restrictions applicable to the PC/104-Plus bus:

- SLOT0 — No known restrictions.
- SLOT1 — Restricted to extensions boards which will **not** use the busmaster function. If an extension board with busmaster function is used, the VMIOMAX-8450 system may lock up while booting.

NOTE: The VMIOMAX-8450 motherboard supports one busmaster extension board in either SLOT0 or SLOT2.

- SLOT2 — No known restrictions.
- SLOT3 — This slot is used by the onboard VGA controller and **cannot** be used for extension boards.

The PC/104-Plus bus specification is available from the PC/104 Consortium (www.PC104.org).

NOTES:
See "PC/104-Plus Bus Pin Definition" on page 88 for information on pin signals.
The current board configuration (stack-up) inside the aluminum case does not allow access to the PC/104-Plus bus at this time.

CHAPTER
2

Hardware Installation

Contents

Hardware Installation

The VMIOMAX-8450 is delivered with the correct jumper settings for proper operation. The default jumper settings must **not** be changed. Improper jumper settings will cause system instability or system hang-ups.

CAUTION: The board must **not** be connected or disconnected to the PC/104 bus or PC/104-Plus bus with the power supply switched to the on position.

Adapter Cable Set

The adapter cable set consists of the following items:

- Mouse/Keyboard cable - Standard "Y" cable that connects both the mouse and keyboard to the CPU
- Two adapter cables — Micro DB9 to DB9 male for serial (com) ports 1 and 2 (P/N 360-010050-000)

Before You Begin...

Take a few minutes to review the items you need to set up your VMIOMAX-8450 system, as well as the system components you should receive with your purchase.

What You Need

Here are the tools and items you need for system setup.

Environment Setup

- Any hardware tools necessary to mount the chassis in the desired location. Make sure you provide room for peripherals (monitor, keyboard and mouse).
- Required temperature should be in the 0°C to +60°C operating range.
- Allow room for proper ventilation when wall mounting the VMIOMAX-8450. No other electrical equipment can be placed *above* the wall mounted chassis because the exhaust air is vented straight up from the chassis.
- Case chassis dimensions are approximately 4.5"x6"x2".
- A keyboard, mouse and monitor for the system CPU (needed for set-up and maintenance operations).
- Serial, parallel, and I/O cables and connectors.
- An RJ-45 Ethernet cable.
- Host CPU (optional).
  If you are using the VMIOMAX-8450 CPU as an IOWorks remote target controller, you must connect a host CPU or desktop PC to it and set up network connections.

What Your Controller System Contains (Unpacking)

Included with the VMIOMAX-8450 controller system are the following hardware, software and documentation components. Several components are optional, and are available based on your specific order, such as the operating system for the controller CPU and the purchase of IOWorks.

Upon receipt, any precautions found in the shipping container should be observed. All items should be carefully unpacked and thoroughly inspected for damage that might have occurred during shipment. Call **Customer Service at (800) 322-3616** for help in filling out any needed claims arising from shipping damage. These claims need to be filed with the shipping carrier. VMIC will provide instructions concerning the disposition of the damaged item(s).

Hardware Components

CAUTIONS: The VMIOMAX-8450 is delivered with the correct jumper settings for proper operation. The default jumper settings must **not** be changed. Improper jumper settings will cause system instability or system hang-ups.
The board must **not** be connected or disconnected to the PC/104 bus or PC/104-Plus bus with power supply switched on.

One VMIOMAX-8450 system chassis contains:

- One single-slot CPU board with a 300 MHz processor. The CPU contains the following general hardware settings:
  - — CompactFlash drive memory (from 16 Mbyte to 128 Mbyte) (optional)
  - — Software-selectable Watchdog Timer with reset
  - — Up to 128 MByte SDRAM using 144-pin Dual In-Line Memory Modules (SODIMM)
  - — SVGA: 1280x1024-pixel resolution at 75 Hz refresh rate maximum supported
  - — On-board Fast Ethernet controller supporting 10 BaseT and 100 BaseTx
  - — A DC/DC power supply for 24V operation (8 to 30V acceptable)
  - — Passive heatsink design (no moving parts)
- Keyboard/Mouse Y-cable
- One 512 Mbyte or 1 Gbyte IBM Microdrive (optional)
- Micro to normal DB9 cables for both serial (com) ports

Documentation

- *VMIOMAX-8450 Product Manual* (this document)

Installation Procedures

Follow the instructions in this section to set up the VMIOMAX-8450 CPU, connect peripherals, set up network connections, and if you are using IOWorks, connect to a host CPU. The figure below lists the external peripheral connections of VMIOMAX-8450 case.

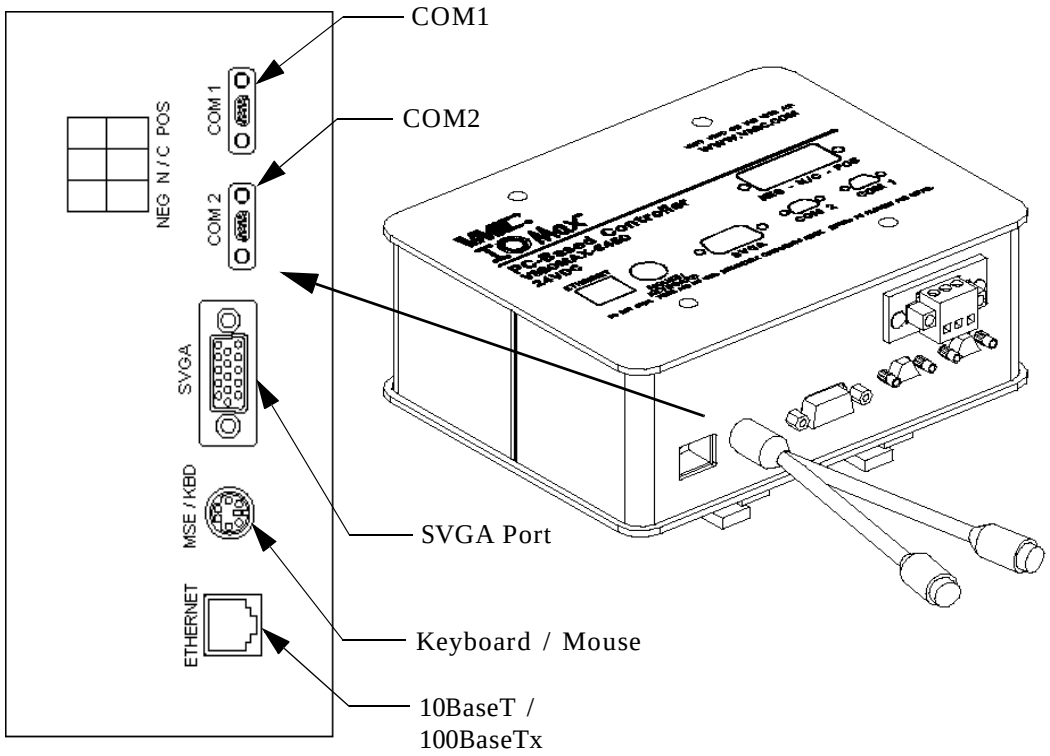


Figure 2-1 VMIOMAX-8450 Case

Peripherals Setup

NOTE: The VMIOMAX-8450 does not have an ON/OFF switch. The system automatically boots up when power is applied.

1. Prepare a safe, stable location for the VMIOMAX-8450 system and its support items (keyboard, etc.).
2. Connect the keyboard and mouse to the PS/2 connector on the bottom of the unit, using the supplied adapter.
3. Connect the CRT (monitor screen) to the bottom panel DB-15 connector.

4. Connect the serial ports (COM1 and COM2), as needed.
5. Connect the power cable to the chassis case connector, and then to a 24VDC source.
6. Connect a network cable to the LAN Ethernet connector on the bottom of the case:
   - A network based on a 100BaseTx standard uses unshielded twisted-pair cables and an RJ-45 connector. The 100BaseTx has a maximum deployment length of 100 m.
   - The RJ-45 connector is also used with the 10BaseT standard. 10BaseT has a maximum length of 100 m from the wiring hub to the terminal node.

Verification

If you have a host CPU connected to the VMIOMAX-8450, key in the following PING command from the host CPU to make sure they are communicating:

From a DOS prompt, key in: `PING [IP address]`. For example,

`PING 192.168.0.2`
- or -
`PING -t 192.168.0.2` for continuous operation.

The `IP address` is the address of the VMIOMAX-8450 CPU. See your system administrator if you do not know the IP address.

You should receive reply messages from the CPU. If you did not receive a reply, check your network configuration.

Congratulations! Now that you have all the key elements in your system set, you can connect I/O boards and begin work with the VMIOMAX-8450. If you purchased IOWorks, refer to the “Starting IOWorks” chapter in the *IOWorks Getting Started Guide* to set up a sample workspace.

NOTE: The VMIOMAX-8450 was certified as compliant with FCC and CE Class A Industrial Automation standards using shielded Ethernet and RS-232 serial port cables. The serial port cables also comply with the recommended standard RS-232C cable length of 50 feet.

CHAPTER
3

Post Installation: Setup and Troubleshooting

Contents

Introduction

Once you have installed your VMIOMAX-8450 controller, use information in this chapter to connect additional features and resolve installation problems.

Getting Information

VMIC provides information in both on-line and hardcopy media. The table below lists the documentation supplied with the VMIOMAX-8450.

Table 3-1 Information Resources

Documentation	Description
CPU Product Manual: VMIOMAX-8450 Product Manual	Provides specifications, hardware settings and technical information specific to the controller CPU. Use this document to check features and capabilities of your VMIC CPU, in addition to setting the BIOS.

Troubleshooting Serial Communications

Use this information to resolve any problems you may have when you connect the host and target CPUs.

What is the connector interface for VMIC CPU serial ports?

On VMIC CPUs, an adapter cable is used to provide a standard IBM PC-compatible male DB9 serial interface. The serial port connector interface implements what is commonly referred to as a Data Communication Equipment (DCE) interface.

I have connected a serial cable between my PC and the VMIC CPU, but they are not communicating. What should I do?

Typical serial communication requires that a Data Terminal Equipment (DTE) interface connects to a DCE interface device. An industry standard null modem can be used to convert a DCE interface to a DTE interface, or a DTE interface to a DCE interface. A null modem simply switches the communication (transmit and receive data pins) and hardware control lines from one standard to the other.

On your PC you have either DB25 (DTE) serial connectors or DB9 (DCE) serial connectors. More than likely, the PC has a DB9 male connector that has a DCE interface.

If your PC has a DB25 serial interface, you need a DB9 to DB25 serial port adapter (also a null modem) and a straight-through serial cable.

Table 3-2 9-Pin to 25-Pin Connector Adapter

Pin No.	9-Pin Connector	Pin No.	25-Pin Connector
1	DCD	8	DCD
2	RD	3	RD
3	TD	2	TD
4	DTR	20	DTR
5	GND	7	GND
6	DSR	6	DSR
7	RTS	4	RTS
8	CTS	5	CTS
9	RI	22	RI

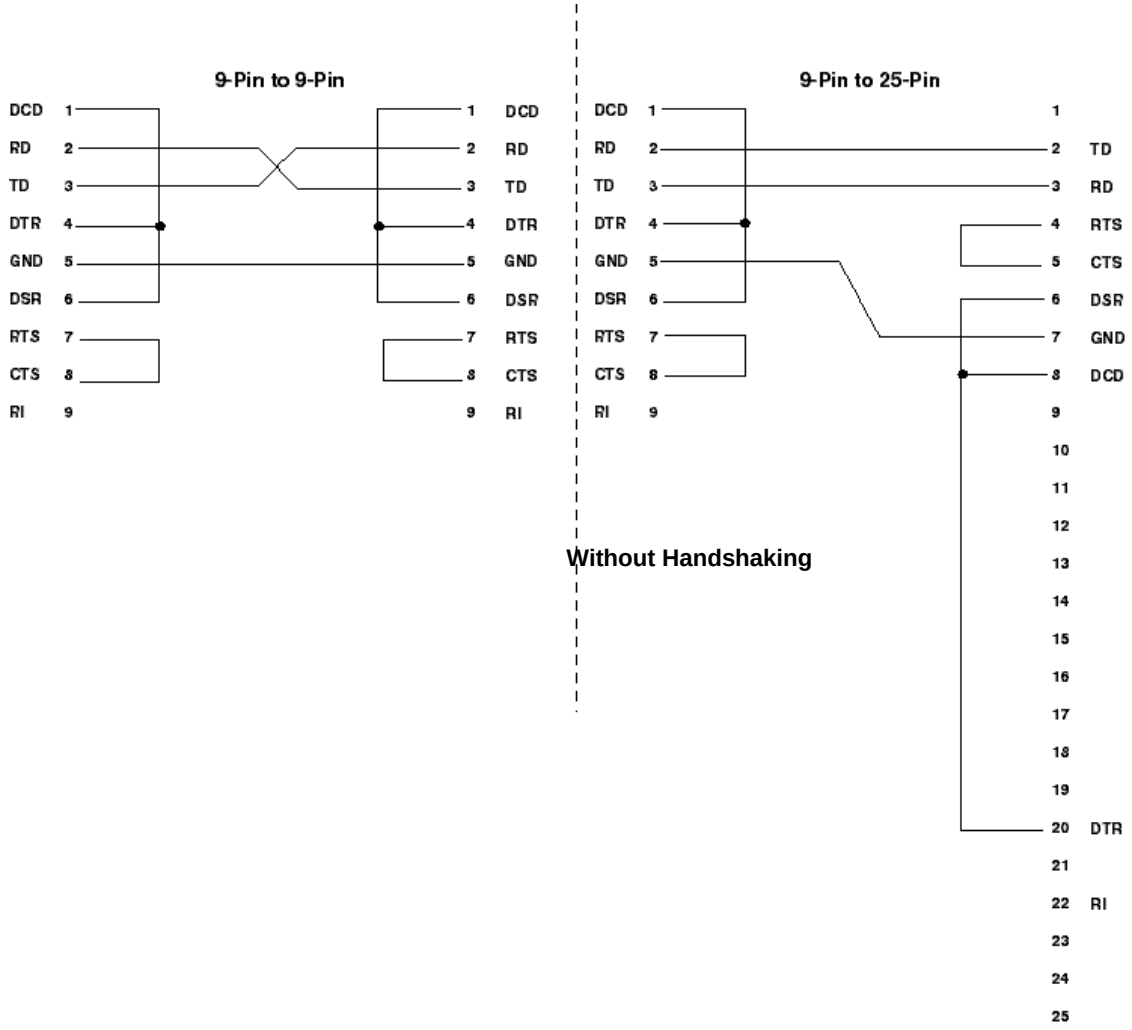
NOTE: The VMIOMAX-8450 was certified as compliant with FCC and CE Class A Industrial Automation standards using shielded Ethernet and RS-232 serial port cables. The serial port cables also comply with the recommended standard RS-232C cable length of 50 feet.

How do I verify my cable?

Follow these steps to verify your cable:

- Use a multimeter to *ohm* the cables out end-to-end on every pin. Be sure not to skip adapters or null modems.
- Using the hardware equipment manuals, record which pins transmit data and which receive data.
- Verify that the transmit data wire on the remote target serial port is wired to receive data wire on the other serial port.
- Finally, verify that the receive data wire on the remote target serial port is wired to transmit data wire on the other serial port. If you still have problems, examine the pins in the male connectors to ensure that they are the same height. In particular, check pins two and three.

Figure 3-1 RS232 Connections and Wiring Diagrams



Cable and Connector Troubleshooting

Some common problems with pins include the following:

- Pins that have been pushed back into the connector or are bent over
- Failed female connectors or connectors with missing wires

I have verified my cable and still cannot communicate. What should I do?

Most problems with serial communication involve cables or port configuration. Try the following:

- Verify the configuration.
- Buy more than one null modem. If you have verified the configuration, install the new null modem and try the connection again. It is easier to put an inexpensive null modem in between your cables and retest, than to verify cable pin outs.
- If you are using a terminal emulator on a computer, reboot and cycle power on the computer(s). If you are using a VT100-type terminal, cycle power and check the baud rate again.

Maintenance

This section provides information relative to the care and maintenance of VMIC products. Should the products malfunction, you must verify the following:

1. Software
2. System configuration
3. Electrical connections
4. Jumper or configuration options
5. Boards fully inserted into their proper connector location
6. Connector pins are clean and free from contamination
7. No components of adjacent boards are disturbed when inserting or removing the board from the VMEbus board slot
8. Quality of cables and I/O connections

Software Maintenance Agreement

A software service agreement is included with your software shipment. The agreement enables you to receive product updates and VMIC customer service. To purchase maintenance/service for your software product, send VMIC the completed form using the address indicated. You receive 30 days free maintenance with your purchase. After that time, you must purchase a maintenance agreement in order to receive customer service. The policies are valid for one year and are renewable each year. VMIC will notify you for maintenance renewal. When you call the 800-customer service phone number, you must give your service representative the product serial number to receive customer support. You can find this serial number on the CD or on the invoice.

Hardware Maintenance

If hardware products must be returned, contact VMIC for a Return Material Authorization (RMA) Number. *This RMA Number must be obtained prior to any return.* See the next section, “Contacting VMIC,” for more information.

Contacting VMIC

Hardware Technical Support

Contact VMIC's customer service for hardware related issues at:

TELEPHONE: 1-800-240-7782

FAX: 256-650-7245

E-MAIL: customer.service@vmic.com

IOWorks Software Technical Support

Contact VMIC's *IOWorks* customer service at:

TELEPHONE: 1-800-269-4714

FAX: 256-650-7245

E-MAIL: software.cs@vmic.com

Providing Information

With your correspondence, please provide the following:

- Type of computer hardware including processor, available disk space, RAM and network board
- List of any connected I/O boards
- List of any other VMIC products you are using
- Exact wording of any messages on your screen
- What you were doing when the error occurred
- What steps you have taken (if any) to resolve the problem

In addition, when e-mailing, please include the following:

- Your name
- Your company's name
- Your phone and fax numbers

CHAPTER
4

Maintenance

Maintenance

This section provides information relative to the care and maintenance of VMIC's products. If the products malfunction, verify the following:

- System power
- Software
- System configuration
- Electrical connections
- Jumper or configuration options
- Boards are fully inserted into their proper connector location
- Connector pins are clean and free from contamination
- No components of adjacent boards are disturbed when inserting or removing the board from the chassis
- Quality of cables and I/O Connections.

If products must be returned, contact VMIC for a Return Material Authorization (RMA) number. **This RMA Number must be obtained prior to any return.**

NOTE: Contact VMIC Customer Service at 1-800-240-7782, or E-mail: customer.service@vmic.com.

CHAPTER

A

Connector Pin Definitions

Contents

Introduction

This appendix describes the pin definitions of the connectors on the VMIOMAX-8450 motherboard.

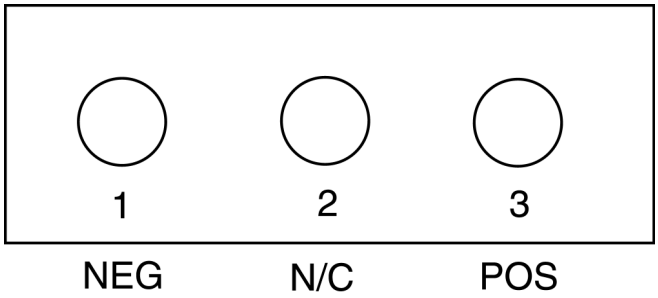
NOTE: For information on the location of a particular connector on the motherboard, see *VMIOMAX-8450 Motherboard Specifications* on page 26.

Power Connector Pin Definition

Connector type: External power connector (Green Plug).

Table A-1 Power Connector Pin Definition

Signal Name	Pin	Signal Name	Pin
Negative	1	N / C	2
Positive* (+24VDC)	3		



* The internal power supply will successfully accept from 8VDC to 30VDC as input power.

COM1 and COM2 Port Connector Pin Definitions

Connector type: Micro DB9 connectors, at the bottom of the aluminum case.

Table A-2 COM1 and COM2 Port Connector Pin Definitions

Signal Name	Pin	Signal Name	Pin
DCD	1	DSR	2
RXD	3	RTS	4
TXD	5	CTS	6
DTR	7	RI	8
GND	9	+5V	10

These ports are RS-232C compliant and support the imposed standard cable length of 50 feet, maximum, in order to meet the requirements of EN61000-4-5 for CE Mark. This meets requirements for the GE Fanuc EMC Test Plan VMIOMAX-8450, DIN Rail Mount PC Controller System.

LPT1 Port Connector Pin Definition

Connector type: IDC26 pin header, 2.54 mm, on CPU card.

Table A-3 LPT1 Connector Pin Definition

Signal Name	Pin	Signal Name	Pin
Strobe	1	Auto LF	2
Data0	3	Error	4
Data1	5	Init	6
Data2	7	Select In	8
Data3	9	GND	10
Data4	11	GND	12
Data5	13	GND	14
Data6	15	GND	16
Data7	17	GND	18
ACK	19	GND	20
Busy	21	GND	22
Paper End	23	GND	24
Select	25	N.C.	26

NOTE: N.C. = Leave pin open.

Mouse/Keyboard Connector Pin Definition

Connector type: Mini Din plug (6-pin), at the bottom of the aluminum case.

Table A-4 Keyboard Connector Pin Definition

Signal Name	Pin	Signal Name	Pin
KB Data	1	GND	3
Mouse Data	2	Mouse Clock	6
		KB Clock	5
		+5V	4

VGA Connector Pin Definition

Connector type: D-Sub, 15-pin connector (female), at the bottom of the aluminum case.

Table A-5 VGA Connector Pin Definition

Signal Name	Pin	Signal Name	Pin
Red	1	GND	5
Green	2	GND	6
Blue	3	GND	7
HSYNC	13	GND	8
VSYNC	14		

NOTE: N.C. = Leave pin open. Pins 4, 9, 10, 11, 12 and 15 are N.C.

10/100BaseT Connector Pin Definition

Connector type: 8-pin, Ethernet connector on connector card, at the bottom of the aluminum case.

Table A-6 10/100BaseT Connector Pin Definition

Signal Name	Pin	Signal Name	Pin
TX+	1	TX-	2
RX+	3	PE	4
PE	5	RX-	6
PE	7	PE	8

NOTE: N.C. = Leave pin open.

PS/2 Mouse / USB / IrDa /Audio Connector Pin Definition

Connector type: IDC16 pin header, 2.54 mm, on connector card.

Table A-7 PS/2 Mouse / USB / IrDa / Audio Connector Pin Definition

Signal Name	Pin	Signal Name	Pin
IRRx	1	IRTx	2
MS Data	3	MS Clock	4
USBDT0+	5	USBDT0-	6
USBDT1+	7	USBDT1-	8
+5V	9	GND	10
Line In L	11	Line In R	12
Line Out L	13	Line Out R	14
Microphone	15	GND Audio	16

EIDE Connector Pin Definition

Connector type: 44-pin header, 2.00 mm, on connector card.

Table A-8 EIDE Connector Pin Definition

Signal Name	Pin	Signal Name	Pin
Reset	1	GND	2
Data7	3	Data8	4
Data6	5	Data9	6
Dat5a	7	Data10	8
Data4	9	Data11	10
Data3	11	Data12	12
Data2	13	Data13	14
Data1	15	Data14	16
Data0	17	Data15	18
GND	19	N.C.*	20
DRQ0	21	GND	22
Write	23	GND	24
Read	25	GND	26
Ready	27	PU0	28
DACK0	29	GND	30
IRQ	31	/CS16	32
Address1	33	GND	34
Address0	35	Address2	36
CS1	37	CS3	38
LED	39	GND	40
+5V	41	+5V	42
GND	43	N.C.	44

* N.C. = Leave pin open.

Floppy Connector Pin Definition

Connector type: FFC 26 pin, 1.00 mm, on CPU board.

Table A-9 Floppy Connector Pin Definition

Signal Name	Pin	Signal Name	Pin
+5V	1	Index	2
+5V	3	Drive Select 0	4
+5V	5	Disk Change	6
N.C.	7	N.C.	8
N.C.	9	Motor On 0	10
N.C.	11	Direction	12
N.C.	13	Step	14
GND	15	Write Data	16
GND	17	Write Gate	18
GND	19	Track 0	20
GND	21	Write Protect	22
GND	23	Read Data	24
GND	25	Head Select	26

NOTE: N.C. = Leave pin open.

PanelLink Connector Pin Definition

Connector type: IDC 12 pin header, 1.27 mm, on CPU board.

Recommended cable connector:

- Manufacturer: ERNI
- Part number: 103634

Table A-10 PanelLink Connector Pin Definition

Signal Name	Pin	Signal Name	Pin
+5V	1	TX1+	2
TX1-	3	GND	4
TX0+	5	TX0-	6
GND	7	TX2+	8
TX2-	9	GND	10
TXC+	11	TXC-	12

Flat Panel Connector Pin Definition

Connector type: IDC 50 pin header, 1.27 mm, on the CPU card.

Recommended cable connector:

- Manufacturer: ERNI
- Part number: 124262 (preferred) or 103632
- Part number of cable: 034575

Table A-11 Flat Panel Connector Pin Definition

Signal Name	Pin	Signal Name	Pin
FLM	1	LP	2
SHFCLK	3	M	4
GND	5	P0	6
P1	7	P2	8
P3	9	GND	10
P4	11	P5	12
P6	13	P7	14
GND	15	P8	16
P9	17	P10	18
P11	19	GND	20
P12	21	P13	22
P14	23	P15	24
GND	25	P16	26
P17	27	P18	28
P19	29	GND	30
P20	31	P21	32
P22	33	P23	34
GND	35	SW-VDD	36
VDD-SRC	37	SW-VBKL	38
VBKL-SRC	39	ENABKL	40
ENAVEE	41	GND	42

Table A-11 Flat Panel Connector Pin Definition (Continued)

Signal Name	Pin	Signal Name	Pin
+12V (PC / 104 Bus)	43	+5V (PC / 104 Bus)	44
+ 3.3V / Max. 500mA	45	GND	46
Panel Select PS0	47	Panel Select PS1	48
Panel Select PS2	49	Panel Select PS3	50

NOTE: The 3.3V are generated by the onboard power supply from the 5V supply voltage of the board and has high power-consumption levels. This 3.3V must be **not** used to supply power to connected displays.

PC/104-Plus Bus Pin Definition

NOTES: All VI/O pins are connected to 3.3V by default.
-12V is not supported on this board.

Table A-12 PC/104-Plus Bus Pin Definition

Signal A	Signal B	Signal C	Signal D	Pin
GND	Reserved	+5V	AD00	1
VI/O	AD02	AD01	+5V	2
AD05	GND	AD04	AD03	3
C/BE0	AD07	GND	AD06	4
GND	AD09	AD08	GND	5
AD11	VI/O	AD10	M66EN	6
AD14	AD13	GND	AD12	7
+3.3V	C/BE1	AD15	+3.3V	8
SERR	GND	SB0	PAR	9
GND	PERR	+3.3V	SDONE	10
STOP	+3.3V	LOCK	GND	11
+3.3V	TRDY	GND	DEVSEL	12
FRAME	GND	TRDY	+3.3V	13
GND	AD16	+3.3V	C/BE2	14
AD18	+3.3V	AD17	GND	15
AD21	AD20	GND	AD19	16
+3.3V	AD23	AD22	+3.3V	17
DSEL0	GND	DSEL	DSEL2	18
AD24	C/BE3	VI/O	DSEL3	19
GND	AD26	AD25	GND	20
AD29	+5V	AD28	AD27	21
+5V	AD30	GND	AD31	22
REQ0	GND	REQ1	VI/O	23

Table A-12 PC/104-Plus Bus Pin Definition (Continued)

Signal A	Signal B	Signal C	Signal D	Pin
GND	REQ2	+5V	GNT0	24
GNT1	VI/O	GNT2	GND	25
+5V	CLK0	GND	CLK1	26
CLK2	+5V	CLK3	GND	27
GND	INTD	+5V	RST	28
+12V	NTA	INTB	INTC	29
+12V	Reserved	Reserved	GND	30

PC/104 Bus Pin Definition

NOTE: -5V and –12V are not supported on this board.

Table A-13 PC/104 Bus Pin Definition (Pin 0)

Signal C	Signal D	Pin
GND	GND	0

Table A-14 PC/104 Bus Pin Definition (Pins 1-19)

Signal A	Signal B	Signal C	Signal D	Pin
IOCHCK	GND	SBHE	MEMCS16	1
D7	RSTDRV	LA23	IOCS16	2
D6	+5V	LA22	IRQ10	3
D5	IRQ9	LA21	IRQ11	4
D4	-5V	LA20	IRQ12	5
D3	DRQ2	LA19	IRQ13	6
D2	-12V	LA18	IRQ14	7
D1	ENDXFR	LA17	DACK0	8
D0	+12V	MEMR	DRQ0	9
IOCHRDY	GND / KEY	MEMW	DACK5	10
AEN	SMEMW	SD8	DRQ5	11
A19	SMEMR	SD9	DACK6	12
A18	IOW	SD10	DRQ6	13
A17	IOR	SD11	DACK7	14
A16	DACK3	SD12	DRQ7	15
A15	DRQ3	SD13	+5V	16
A14	DACK1	SD14	MASTER	17
A13	DRQ1	SD15	GND	18
A12	REFRESH	GND	GND	19

Table A-15 PC/104 Bus Pin Definition (Pins 20-32)

Signal A	Signal B	Pin
A11	SYSCLK	20
A10	IRQ7	21
A9	IRQ6	22
A8	IRQ5	23
A7	IRQ4	24
A6	IRQ3	25
A5	DACK2	26
A4	TC	27
A3	BALE	28
A2	+5V	29
A1	OSC	30
A0	GND	31
GND	GND	32

IDE Connector Pin Definition

Connector type: Standard 40-pin header.

Table A-16 IDE Connector Pin Definition

Signal Name	Pin	Signal Name	Pin
Reset	1	GND	2
Data7	3	Data8	4
Data6	5	Data9	6
Dat5a	7	Data10	8
Data4	9	Data11	10
Data3	11	Data12	12
Data2	13	Data13	14
Data1	15	Data14	16
Data0	17	Data15	18
GND	19	N.C.	20
DRQ0	21	GND	22
Write	23	GND	24
Read	25	GND	26
Ready	27	PU0	28
DACK0	29	GND	30
IRQ	31	/CS16	32
Address1	33	GND	34
Address0	35	Address2	36
CS1	37	CS3	38
LED	39	GND	40

CHAPTER

B

Motherboard Software Specifications

Contents

Introduction

This appendix describes the software specifications of the VMIOMAX-8450 motherboard, including address maps and interrupts, and DMA channels.

System Address Mapping

This appendix describes the system address mapping of the CPU memory and I/O address spaces. Also covered in this section are the PCI configuration space mappings.

Memory Address Map

The following table displays the memory address map of the VMIOMAX-8450 motherboard.

Table B-1 VMIOMAX-8450 Motherboard Memory Address Map

Address Range (Dec)	Address Range (Hex)	Size	Description
1024K-16384K	100000-FFFFFF	15360K	Extended Memory
896K-1024K	0E0000-0FFFFF	128K	System BIOS
800K-895K	0C8000-0DFFFF	96K	Unused
768K-800K	0C0000-0C7FFFF	32K	Graphic BIOS
736K-768K	0B8000-0BFFFF	32K	Monochrome Text Memory
704K-736K	0B0000-0B7FFF	32K	Color Text Memory
640K-704K	0A0000-0AFFFF	64K	Graphic Memory
0K-640K	0-9FFFF	640K	Conventional Memory

I/O Address Map

The VMIOMAX-8450 system chip set implements a number of registers in I/O address space. These registers occupy the following map in the I/O space. Other resources may be used, depending on whether or not specific functions are enabled or disabled in the BIOS.

Table B-2 VMIOMAX-8450 Motherboard I/O Address Map

Address Range (Hex)	Size	Description
0000-000F	16 Bytes	DMA Controller 1 (8237)
0020-0021	2 Bytes	Interrupt Controller (8259)
0022-0023	2 Bytes	ST486 Specific Registers
0040-0043	4 Bytes	Timer Controller (8254)
0060	1 Byte	Keyboard Controller Data Byte

Table B-2 VMIOMAX-8450 Motherboard I/O Address Map (Continued)

Address Range (Hex)	Size	Description
0061	1 Byte	NM1, Speaker Control
0064	1 Byte	Kbd Ctrl, CMD, STAT Byte
0070, bit 7	1 bit	Enable
0070, bit 6:0	7 bits	Real Time Clock Address
0078	1 Byte	Internal
0079	1 Byte	Watchdog
0080-008F	16 Bytes	DMA Page Registers
00A0-00A1	2 Bytes	Interrupt Controller 2 (8259)
00C0-00DE	31 Bytes	DMA Controller 1 (8237)
00F0	1 Byte	Reset Numeric Error
0102	1 Byte	VGA Setup Register
0170-0177	8 Bytes	Secondary IDE Channel
01F0-01F7	8 Bytes	Primary IDE Channel
0201	1 Byte	Super I/O
0278-027B	4 Bytes	Parallel Port 2 (Bidir)
02F8-02FF	8 Bytes	Serial Port 2
0378-037F	8 Bytes	Parallel Port 1
03B4, 03B5, 03BA	3 Bytes	VGA Registers
03D4, 03D5, 03DA	3 Bytes	VGA Registers
03C0-03CF	16 Bytes	VGA Registers
03F0-03F5	6 Bytes	Floppy Controller Registers
03F6	1 Byte	IDE Command Port
03F7 (Write)	1 Byte	Floppy Command Port
03F7, bit 7	1 bit	Floppy Disk Change
03F7, bits 6:0	7 bits	IDE Status Port
03F8-03FF	8 Bytes	Serial Port 2
0CF8	1 Byte	PCI Configuration Address Register
0CFC-0CFF	8 Bytes	PCI Configuration Data Registers

Table B-2 VMIOMAX-8450 Motherboard I/O Address Map (Continued)

Address Range (Hex)	Size	Description
046E8	1 Byte	VGA Add-in Mode Enable Register
C000-C0FF	256 Bytes	PCI Configuration Registers

Interrupts and DMA Channels

This section describes the VMIOMAX-8450's interrupts and DMA channels.

Interrupts

The following is a list of software interrupts incorporated into the VMIOMAX-8450.

Table B-3 VMIOMAX-8450 Motherboard Interrupts

IRQ	System Resource
NMI	Parity Error
0	Timer
1	Keyboard
2	Interrupt Controller 2
3	Serial Port 2
4	Serial Port 1
5	User available (PC/104 or -Plus)
6	Floppy
7	Parallel Port 1
8	Real Time Clock
9	User available (PC/104 or -Plus)
10	User available (PC/104 or -Plus)
11	Ethernet Controller
12	PS/2 Mouse
13	Math coprocessor
14	EIDE
15	EIDE, if the secondary IDE controller is disabled in BIOS setup, IRQ15 can be used on the PC/104 or -Plus bus.

DMA channels

The following is a list of DMA channels incorporated into the VMIOMAX-8450.

Table B-4 VMIOMAX-8450 Motherboard DMA Channels

DMA	Data Width	System Resource
0	8 bits	User available
1	8 bits	User available
2	8 bits	Floppy
3	8 bits	Parallel port
4		Reserved, cascade channel
5	16 bits	IDE controller
6	16 bits	User available
7	16 bits	User available

NOTE: Depending on enabled or disabled functions in the BIOS other or more resources may be used.