ARTISAN®
TECHNOLOGY GROUP

Your **definitive** source for quality pre-owned equipment.

**Artisan Technology Group**
(217) 352-9330 | sales@artisantg.com | artisantg.com

**Full-service, independent repair center**
with experienced engineers and technicians on staff.

**We buy your excess, underutilized, and idle equipment**
along with credit for buybacks and trade-ins.

**Custom engineering**
so your equipment works exactly as you specify.

- Critical and expedited services
- In stock / Ready-to-ship
- Leasing / Rentals / Demos
- ITAR-certified secure asset solutions

**Expert team | Trust guarantee | 100% satisfaction**

All trademarks, brand names, and brands appearing herein are the property of their respective owners.

Find the *Abaco Systems / VMIC VMIVME-7587-530* at our website: ***Click HERE***

# VMIVME - 7587

## Pentium® Processor-Based VMEbus CPU

## PRODUCT MANUAL

DOCUMENT NO. 500-007587-000 E

February 6, 1997

VME MICROSYSTEMS INTERNATIONAL CORPORATION
12090 SOUTH MEMORIAL PARKWAY
HUNTSVILLE, AL 35803-3308
(205) 880-0444
(800) 322-3616
FAX NO.: (205) 882-0859

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

## RECORD OF REVISIONS

| REVISION LETTER | DATE | PAGES INVOLVED | CHANGE NUMBER |
|---|---|---|---|
| A | 04/26/96 | Release | 96-0316 |
| B | 08/09/96 | Revise entire | 96-0512 |
| C | 12/25/96 | Revise entire | 96-0880 |
| D | 01/20/97 | Cover, pages ii, B-2 and B-5 | 97-0128 |
| E | 02/06/97 | Edited Appendix B, Section 3 to add SETUP FOR WINDOWS NT 4.0.<br>Edited Chapter 3, Section 7. | 97-0178 |



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

## COPYRIGHT AND TRADEMARKS

© Copyright 1996. The information in this document has been carefully checked and is believed to be entirely reliable. While all reasonable efforts to ensure accuracy have been taken in the preparation of this manual, VMIC assumes no responsibility resulting from omissions or errors in this manual, or from the use of information contained herein.

VMIC reserves the right to make any changes, without notice, to this or any of VMIC's products to improve reliability, performance, function, or design.

VMIC does not assume any liability arising out of the application or use of any product or circuit described herein; nor does VMIC convey any license under its patent rights or the rights of others.

For warranty and repair policies, refer to VMIC's Standard Condition of Sale.

AMXbus™, BITMODULE™, COSMODULE™, DMAbus™, IOWorks™, IOWorks Access™, IOWorks Foundation™, IOWorks Manager™, IOWorks Server™, MAGICWARE™, MEGAMODULE™, PLC ACCELERATOR™ (ACCELERATION)™, QUICK-R-NET™, Soft Logic Link™, SRTbus™, TESTCAL™, "The Next Generation PLC"™, The PLC Connection™, TURBOMODULE™, UCLIO™, UIOD™, UPLC™, Visual IOWorks™, Visual Soft Logic Control(ler)™, VMEnet™, VMEnet II™, VME*access*™, VME*manager*™, VME*monitor*™, and VME*probe*™ are trademarks of VME Microsystems International Corporation.

The I/O man figure, UIOC®, *WinUIOC*®, and the VMIC logo are registered trademarks of VME Microsystems International Corporation.

Microsoft, MS-DOS, and Windows are registered trademarks and Windows NT is a trademark of Microsoft Corporation.

Pentium is a registered trademark of Intel Corporation.

Other registered trademarks are the property of their respective owners.

UIOC®

*WinUIOC*®



(I/O Man Figure)

(VMIC LOGO)

**VME Microsystems International Corporation**

All Rights Reserved

This document shall not be duplicated, nor its contents used for any purpose, unless granted express written permission from VMIC.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

# VMIC
# SAFETY SUMMARY

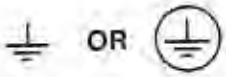
THE FOLLOWING GENERAL SAFETY PRECAUTIONS MUST BE OBSERVED DURING ALL PHASES OF THE OPERATION, SERVICE, AND REPAIR OF THIS PRODUCT. FAILURE TO COMPLY WITH THESE



PRECAUTIONS OR WITH SPECIFIC WARNINGS ELSEWHERE IN THIS MANUAL VIOLATES SAFETY STANDARDS OF DESIGN, MANUFACTURE, AND INTENDED USE OF THIS PRODUCT. VME MICROSYSTEMS INTERNATIONAL CORPORATION ASSUMES NO LIABILITY FOR THE CUSTOMER'S FAILURE TO COMPLY WITH THESE REQUIREMENTS.



## GROUND THE SYSTEM



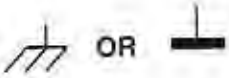

To minimize shock hazard, the chassis and system cabinet must be connected to an electrical ground. A three-conductor AC power cable should be used. The power cable must either be plugged into an approved three-contact electrical outlet or used with a three-contact to two-contact adapter with the grounding 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 VME Microsystems International Corporation 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.




**NOTE:**

**DANGEROUS VOLTAGES, CAPABLE OF CAUSING DEATH, ARE PRESENT IN THIS SYSTEM. USE EXTREME CAUTION WHEN HANDLING, TESTING, AND ADJUSTING.**



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

# SAFETY SYMBOLS

## GENERAL DEFINITIONS OF SAFETY SYMBOLS USED IN THIS MANUAL

Instruction manual symbol: the product is marked with this symbol when it is necessary for the user to refer to the instruction manual in order to protect against damage to the system.

Indicates dangerous voltage (terminals fed from the interior by voltage exceeding 1000 volts 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, terminal 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).

Alternating or direct current (power line).

The WARNING sign denotes a hazard. It calls attention to a procedure, a practice, a condition, or the like, which, if not correctly performed or adhered to, could result in injury or death to personnel.

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

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



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

# TABLE OF CONTENTS


CHAPTER 1 - OVERVIEW ..... 1-1

SECTION 1 - INTRODUCTION TO THE VMIVME-7587 ..... 1-1
SECTION 2 - ABOUT THIS MANUAL ..... 1-2
SECTION 3 - PCI-to-VMEbus BRIDGE OPTIONS ..... 1-3
SECTION 4 - REFERENCES ..... 1-4
SECTION 5 - VMIVME-7587 FEATURES ..... 1-6
SECTION 6 - VMEbus FEATURES ..... 1-9

CHAPTER 2 - INSTALLATION AND SETUP ..... 2-1

SECTION 1 - INTRODUCTION ..... 2-1
SECTION 2 - UNPACKING PROCEDURES ..... 2-1
SECTION 3 - HARDWARE SETUP ..... 2-2
VMIVME-7587-xx9, The Pentium® VMEbus CPU ..... 2-2
VMIVME-7587-xx0, Cypress VIC64 Based PCI-to-VMEbus Bridge ..... 2-6
VMIVME-7587-xx1, Tundra Universe™ Based PCI-to-VMEbus Bridge ..... 2-7
SECTION 4 - INSTALLATION ..... 2-8
SECTION 5 - FRONT PANEL CONNECTORS ..... 2-9
SECTION 6 - LED STATUS DEFINITION ..... 2-10
SECTION 7 - PMC EXPANSION SITE ..... 2-10
SECTION 8 - BIOS SETUP ..... 2-11

CHAPTER 3 - PC/AT FUNCTIONS ..... 3-1

SECTION 1 - CPU REGISTER MODEL ..... 3-1
SECTION 2 - PHYSICAL MEMORY ..... 3-2
SECTION 3 - MEMORY AND PORT MAPS ..... 3-4
MEMORY MAP - CYPRESS VIC64 BASED PCI-to-VMEbus BRIDGE OPTION ... 3-4
MEMORY MAP - TUNDRA UNIVERSE™ BASED PCI-to-VMEbus BRIDGE OPTION 3-5





Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

I/O PORT MAP ..... 3-6
SECTION 4 - PC/AT INTERRUPTS ..... 3-9
SECTION 5 - PCI INTERRUPTS ..... 3-12
SECTION 6 - I/O PORTS ..... 3-15
SECTION 7 - VIDEO GRAPHICS ADAPTER ..... 3-15
SECTION 8 - SCSI-2 CONTROLLER ..... 3-16
SECTION 9 - ETHERNET CONTROLLER ..... 3-17
10BaseT ..... 3-17
10Base2 ..... 3-17

CHAPTER 4 - MAINTENANCE ..... 4-1
MAINTENANCE PRINTS ..... 4-2

APPENDIX A - CONNECTOR PINOUTS ..... A-1
SECTION 1 - INTRODUCTION ..... A-1
SECTION 2 - ETHERNET CONNECTOR PINOUT ..... A-4
SECTION 3 - SCSI-2 CONNECTOR PINOUT ..... A-5
SECTION 4 - FLOPPY DRIVE CONNECTOR PINOUT ..... A-6
SECTION 5 - EIDE HARD DRIVE CONNECTOR PINOUT ..... A-7
SECTION 6 - PMC CONNECTOR PINOUT ..... A-8
SECTION 7 - KEYBOARD CONNECTOR PINOUT ..... A-10
SECTION 8 - MOUSE CONNECTOR PINOUT ..... A-11
SECTION 9 - PRINTER CONNECTOR PINOUT ..... A-12
SECTION 10 - SERIAL CONNECTOR PINOUT ..... A-13
SECTION 11 - VIDEO CONNECTOR PINOUT ..... A-14
SECTION 12 - VMEbus CONNECTOR PINOUT ..... A-15

APPENDIX B - ETHERNET ..... B-1
SECTION 1 - INTRODUCTION ..... B-1
SECTION 2 - ETHERNET DRIVER SOFTWARE ..... B-1
SECTION 3 - ETHERNET SETUP ..... B-2
WINDOWS FOR WORKGROUPS™ (VERSION 3.11) SETUP ..... B-2
WINDOWS 95® SETUP ..... B-4
WINDOWS NT™ (VERSION 3.51) SETUP ..... B-6



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

WINDOWS NT™ (VERSION 4.0) SETUP ..... B-8
OS/2 WARP SETUP ..... B-21

APPENDIX C - BASIC INPUT OUTPUT SYSTEM ..... C-1

SECTION 1 - INTRODUCTION ..... C-1
SECTION 2 - SYSTEM BIOS ..... C-1
HELP MENU ..... C-2
EXITING THE BIOS SETUP ..... C-3
STANDARD SETUP ..... C-3
Date/Time Configuration ..... C-4
Floppy Disk Drive Configuration ..... C-4
Master and Slave Disk Drive Configuration ..... C-5
ADVANCED SETUP ..... C-5
Quick Boot ..... C-5
Bootup Sequence ..... C-5
Bootup Num-Lock ..... C-5
Floppy Drive Swap ..... C-5
Mouse Support ..... C-5
Primary Display ..... C-6
Password Check ..... C-6
OS/2 Compatible Mode ..... C-6
Internal Cache ..... C-6
External Cache ..... C-6
System BIOS Cachable ..... C-6
C000, 16K Shadow ..... C-7
C400, 16K Shadow ..... C-7
C800, 16K Shadow ..... C-7
CC00, 16K Shadow ..... C-7
D000, 16K Shadow ..... C-7
D400, 16K Shadow ..... C-7
D800, 16K Shadow ..... C-7
DC00, 16K Shadow ..... C-7
CHIPSET SETUP ..... C-7
Memory Hole ..... C-7
DRAM Speed ..... C-7
IRQ12/M Mouse Function ..... C-7
8 bit I/O Recovery Time (SYSCLK) ..... C-8
16 bit I/O Recovery Time (SYSCLK) ..... C-8
OnBoard SCSI ..... C-8
POWER MGMT SETUP ..... C-8
Power Management/APM ..... C-8
Instant-on Timeout (Minute) ..... C-8



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

## APPENDIX D - DEVICE CONFIGURATION: I/O AND INTERRUPT CONTROL D-1

SECTION 1 - INTRODUCTION ..... D-1
Functional Overview and References ..... D-2
Data Book References ..... D-4
SECTION 2 - DEVICE ADDRESS DEFINITION ..... D-5
ISA DEVICES ..... D-5
PCI DEVICES ..... D-7
SECTION 3 - DEVICE INTERRUPT DEFINITION ..... D-8
PC/AT Interrupt Definition ..... D-8
ISA Device Interrupt Map ..... D-9
PCI Device Interrupt Map ..... D-12



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Green PC Monitor Power State ..... C-8
Video Power Down Mode ..... C-8
Hard Disk Power Down Mode ..... C-9
Hard Disk Time Out ..... C-9
Standby Time Out (Minute) ..... C-9
Suspend Time Out (Minute) ..... C-9
Slow Clock Ratio ..... C-9
Display Activity ..... C-9
PCI/PnP SETUP ..... C-9
Plug and Play Aware O/S ..... C-9
PCI Burst Mode ..... C-10
PCI Concurrency ..... C-10
PCI Streaming ..... C-10
PCI Latency Timer (PCI Clocks) ..... C-10
PCI VGA Palette Snoop ..... C-10
PCI EIDE Bus Master ..... C-10
Off Board PCI EIDE Card ..... C-10
Off Board PCI EIDE Primary IRQ & Secondary IRQ ..... C-11
IRQx ..... C-11
Reserved Memory Size ..... C-11
Reserved Memory Address ..... C-11
PERIPHERAL SETUP ..... C-11
On Board FDC ..... C-11
On Board Serial Port 1 ..... C-11
On Board Serial Port 2 ..... C-11
On Board Parallel Port ..... C-11
Parallel Port IRQ ..... C-12
Parallel Port Mode ..... C-13
Parallel Port DMA Channel ..... C-13
On Board PCI EIDE ..... C-13
SECURITY MENU ..... C-13
Supervisor ..... C-13
User ..... C-14
ANTI-VIRUS ..... C-15
UTILITY MENU ..... C-15
Color Set ..... C-15
Language ..... C-15
DEFAULT MENU ..... C-15
Original ..... C-16
Optimal ..... C-16
Fail-safe ..... C-17



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

# LIST OF FIGURES


| | | |
|---|---|---|
| Figure 1-2 | VMIVME-7587 Block Diagram | 1-7 |
| Figure 1-3 | VMIVME-7587 VMEbus Functions | 1-10 |
| Figure 2-1 | VMIVME-7587 CPU Board I/O Port and Jumper Locations | 2-3 |
| Figure 2-2 | VMIVME-7587 I/O Board I/O Port Locations | 2-4 |
| Figure 2-3 | Jumper Locations on the VIC64 Based PCI-to-VMEbus Bridge | 2-6 |
| Figure 2-4 | Jumper Locations on the Universe™ Based PCI-to-VMEbus Bridge | 2-7 |
| Figure 2-5 | LED Position on the Front Panel | 2-10 |
| Figure 2-6 | Type I and Type II PMC Expansion Site | 2-12 |
| Figure 3-1 | Pentium® CPU Block Diagram | 3-2 |
| Figure 3-2 | Connections for the PC Interrupt Logic Controller | 3-14 |
| Figure A-1 | VMIVME-7587 CPU Board Connector Locations | A-2 |
| Figure A-2 | VMIVME-7587 I/O Board Connector Locations | A-3 |
| Figure A-3 | Ethernet Connector Pinout | A-4 |
| Figure A-4 | SCSI-2 Connector Pinout | A-5 |
| Figure A-5 | Floppy Drive Connector Pinout | A-6 |
| Figure A-6 | EIDE Hard Drive Connector Pinout | A-7 |
| Figure A-7 | PMC Connector | A-8 |
| Figure A-8 | Keyboard Connector Pinout | A-10 |
| Figure A-9 | PC/AT Keyboard Connector Pinout | A-10 |
| Figure A-10 | Mouse Connector Pinout | A-11 |
| Figure A-11 | Printer Connector Pinout | A-12 |
| Figure A-12 | Serial Connector Pinouts | A-13 |
| Figure A-13 | Video Connector Pinout | A-14 |
| Figure A-14 | VMEbus Connector Diagram | A-15 |
| Figure B-1 | Accessing the Control Panel | B-9 |
| Figure B-2 | Accessing the Network Icon | B-10 |
| Figure B-3 | Installing the Network NT Option | B-10 |




Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Figure B-4 Configuring the Computer's Participation on a Network ..... B-11
Figure B-5 Searching for the Network Adapters ..... B-11
Figure B-6 Selecting the Network Adapter ..... B-12
Figure B-7 Creating the Drive Path ..... B-12
Figure B-8 Loading the SMC 9000 Ethernet Adapter into Setup Wizard ..... B-13
Figure B-9 Searching for the SMC 9000 Ethernet Adapter ..... B-13
Figure B-10 Selecting the Appropriate Network Protocols ..... B-14
Figure B-11 Selecting the Appropriate Network Services ..... B-14
Figure B-12 Installing the Selected Networking Components ..... B-15
Figure B-13 Entering the CD-ROM Path for Windows NT 4.0 Setup ..... B-15
Figure B-14 Selecting SMC 9000 Ethernet Adapter Card Options ..... B-16
Figure B-15 Verifying the SMC 9000 Drivers' Path ..... B-17
Figure B-16 Disabling or Arranging Network Bindings ..... B-17
Figure B-17 Completing Network Installation ..... B-18
Figure B-18 Verifying the Computer Name and the Workgroup or Domain ..... B-19
Figure B-19 Exiting the Network Setup Wizard ..... B-20
Figure B-20 Rebooting to Include Network Settings and Changes ..... B-20
Figure C-1 BIOS Setup Main Menu ..... C-2
Figure C-2 BIOS Setup Help Menu ..... C-2
Figure C-3 BIOS Exit Menu ..... C-3
Figure C-4 Standard Setup Menu ..... C-3
Figure C-5 Date/Time Menu ..... C-4
Figure C-6 Floppy Disk Drive Configuration Menu ..... C-4
Figure C-7 Supervisor Password Menu ..... C-14
Figure C-8 User Password Menu ..... C-14
Figure C-9 Virus Protection Menu ..... C-15
Figure C-10 Original BIOS Defaults Menu ..... C-16
Figure C-11 Optimal BIOS Defaults Menu ..... C-17
Figure C-12 Fail-safe BIOS Defaults Menu ..... C-17
Figure D-1 VMIVME-7587 Block Diagram ..... D-3
Figure D-2 BIOS Default Connections for the PC Interrupt Logic Controller ... D-11




Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

# LIST OF TABLES


| | | |
|---|---|---|
| Table 1-1 | PC/AT I/O Features | 1-8 |
| Table 2-1 | CPU Clock Multiplier Jumper (JB2) | 2-5 |
| Table 2-2 | CPU Socket Frequency Jumper (JB1) | 2-5 |
| Table 2-3 | VIC64 Based PCI-to-VMEbus Bridge Jumper Functions and Factory Settings | 2-6 |
| Table 2-4 | Universe™ Based PCI-to-VMEbus Bridge Jumper Functions and Factory Settings | 2-7 |
| Table 3-1 | VMIVME-7587-xx0, Cypress VIC64 Based Interface Memory Address Map | 3-4 |
| Table 3-2 | VMIVME-7587-xx1, Universe™ Based Interface Memory Address Map | 3-5 |
| Table 3-3 | Cypress VIC64 Starting I/O Space Addresses | 3-6 |
| Table 3-4 | VMIVME-7587 I/O Address Map | 3-7 |
| Table 3-5 | PC/AT Hardware Interrupt Line Assignments | 3-9 |
| Table 3-6 | PC/AT Interrupt Vector Table | 3-10 |
| Table 3-7 | NMI Status Control Register Bit Description | 3-13 |
| Table 3-8 | NMI Enable and Real-Time Clock Address Register Bit Description | 3-13 |
| Table 3-9 | Supported Graphics Video Resolutions | 3-15 |
| Table A-1 | PMC Connector Pin Description | A-8 |
| Table A-2 | VMEbus Connector Pinout | A-15 |
| Table D-1 | ISA Device Mapping Configuration | D-7 |
| Table D-2 | PCI Device Mapping Configuration | D-8 |
| Table D-3 | Ethernet Interrupt Line Mapping | D-9 |
| Table D-4 | Device PCI Interrupt Mapping by the BIOS | D-12 |
| Table D-5 | Default PIRQx to IRQx BIOS Mapping | D-13 |




Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

CHAPTER

# 1 OVERVIEW

## IN THIS CHAPTER:


| | |
|---|---|
| SECTION 1 - INTRODUCTION TO THE VMIVME-7587 | 1-1 |
| SECTION 1 - ABOUT THIS MANUAL | 1-2 |
| SECTION 2 - PCI-to-VMEbus BRIDGE OPTIONS | 1-3 |
| SECTION 3 - REFERENCES | 1-4 |
| SECTION 4 - VMIVME-7587 FEATURES | 1-6 |
| SECTION 5 - VMEbus FEATURES | 1-9 |


## SECTION 1 - INTRODUCTION TO THE VMIVME-7587

VMIC's VMIVME-7587 is a complete IBM PC/AT compatible Pentium® computer with the additional benefits of Eurocard construction and full compatibility with the VMEbus Specification Rev. C.1. The VMIVME-7587 with advanced VMEbus interface, and RAM that is dual-ported to the VMEbus, is ideal for multiprocessor applications.

The CPU board functions as a standard PC/AT. It executes a PC/AT-type power-on self-test, then boots up MS-DOS™, Windows 95®, Windows NT™, OS/2, or any other PC/AT compatible operating system. The PC/AT mode of the VMIVME-7587 is discussed in Chapter 3.

Beyond the standard PC/AT compatible CPU, the VMIVME-7587, when supplied with an optional PCI-to-VMEbus bridge, may also operate as a VMEbus controller. Two types of PCI-to-VMEbus bridge mezzanines to the CPU board are available. Through either of these the VMIVME-7587 takes on the additional functions of a VMEbus controller and interacts with other VMEbus modules.

The VMIVME-7587 may also be accessed as a VMEbus slave board. The VMEbus functions are available by programming the VMIVME-7587's PCI-to-VMEbus bridge according to the references defined in this manual.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

In this document suite, references made to the VMIVME-7587-xx9 apply to the PC/AT CPU board without the optional PCI-to-VMEbus bridge. References made to the VMIVME-7587 without designating the VMEbus interface designation of -xx9, -xx0, or -xx1 means that the reference applies to the product in any format.

The VMIVME-7587 programmer may quickly and easily control all the VMEbus functions simply by linking to a library of VMEbus interrupt and control functions. This library is located in VMIC's VMIVME/SW-9420 IOWorks Access software for Windows NT™ users and VMIVME/SW-7420 *VMEaccess* software for MS- DOS™ users.

# SECTION 1 - ABOUT THIS MANUAL

Because this product bridges the traditionally divergent worlds of Intel-based PCs and Motorola-based VMEbus controllers, some confusion over "conventional" notation and terminology may exist. We have made every effort to make this manual consistent by adhering to conventions typical for the Motorola/VMEbus world; nevertheless, users in both camps should review the following notes:

- Hexadecimal numbers are listed Motorola-style, prefixed with a dollar sign: $F79, for example. By contrast, this same number would be signified 0F79H according to the Intel convention, or 0xF79 by many programmers. Less common are forms such as $F79_h$ or the mathematician's $F79_{16}$.
- An 8-bit quantity is termed a "byte", a 16-bit quantity is termed a "word", and a 32-bit quantity is termed a "longword." The Intel convention is similar, although their 32-bit quantity is more often called a "double-word".
- Motorola programmers should note that Intel processors have an I/O bus that is completely independent from the memory bus. Every effort has been made in the manual to clarify this by referring to registers and logical entities in I/O space by prefixing I/O addresses as such. Thus, a register at "I/O $140" is not the same as a register at "$140", since the latter is on the memory bus while the former is on the I/O bus.
- Intel programmers should note that addresses are listed in this manual using a linear, "flat-memory" model rather than the old segment:offset model associated with Intel Real Mode



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

programming. Thus, a ROM chip at a segment:offset address of C000:0 will be listed in this manual as being at address $C0000. For reference, here are some quick conversion formulas:

**Segment:Offset to Linear Address**

Linear Address = (Segment × 16) + Offset

**Linear Address to Segment:Offset**

Segment = ((Linear Address ÷ 65536) − *remainder*) × 4096

Offset = *remainder* × 65536

Where *remainder* = the fractional part of (Linear Address ÷ 65536)

Note that there are many possible segment:offset addresses for a single location. The formula above will provide a unique segment:offset address by forcing the segment to an even 64 Kbyte boundary, e.g., $C000, $E000, etc. When using this formula, make sure to round the offset calculation properly!

# SECTION 2 - PCI-to-VMEbus BRIDGE OPTIONS

VMIC's VMIVME-7587 is available with one of two PCI-to-VMEbus bridge options. The first, the VMIVME-7587-xx0, includes a PCI-to-VMEbus bridge mezzanine built around the Cypress Semiconductor Corporation VIC64 VMEbus interface chip. The functions and programming of the VIC64 based VMEbus are addressed in a separate manual supplied in addition to this text.

- PCI-to-VMEbus bridge option (VMIVME-7587-xx0) requires VMIC manual (500-007587-002).

The second option, the VMIVME-7587-xx1, includes a PCI-to-VMEbus bridge mezzanine built around the Tundra Semiconductor Corporation Universe™ VMEbus interface chip. The Universe™ provides a reliable high performance 64-bit VMEbus to PCI interface in one design. The functions and programming of the Universe™ based VMEbus are also provided to the user in a separate manual.

- PCI-to-VMEbus bridge option (VMIVME-7587-xx1) requires VMIC manual (500-007587-001).



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

# SECTION 3 - REFERENCES

For the most up-to-date physical description and specifications for the VMIVME-7587, please refer to:

***VMIC specification number 800-007587-000***

The following references pertain to the Cypress 'VIC64' based bridge option available in the VMIVME-7587-xx0:

***VIC64 User's Guide, and CY7C964 Design Notes***
Cypress Semiconductor Corporation
3901 North First Street
San Jose, CA 95134

***S5930-S5933 PCI Controllers***
Applied Micro Circuits Corporation
6195 Lusk Blvd.
San Diego, CA 92121-2793
(619) 450-9333
(800) 755-2622

***PCI Bus Interface and Clock Distribution Chips***
PLX Technology, inc.
625 Clyde Avenue
Mountain View, CA 94043
(415) 694-2800
(415) 960-0479

The following documents refer to the Tundra Universe™ based bridge option available in the VMIVME-7587-xx1:

***VMEbus Interface Components Manual***
Tundra Semiconductor Corporation
603 March Rd.
Kanata, Ontario
Canada, K2K 2M5
(613) 592-0714
(613) 592-1320 Fax.

***PCI Bus Interface and Clock Distribution Chips***
PLX Technology, inc.
625 Clyde Avenue
Mountain View, CA 94043
(415) 694-2800
(415) 960-0479



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

There are many books widely available on the subject of general PC/AT use and programming. Some reference sources which may be particularly helpful in using or programming the VMIVME-7587 include:

***Pentium® Family User's Manual: Architecture and Programming Manual***
and the ***Pentium® Family User's Manual: Data Book***
Intel Literature Sales
P.O. Box 7641
Mt. Prospect, IL 60056-7641

***Intel Triton 82430FX***
***PCISET Preliminary Data Sheet***
Intel Folsom
FM4-41
1900 Prairie City Road
Folsom, CA 95630-9598

***PCI Special Interest Group***
P.O. Box 14070
Portland, OR 97214
(800) 433-5177 (U.S.)
(503) 797-4207 (International)
(503) 234-6762 (FAX)

***Programmers Guide to the AMIBIOS***
American Megatrends, Inc.
6145-F Northbelt Parkway
Norcross, GA 30071

The VMIC VMEbus interrupt and control function software library references include for Windows NT™:

***VMIVME/SW-9420 IOWorks Access User's Guide***
Doc. No. 520-009420-910

and for MS-DOS™:

***VMIVME/SW-7420 VMEaccess User's Guide***
Doc. No. 520-007420-000

For a detailed description and specification of the VMEbus, please refer to:

***VMEbus Specification Rev. C.1***
***and The VMEbus Handbook***
VITA - VFEA International Trade Association
10229 N. Scottsdale Road, Suite B
Scottsdale, AZ 85253



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

# SECTION 4 - VMIVME-7587 FEATURES

The VMIVME-7587 performs all the functions of a standard IBM PC/AT motherboard with the following features:

- Two-Slot VMEbus 6U Size
- High-performance Intel P54C Pentium® processor
  Available in speeds from 133 to 200 MHz
  Standard 16 Kbyte internal cache
- Low-power VRE 3.5V design
- Up to 64 Mbytes of DRAM
- 512 Kbyte Synchronous Burst SRAM External (L2) Cache
- PCI SVGA video graphics accelerator
  2 Mbyte of video DRAM
  Resolutions up to 1280 x1024, noninterlaced, 256 colors, and 75 Hz refresh rate
- Battery-backed clock/calendar
- Front panel reset switch and miniature speaker
- On-board ports for keyboard, mouse, EIDE hard drive, floppy drive, Ethernet, video, serial, parallel I/O, and SCSI-2
- Front panel "vital sign" indicators (power, EIDE hard drive activity, VMEbus SYSFAIL, and Ethernet status
- Indicators for hard drive activity, power, status

The VMIVME-7587 also supports standard PC/AT I/O features such as those listed in Table 1-1 on page 1-8. Figure 1-2 on page 1-7 also shows a block diagram of the VMIVME-7587 emphasizing the I/O features, including the optional PCI-to-VMEbus bridge option.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

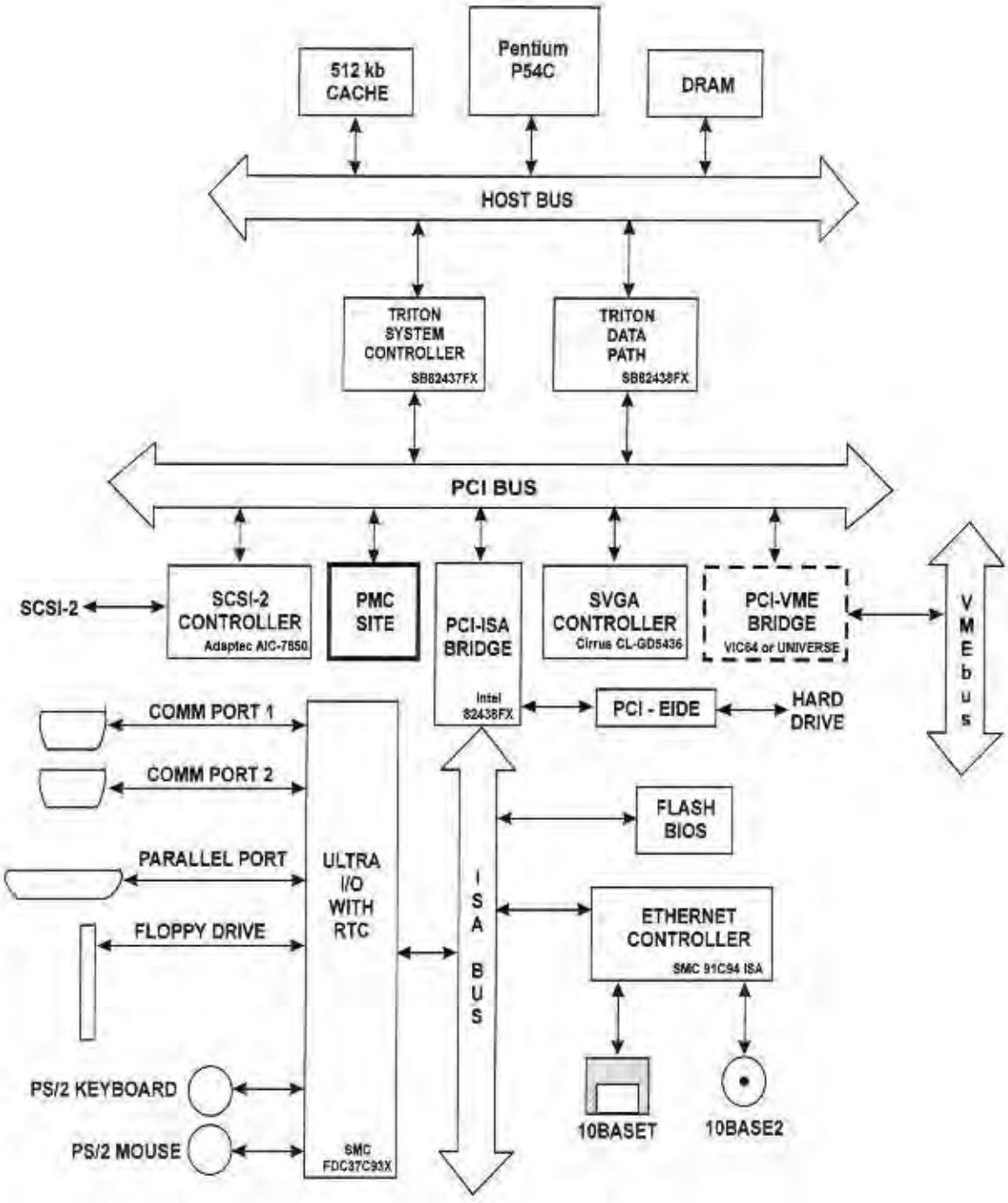



**Figure 1-2** VMIVME-7587 Block Diagram



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

**Table 1-1** PC/AT I/O Features

| I/O FEATURE | IDENTIFIER | PHYSICAL ACCESS |
|---|---|---|
| Two Serial Ports (16550-compatible RS-232C) | COM1, COM2 | Front Panel, DB-9 Male |
| One Parallel Port | LPT1 | Front Panel DB25S (female) |
| AT-style Keyboard Controller with PS/2-style Adapter | KBD | Front Panel PS/2-Style Mini-DIN Circular (female) |
| PS/2-Style Mouse | MSE | Front Panel PS/2-Style Mini-DIN Circular (female) |
| Real-Time Clock/Calendar with Battery and Watchdog Timer | Date, Time | N/A |
| Super VGA Video Controller with 2 Mbyte DRAM | Display | Front Panel DB15HD High Density (female) |
| Ethernet, 10baseT, 10base2 | Novell NE-1000 compatible | Front Panel BNC, RJ45 |
| Floppy Disk Controller (2 drives maximum) | Drives A, B | 34-pin Header Flat Cable Type |
| EIDE Fixed Disk Controller (2 drives maximum) | Drives C, D | 40-pin Header Flat Cable Type |
| SCSI-2 Controller | SCSI-2 | Front Panel 50 Pin High Density SCSI2 |
| Hardware Reset | Cold Boot | Front Panel Pushbutton |
| IBM/PC Sound | Beep | Front Panel Speaker Port |
| LED Indicators | Power, Status, Hard Drive Activity, and Ethernet TX/RX | Front Panel |



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

# SECTION 5 - VMEbus FEATURES

In addition to its PC/AT functions, the VMIVME-7587 has the following VMEbus features when purchased with either the VIC64 based bridge option or the Universe™ based bridge option:

- Two-slot, 6U height VMEbus board
- Complete 6-line Address Modifier (AM-Code) programmability
- 32-bit data interface with separate hardware byte/word swapping for master and slave accesses
- Support for VME64 multiplexed MBLT 64-bit VMEbus block transfers
- User-configured interrupter
- User-configured interrupt handler
- System Controller mode with programmable VMEbus arbiter (PRI, SGL, and RRS modes are supported)
- VMEbus BERR* bus error timer (software programmable)
- Slave access from the VMEbus to local RAM and mailbox registers
- Full-featured programmable VMEbus requester (ROR, RWD, and BCAP modes are supported).

The VIC64 based bridge option available with the VMIVME-7587-xx0 includes the following VMEbus features:

- VMEbus requester ROC mode support
- Complete VMEbus master access through Real-mode memory window or Protected-mode memory window.

The Universe™ based bridge option available with the VMIVME-7587-xx1 has the following additional VMEbus features:

- System Controller auto-detection
- Complete VMEbus master access through five separate Protected-mode memory windows.

Figure 1-3 shows the VMIVME-7587 functions in a typical VMEbus system. The VMIVME-7587 is a versatile double-board solution for VMEbus control with familiar PC/AT operation.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

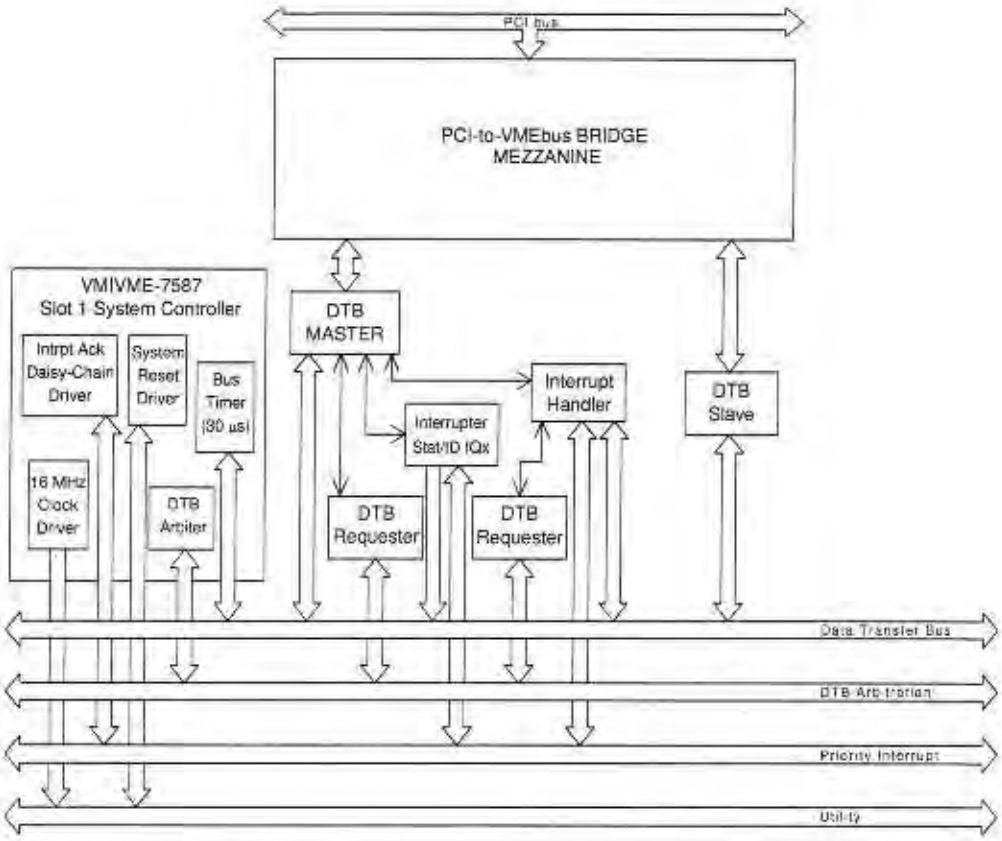



**Figure 1-3** VMIVME-7587 VMEbus Functions



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

CHAPTER 2

# INSTALLATION AND SETUP

## IN THIS CHAPTER:


| | |
|---|---|
| SECTION 1 - INTRODUCTION | 2-1 |
| SECTION 2 - UNPACKING PROCEDURES | 2-1 |
| SECTION 3 - HARDWARE SETUP | 2-2 |
| SECTION 4 - INSTALLATION | 2-8 |
| SECTION 5 - FRONT PANEL CONNECTORS | 2-9 |
| SECTION 6 - LED STATUS DEFINITION | 2-10 |
| SECTION 7 - PMC EXPANSION SITE | 2-10 |
| SECTION 8 - BIOS SETUP | 2-11 |


## SECTION 1 - INTRODUCTION

This chapter describes unpacking, inspection, hardware jumper settings, connector definitions, installation, system setup, and operation of the VMIVME-7587-xx9, the Pentium® VMEbus CPU, and also the PCI-to-VMEbus bridge options; the Cypress VIC64 based interface (VMIVME-7587-xx0), and the Tundra Universe™ based interface (VMIVME-7587-xx1).

## SECTION 2 - UNPACKING PROCEDURES

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. The board(s) should be checked for broken components, damaged printed



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

circuit board(s), heat damage, and other visible contamination. All claims arising from shipping damage should be filed with the carrier and a complete report sent to VMIC customer support together with a request for advice concerning the disposition of the damaged item(s).

**CAUTION**

**Some of the components assembled on VMIC's products may be sensitive to electrostatic discharge and damage may occur on boards that are subjected to a high energy electrostatic field. When the board is placed on a bench for configuring, etc., it is suggested that conductive material be inserted under the board to provide a conductive shunt. Unused boards should be stored in the same protective boxes in which they were shipped.**

# SECTION 3 - HARDWARE SETUP

## VMIVME-7587-xx9, The Pentium® VMEbus CPU

The VMIVME-7587-xx9 is tested for system operation and shipped with factory-installed header jumpers. The physical location of the user-configurable jumpers and connectors for the CPU board and the I/O board are illustrated with Figure 2-1 and Figure 2-2. Table 2-1 on page 2-5 defines the CPU clock multiplier jumper (JB2) and Table 2-2 on page 2-5 lists the CPU socket frequency jumper (JB1).



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

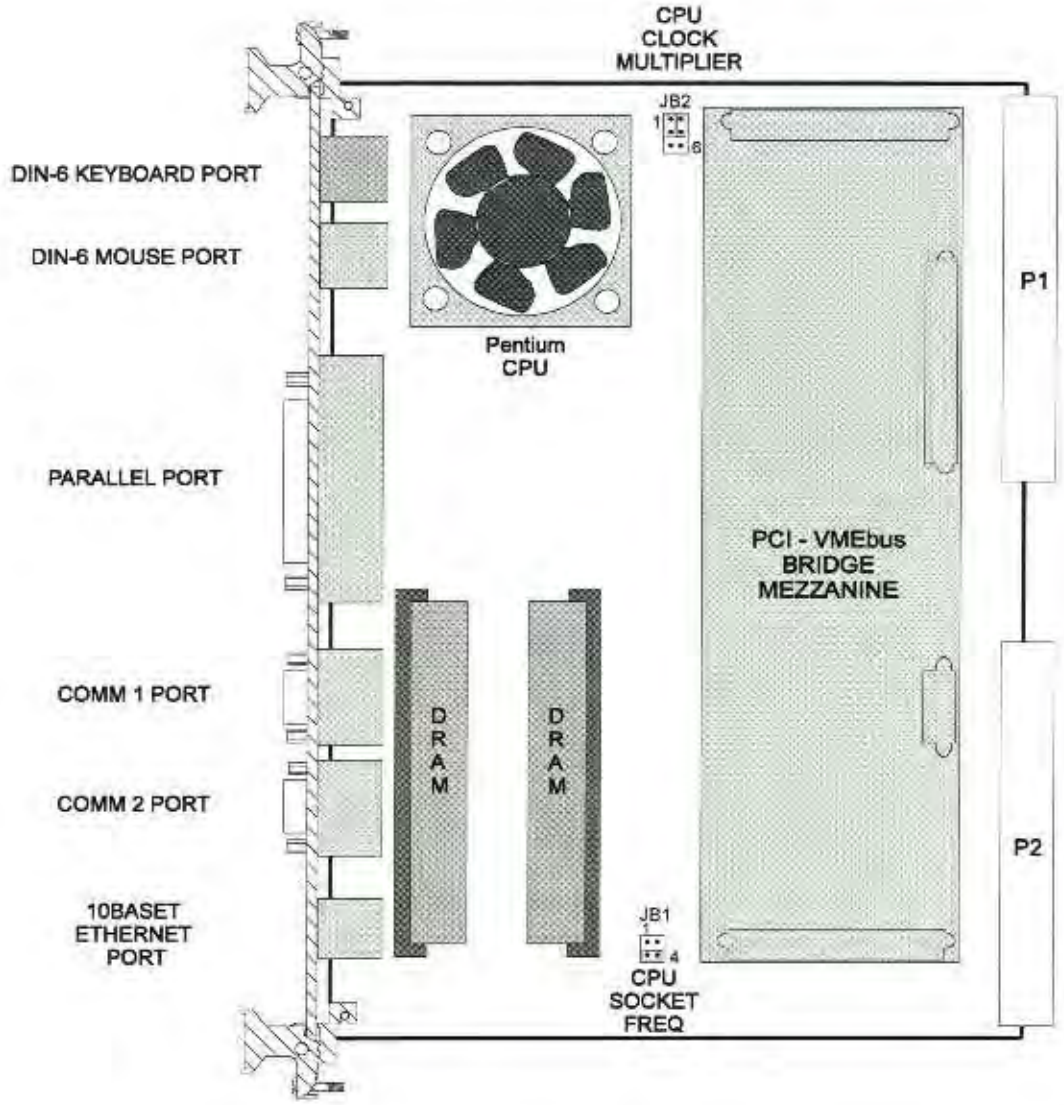



**Figure 2-1** VMIVME-7587 CPU Board I/O Port and Jumper Locations



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

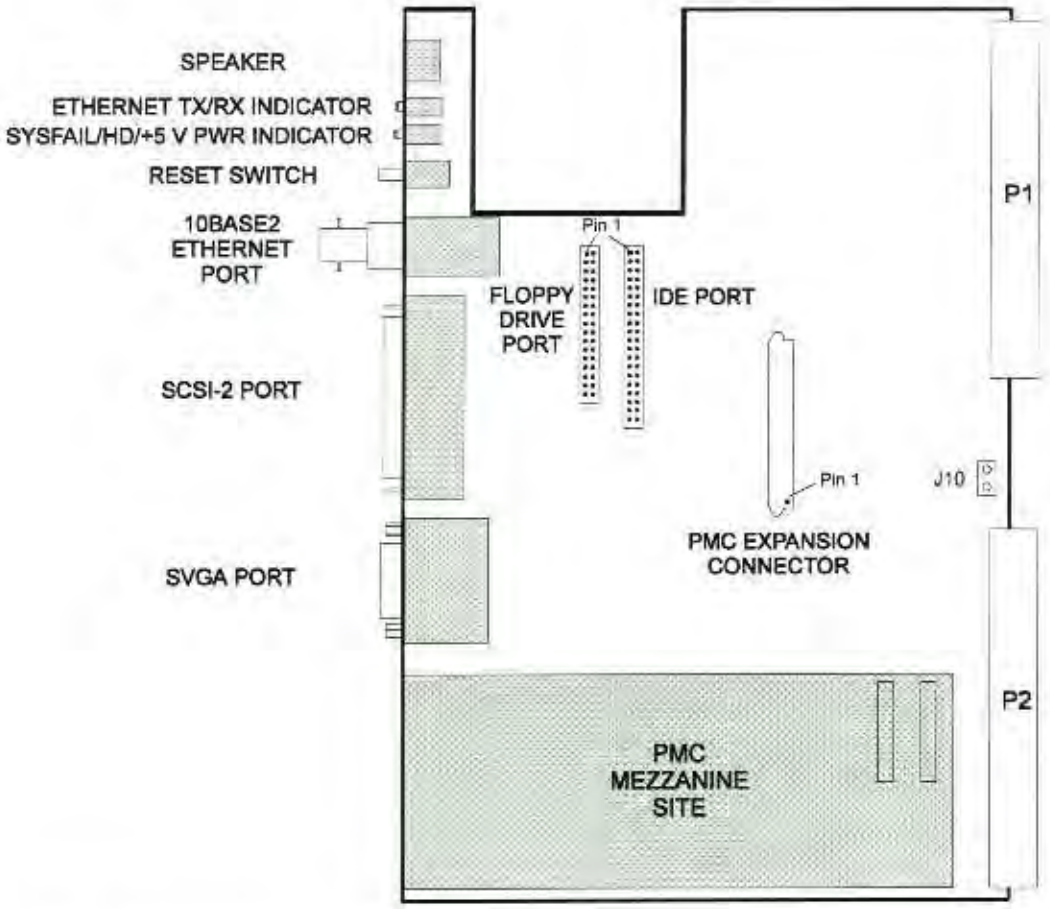



**Figure 2-2** VMIVME-7587 I/O Board I/O Port Locations

**NOTE:**

**The PMC Expansion Connectors are not loaded on certain versions of the VMIVME-7587.**



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

**Table 2-1** CPU Clock Multiplier Jumper (JB2)

| Speed Ratio | Jumper Setting |
|---|---|
| 3\2 x | 1-3, 2-4 |
| 2 x | 3-5, 2-4 |
| 3 x | 1-3, 4-6 |
| 5\2 x | 3-5, 4-6 |

**Table 2-2** CPU Socket Frequency Jumper (JB1)

| Jumper Settings | | |
|---|---|---|
| **Frequency (MHz)** | **Jumpers 1-2** | **Jumpers 3-4** |
| 50 | IN | IN |
| 66 | OUT | IN |
| 60 | IN | OUT |
| TST | IN | IN |

**WARNING**

**Modifying the product will void the warranty.**



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

## VMIVME-7587-xx0, Cypress VIC64 Based PCI-to-VMEbus Bridge

The Cypress VIC64 chip based PCI-to-VMEbus bridge is tested for system operation and shipped with factory-installed header jumpers. The bridge is shipped with the CPU and I/O board as part of the VMIVME-7587-xx0. Figure 2-3 illustrates the physical location of the user-configurable jumpers and connectors on the bridge option. Each jumper designator, its function, and the factory-installed default configuration is included in Table 2-3.

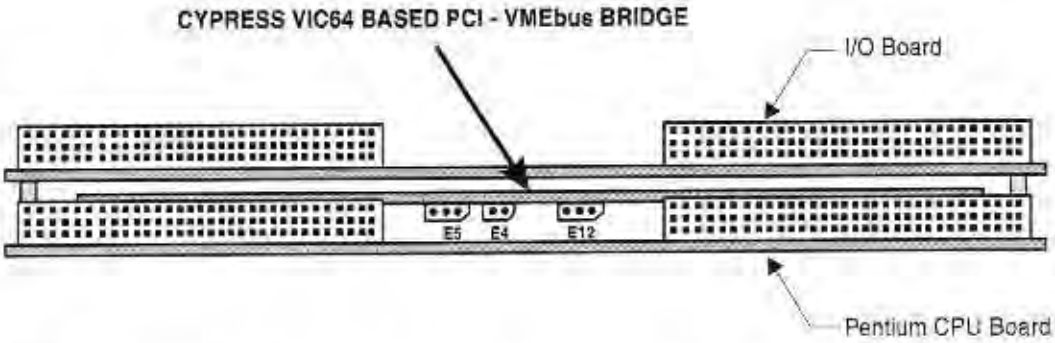



**Figure 2-3** Jumper Locations on the VIC64 Based PCI-to-VMEbus Bridge

**Table 2-3** VIC64 Based PCI-to-VMEbus Bridge Jumper Functions and Factory Settings

| JUMPER | FUNCTION | FACTORY SETTING |
|---|---|---|
| E4 | Enable System Controller | Installed |
| E5 & E12 | 1 - 2 - Receive SYSFAIL only<br>2 - 3 - Drive/Receive SYSFAIL | 2 - 3 Installed |

**NOTE:**

**OTHER JUMPER LOCATIONS ARE RESERVED FOR VMIC USE ONLY AND SHOULD NOT BE ALTERED FROM THE FACTORY DEFAULT SETTINGS.**



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

## VMIVME-7587-xx1, Tundra Universe™ Based PCI-to-VMEbus Bridge

The Tundra Universe™ based PCI-to-VMEbus bridge is tested for system operation and shipped with factory-installed header jumpers. The bridge is shipped with the CPU and I/O board as part of the VMIVME-7587-xx1. Figure 2-4 illustrates the physical location of the user-configurable jumpers and connectors on the bridge option. Table 2-4 lists each jumper designator, its function, and the factory-installed default configuration.

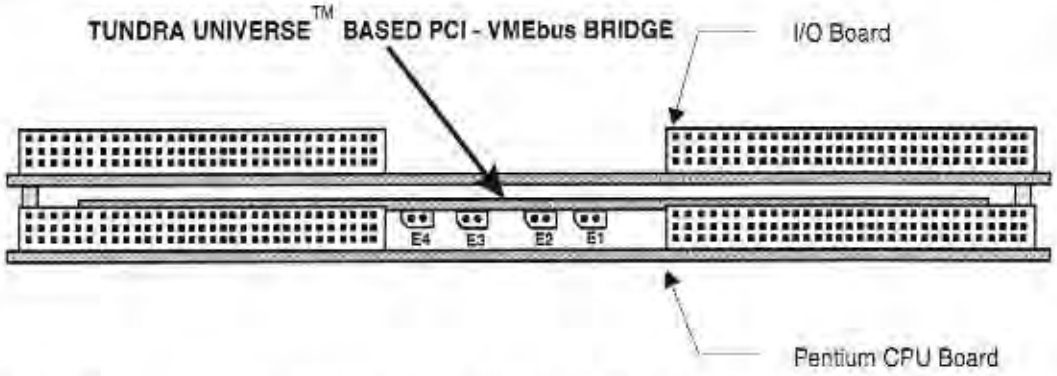



**Figure 2-4** Jumper Locations on the Universe™ Based PCI-to-VMEbus Bridge

**Table 2-4** Universe™ Based PCI-to-VMEbus Bridge Jumper Functions and Factory Settings

| JUMPER | FUNCTION | FACTORY SETTING |
|---|---|---|
| E1 | Installed - Universe™ memory mapped<br>Removed - Universe™ I/O mapped | Installed (Should Not be Removed) |
| E2 | Installed - Receives VMEbus SYSRESET<br>Removed - Does Not Receive | Installed |
| E3 | Installed - Drives VMEbus SYSRESET<br>Removed - Does not drive | Installed |
| E4 | Installed - SYSFAIL Not asserted upon reset<br>Removed - SYSFAIL Asserted upon reset | Installed |

**NOTE:**

**Any other jumper locations are reserved for VMIC use only and should not be altered from the factory default settings.**



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

# SECTION 4 - INSTALLATION

**********
* CAUTION *
**********

**DO NOT INSTALL OR REMOVE THE BOARD WHILE POWER IS APPLIED.**

The VMIVME-7587 conforms to the VMEbus physical specification for a 6U x 4HP dual Eurocard (dual height, two-slot width). It can be plugged directly into any standard chassis accepting this type of board.

The following steps describe the VMIC recommended method for VMIVME-7587 installation and powerup:

1. Make sure power to the equipment is off.
2. If a drive module or other expansion module such as VMIC's VMIVME-7452 VMEbus Floppy/Hard Disk Module is to be used, connect it to the controller prior to card installation. Refer to the disk module manual.
3. Choose two chassis slots. The VMIVME-7587 must be attached to a dual P1/P2 VMEbus backplane.

   If the VMIVME-7587-xx0 with the VIC64 based PCI-to-VMEbus bridge option is to be the VMEbus system controller, choose the first two VMEbus slots and make sure jumper E4 is installed. If some other board is the VMEbus system controller, choose any slot *except* slot one and make sure jumper E4 is removed.

   If the VMIVME-7587-xx1 with the Universe™ based PCI-to-VMEbus bridge is to be the VMEbus system controller, choose the first two VMEbus slots. If some other board is the VMEbus system controller, choose any slot *except* slot one. The Universe™ based bridge requires no jumpers for enabling/disabling the system controller function.

   **NOTE:**

   **The VMIVME-7587 has an operating temperature of 0 to 55 °C. It is advisable to install blank panels over any exposed VMEbus slots. This will allow for better air flow over the VMIVME-7587 board.**

4. Insert the VMIVME-7587 and its attached expansion modules into the chosen VMEbus chassis slot (expansion modules should fill the slots immediately adjacent to the VMIVME-7587). While ensuring



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

that the boards are properly aligned and oriented in the supporting board guides, slide the boards smoothly forward against the mating connector until firmly seated.

5. Connect all needed peripherals to the front panel. Each connector is clearly labeled on the front panel, and detailed pinouts are in Appendix A. Minimally, a keyboard and a monitor are required if the user has not previously configured the system.
6. Apply power to the system. Several messages are displayed on the screen, including names, versions, and copyright dates for the various BIOS modules on the VMIVME-7587. Among the screen messages should be a VMIC product identifier such as:

   ```
   VME Microsystems International Corp.
   VMIVME-7587
   ```

7. If a drive module was installed, the BIOS Setup program must be run to configure the drive types. The procedure varies according to the BIOS manufacturer. See Appendix C to properly configure the system.
8. If a drive module is present, install the operating system according to the manufacturer's instructions.

# SECTION 5 - FRONT PANEL CONNECTORS

Front panel connections for the parallel and video ports are typical for any PC/AT and clearly labeled. The keyboard and mouse connectors are standard mini-DIN PS/2 style connectors; an adapter is supplied to connect a keyboard with a PC/AT connector to the VMIVME-7587. See Appendix A for connector pinouts and orientation.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

# SECTION 6 - LED STATUS DEFINITION

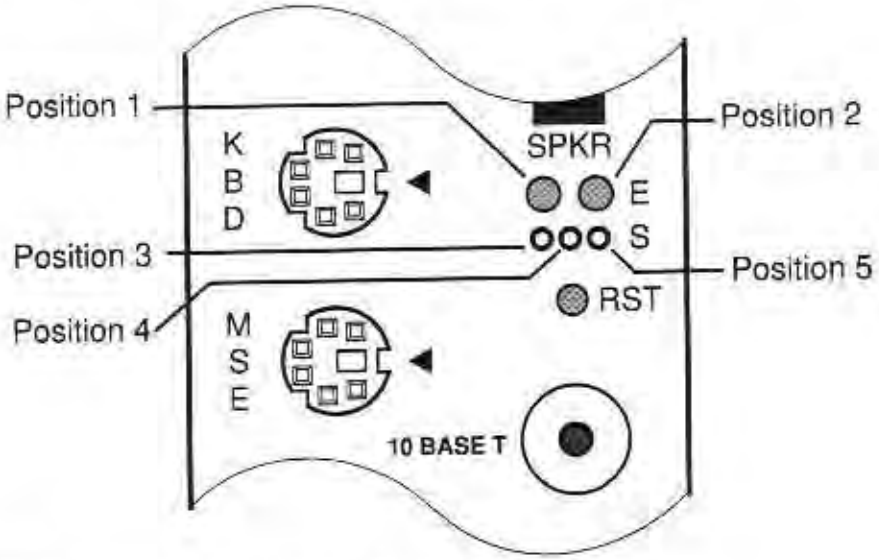



**Figure 2-5** LED Position on the Front Panel

**LED Definition**

Position 1 - Ethernet Transmit - Indicates when the Ethernet is transmitting data.

Position 2 - Ethernet Receive - Indicates when the Ethernet is receiving data.

Position 3 - Power - Indicates when power is applied to the board.

Position 4 - Hard Drive Indicator - Indicates when hard drive activity is occurring.

Position 5 - SYSFAIL - Indicates when a VMEbus SYSFAIL is asserted.

# SECTION 7 - PMC EXPANSION SITE

The PCI Mezzanine Card (PMC) site on the VMIVME-7587 allows expansion of the PCI bus for the use of such peripherals as the VMIPMC-5588 Reflective Memory card or other third-party PMC mezzanine cards. The PMC site on the VMIVME-7587 is attached to the primary (type 0) PCI bus.

**Note:**

**Some PMC boards utilize interrupts; when using these, some configuration setup is necessary.**



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

PMC products that require interrupts can conflict with Ethernet requests. The VMIVME-7587 ships from VMIC with the Ethernet configured to use interrupt request (IRQ) line 9. A PMC board that requires an interrupt will force interrupt sharing between the Ethernet and the PCI device (the PMC board). This will cause one of the devices to not function properly.

The solution is to change the CMOS setup to force the BIOS to select IRQ 9 as an ISA bus interrupt only, thereby preventing the interrupt from being selected as a PCI bus interrupt. IRQ 9 will be selected as the Ethernet interrupt without interfering with the PCI bus interrupts.

The following setup is recommended when using PMC interrupts in the VMIVME-7587:

1. Enter into the CMOS setup
2. Double click on or scroll to the PCI/PnP option in the Standard Setup menu and hit <Enter>
3. Scroll down to the option labeled IRQ 9 and hit <Enter>
4. Choose the option ISA/EISA.
5. Hitting <ESC> twice will bring up the Exit menu, choose Save Changes and Exit.

The machine will reboot and there should not be conflict between the interrupts.

The VMIVME-7587 supports Type I and Type II PMC specifications. Type I PMC specification allows the PMC card to extend through the front panel of the VMIVME-7587 for front panel connections and displays. The Type II PMC specification calls for the PMC card to be shorter than the Type I, therefore enabling the PMC card to remain hidden behind the front panel of the VMIVME-7587. Figure 2-6 on page 2-12 shows where the two types of PMC expansion boards are placed on the VMIVME-7587.

**WARNING**

**THE PMC EXPANSION SITE ON THE VMIVME-7587 IS A 5 V SITE. DO NOT ATTEMPT TO PLACE A 3.3 V PMC BOARD IN THIS SITE. HARDWARE DAMAGE WILL OCCUR.**

# SECTION 8 - BIOS SETUP

The VMIVME-7587 has an on-board BIOS Setup program that controls many configuration options. These options are saved in a special



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

nonvolatile, battery-backed memory chip and are collectively referred to as the board's "CMOS configuration." The CMOS configuration controls many details concerning the behavior of the hardware from the moment power is applied.

The VMIVME-7587 is shipped from the factory with no hard or floppy drives configured in CMOS. The BIOS Setup program must be run to configure the specific drives attached.

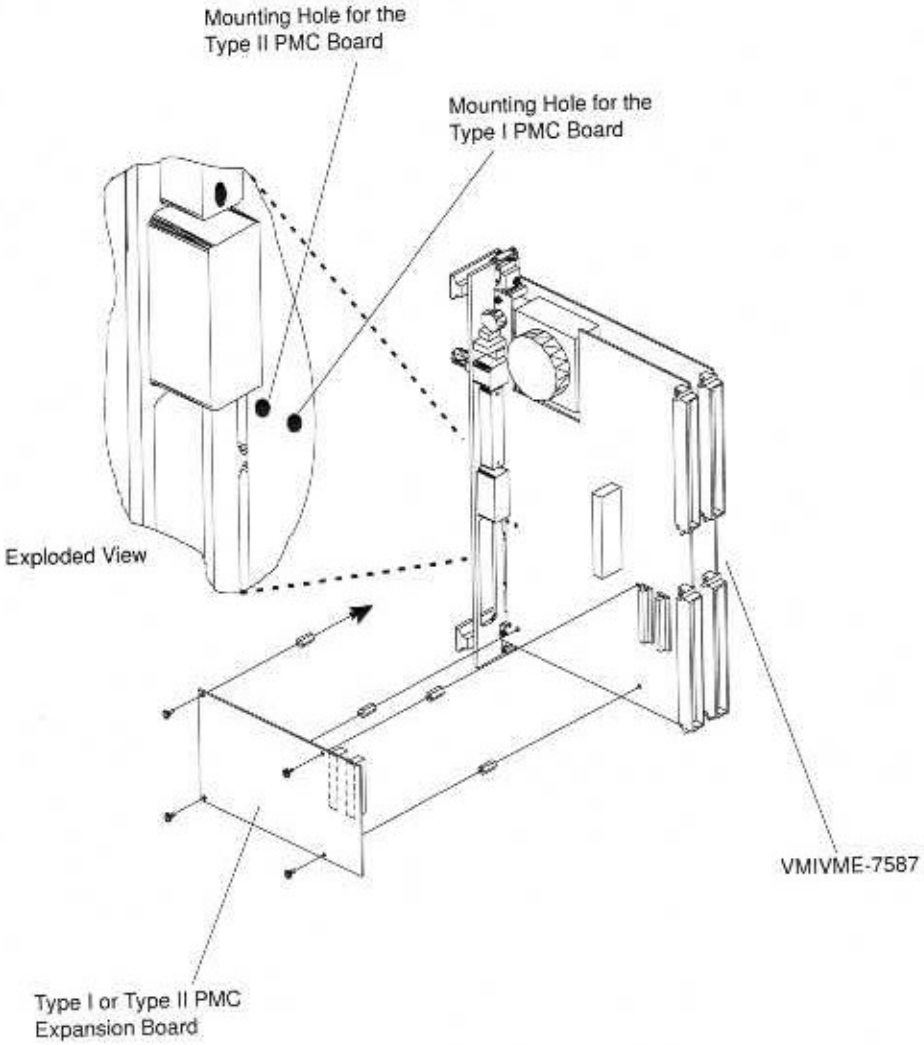



**Figure 2-6** Type I and Type II PMC Expansion Site



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

CHAPTER

# 3 PC/AT FUNCTIONS

## IN THIS CHAPTER:


| | |
|---|---|
| SECTION 1 - CPU REGISTER MODEL | 3-1 |
| SECTION 2 - PHYSICAL MEMORY | 3-2 |
| SECTION 3 - MEMORY AND PORT MAPS | 3-4 |
| SECTION 4 - PC/AT INTERRUPTS | 3-9 |
| SECTION 5 - PCI INTERRUPTS | 3-12 |
| SECTION 6 - I/O PORTS | 3-15 |
| SECTION 7 - VIDEO GRAPHICS ADAPTER | 3-15 |
| SECTION 8 - SCSI-2 CONTROLLER | 3-16 |
| SECTION 9 - ETHERNET CONTROLLER | 3-17 |


## SECTION 1 - CPU REGISTER MODEL

The CPU Register Model is illustrated by the Pentium® CPU block diagram in Figure 3-1 on page 3-2.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

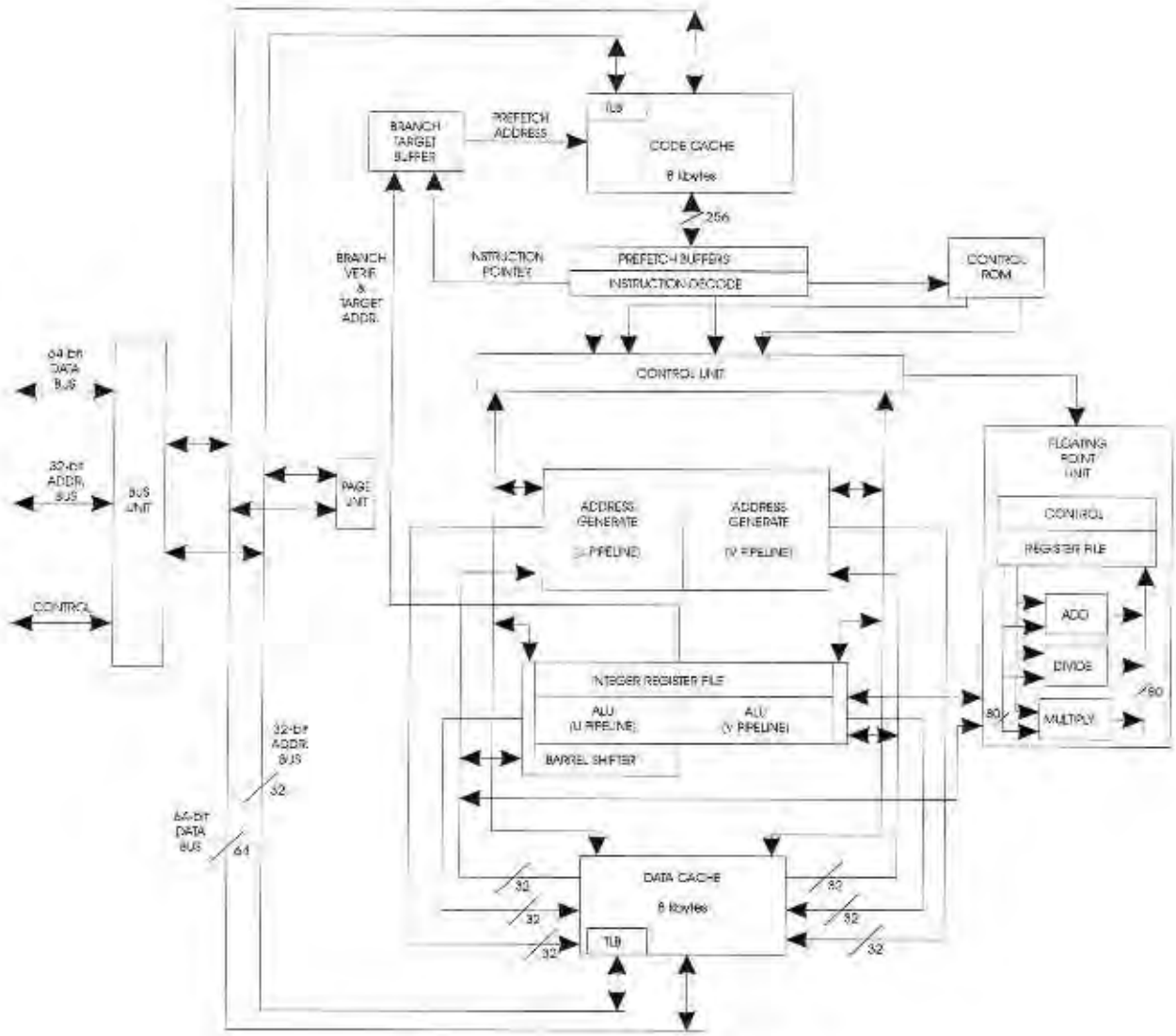



**Figure 3-1** Pentium® CPU Block Diagram

# SECTION 2 - PHYSICAL MEMORY

The VMIVME-7587 has two 72-pin SIMM sockets which support 1 M x 32, 2 M x 32, 4 M x 32, or 8 M x 32 factory-installed SIMM modules for a total of 8 Mbyte, 16 Mbytes, 32 Mbytes, or 64 Mbytes of DRAM, respectively. The memory modules are available either as fast page mode rated at 70 ns or faster or Extended Data Out (EDO) mode. Memory can be accessed as bytes, words, or longwords. Note that this memory is not



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

user-upgradable. To upgrade this memory, contact VMIC's customer service to receive a Return Material Authorization (RMA).

All DRAM on the VMIVME-7587 is dual-ported to the VMEbus through the PCI-to-VME bridge. The memory is not only addressable by the local processor, but is also addressable through the VMEbus slave interface by another VMEbus master. Caution must be used when sharing memory between the local processor and the VMEbus to prevent a VMEbus master from overwriting the local processor's operating system.

The VMIVME-7587 includes both the system and video BIOS in a single 128 K x 8 EPROM. The system portion of this ROM (at $E0000) is automatically shadowed, but for higher performance it is recommended that shadow RAM for the video BIOS be enabled from the Advanced CMOS Setup menu in BIOS Setup (see Appendix C).



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

# SECTION 3 - MEMORY AND PORT MAPS

## MEMORY MAP - CYPRESS VIC64 BASED PCI-to-VMEbus BRIDGE OPTION

The memory map for the Cypress VIC64 Based Interface (VMIVME-7587-xx0) is shown in Table 3-1. All systems share this same memory map, although a VMIVME-7587 with less than the full 64 Mbytes of DRAM does not fill the entire space reserved for On-Board Extended Memory.

**Table 3-1** VMIVME-7587-xx0, Cypress VIC64 Based Interface Memory Address Map

| MODE | MEMORY ADDRESS RANGE | SIZE | DESCRIPTION |
|---|---|---|---|
| PROTECTED MODE | $FFFF 0000 - $FFFF FFFF | 64 Kbytes | ROM BIOS Image |
| | $0400 0000 - $FFFE FFFF | 3.9 Gbytes | Protected Mode VMEbus Windows* |
| | $0010 0000 -$03FF FFFF | 63 Mbytes | Reserved for On-Board Extended Memory (not filled on all systems) |
| REAL MODE | $E0000 - $FFFFF | 128 Kbytes | ROM BIOS |
| | $D0000 - $DFFFF | 64 Kbytes | Real Mode VMEbus Window |
| | $C8000 - $CFFFF | 32 Kbytes | SCSI-2 |
| | $C0000 - $C7FFF | 32 Kbytes | Video ROM |
| | $A0000 - $BFFFF | 128 Kbytes | Video RAM |
| | $00000 - $9FFFF | 640 Kbytes | User RAM/DOS RAM |

* There are actually 4 Protected Mode VMEbus Windows of 16 Mbytes each in this space. Each window maps to the same 16 Mbyte VMEbus address space; however, each window corresponds to a different type of VMEbus access (A24, A16, A32, and USER). See VMIC Manual 500-007587-002 for Protected Mode VMEbus addressing details.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

## MEMORY MAP - TUNDRA UNIVERSE™ BASED PCI-to-VMEbus BRIDGE OPTION

The memory map for the Tundra Universe™ based interface (VMIVME-7587-xx1) is shown in Table 3-2. All systems share this same memory map, although a VMIVME-7587 with less than the full 64 Mbytes of DRAM does not fill the entire space reserved for On-Board Extended Memory.

**Table 3-2** VMIVME-7587-xx1, Universe™ Based Interface Memory Address Map

| MODE | MEMORY ADDRESS RANGE | SIZE | DESCRIPTION |
|---|---|---|---|
| PROTECTED MODE | $FFFF 0000 - $FFFF FFFF | 64 Kbytes | ROM BIOS Image |
| | $0400 0000 - $FFFE FFFF | 3.9 Gbytes | Unused * |
| | $0010 0000 -$03FF FFFF | 63 Mbytes | Reserved for ** On-Board Extended Memory (not filled on all systems) |
| REAL MODE | $E0000 - $FFFFF | 128 Kbytes | ROM BIOS |
| | $D0000 - $DFFFF | 64 Kbytes | Unused |
| | $C8000 - $CFFFF | 32 Kbytes | SCSI-2 |
| | $C0000 - $C7FFF | 32 Kbytes | Video ROM |
| | $A0000 - $BFFFF | 128 Kbytes | Video RAM |
| | $00000 - $9FFFF | 640 Kbytes | User RAM/DOS RAM |

* This space can be used to setup Protected mode PCI-to-VMEbus windows (Also referred to as PCI slave images).

** This space can be allocated as shared memory (i.e. shared between Pentium® CPU and VMEbus Master). Note, that if a PMC Card is loaded, the expansion BIOS may be placed in this area.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

## I/O PORT MAP

The Pentium® CPU has special input/output instructions that access I/O peripherals residing in I/O addressing space (which is separate and distinct from memory addressing space). Locations in I/O address space are often referred to as *ports*. When the CPU decodes and executes an I/O instruction, it produces a 16-bit I/O address on lines A00-A15 and identifies the I/O cycle with the M/I/O control line. Thus, the CPU has an independent 64 Kbyte I/O address space which is accessible as bytes, words, or longwords.

Standard PC/AT hardware circuitry reserves only 1024 bytes of I/O addressing space from I/O $000–$3FF for peripherals. All standard PC I/O peripherals such as serial and parallel ports, hard and floppy drive controllers, video system, real-time clock, system timers, and interrupt controllers are addressed in this region of I/O space. The BIOS initializes and configures all these registers properly, so beware of adjusting these I/O ports directly.

The Cypress VIC64 based PCI-to-VME bridge (VMIVME-7587-xx0) uses an AMCC PCI Controller chip, a PLX 9060 PCI Controller chip, and a VMEbus Interface Controller chip (VIC64) for communication with the VMEbus. The VIC64 requires allocation of 256 bytes in I/O space. The PLX 9060 requires an additional 128 bytes. Also, there is an additional 32 bytes of system I/O required. At boot-time, the BIOS determines the I/O space addresses allocated to these devices. The starting addresses of these address spaces are located in the following PCI configuration base address registers, Table 3-3.

**Table 3-3** Cypress VIC64 Starting I/O Space Addresses

| | Bytes | Location PCI Config. Space |
|---|---|---|
| VIC64 | 256 I/O | $14 (AMCC) |
| PLX | 128 I/O | $14 (PLX) |
| System | 32 I/O | $ 18 (AMCC) |

The Tundra Universebased bridge (VMIVME-7587-xx1) uses a Tundra Universe PCI/VME controller and a PLX 9060ES PCI Controller chip for communication with the VMEbus. All the registers are memory mapped and therefore require no I/O accesses. The assigned and user-available I/O addresses are summarized in the I/O Address Map, Table 3-4.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

**Table 3-4** VMIVME-7587 I/O Address Map

| I/O ADDRESS RANGE | SIZE IN BYTES | HARDWARE DEVICE | PC/AT FUNCTION |
|---|---|---|---|
| $000 - $00F | 16 | | DMA Controller 1 (Intel 8237A Compatible) |
| $010 - $01F | 16 | | Reserved |
| $020 - $021 | 2 | | Master Interrupt Controller (Intel 8259A Compatible) |
| $022 - $03F | 30 | | Reserved |
| $040 - $043 | 4 | | Programmable Timer (Intel 8254 Compatible) |
| $044 - $05F | 30 | | Reserved |
| $060 - $064 | 5 | | Keyboard, Speaker, Eqpt. Config (Intel 8042 Compatible) |
| $065 - $06F | 11 | | Reserved |
| $070 - $071 | 2 | | Real-Time Clock, NMI Mask |
| $072 - $07F | 14 | | Reserved |
| $080 - $08F | 16 | | DMA Page Registers |
| $090 - $091 | 2 | | Reserved |
| $092 | 1 | | Alt. Gate A20 / Fast Reset Register |
| $093 | 1 | | Reserved |
| $094 | 1 | Super VGA Chip | POS102 Access Control Register |
| $095 - $09F | 11 | | Reserved |
| $0A0 - $0A1 | 2 | | Slave Interrupt Controller (Intel 8259A Compatible) |
| $0A2 - $0BF | 30 | | Reserved |
| $0C0 - $0DF | 32 | | DMA Controller 2 (Intel 8237A Compatible) |
| $0E0 - $16F | 142 | | Reserved |
| $170 - $177 | 8 | Ultra I/O Chip | Secondary Hard Disk Controller |
| $178 - $1EF | 120 | | **User I/O** |
| $1F0 - $1F7 | 8 | Ultra I/O Chip | Primary Hard Disk Controller |



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

**Table 3-4** VMIVME-7587 I/O Address Map (Continued)

| I/O ADDRESS RANGE | SIZE IN BYTES | HARDWARE DEVICE | PC/AT FUNCTION |
|---|---|---|---|
| **$1F8 - $277** | 128 | | **User I/O** |
| **$278 - $27F** | 8 | I/O Chip* | LPT2 Parallel I/O* |
| **$280 - $2E7** | 104 | SMC9000 Chip | Ethernet |
| **$2E8 - $2EE** | 7 | UART* | COM4 Serial I/O* |
| **$2EF - $2F7** | 9 | | **User I/O** |
| **$2F8 - $2FE** | 7 | Ultra I/O Chip | COM2 Serial I/O (16550 Compatible) |
| **$2FF - $36F** | 113 | SMC9000 Chip | Ethernet |
| **$370 - $377** | 8 | Ultra I/O Chip | Secondary Floppy Disk Controller |
| **$378 - $37F** | 8 | Ultra I/O Chip | LPT1 Parallel I/O |
| **$380 - $3E7** | 108 | SMC9000 Chip | Ethernet |
| **$3E8 - $3EE** | 7 | UART* | COM3 Serial I/O* |
| **$3F0 - $3F7** | 8 | Ultra I/O Chip | Primary Floppy Disk Controller |
| **$3F8 - $3FE** | 7 | Ultra I/O Chip | COM1 Serial I/O (16550 Compatible) |
| **$3FF** | 1 | | Reserved |

* While these I/O ports are reserved for the listed functions, they are not implemented on the VMIVME-7587. They are listed here to make the user aware of the standard PC/AT usage of these ports.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

# SECTION 4 - PC/AT INTERRUPTS

In addition to an I/O port address, an I/O device has a separate hardware interrupt line assignment. Assigned to each interrupt line is a corresponding interrupt vector in the 256-vector interrupt table at $00000 to $003FF in memory. The 16 maskable interrupts and the single Non-Maskable Interrupt (NMI) are listed in Table 3-5 along with their functions. Table 3-6 on page 3-10 details the vectors in the interrupt vector table.

**Table 3-5** PC/AT Hardware Interrupt Line Assignments

| IRQ | AT FUNCTION | COMMENTS |
|---|---|---|
| NMI | Parity Errors (Must be enabled in BIOS Setup) | **Used by VMIVME-7587 VMEbus Interface** |
| 0 | System Clock/Calendar | Setup by BIOS |
| 1 | System Clock/Calendar | Setup by BIOS |
| 2 | Duplexed to IRQ9 | |
| 3 | COM2 / COM4 | |
| 4 | COM1 / COM3 | |
| 5 | LPT2 | Determined by BIOS |
| 6 | Floppy Controller | |
| 7 | LPT1 | |
| 8 | Real-Time Clock | |
| 9 | Old IRQ2 | VGA or Network I/O |
| 10 | Not Assigned | Determined by BIOS |
| 11 | Not Assigned | Determined by BIOS |
| 12 | Not Assigned | Determined by BIOS |
| 13 | Math Coprocessor | |
| 14 | AT Hard Drive | |
| 15 | Not Assigned | Determined by BIOS |



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

**Table 3-6** PC/AT Interrupt Vector Table

| INTERRUPT # | | IRQ LINE | REAL MODE | PROTECTED MODE |
|---|---|---|---|---|
| HEX | DEC | | | |
| 00 | 0 | | Divide Error | Same as Real Mode |
| 01 | 1 | | Debug Single Step | Same as Real Mode |
| 02 | 2 | NMI | Memory Parity Error, VMEbus Interrupts | Same as Real Mode (Must be enabled in BIOS Setup) |
| 03 | 3 | | Debug Breakpoint | Same as Real Mode |
| 04 | 4 | | ALU Overflow | Same as Real Mode |
| 05 | 5 | | Print Screen | Array Bounds Check |
| 06 | 6 | | | Invalid OpCode |
| 07 | 7 | | | Device Not Available |
| 08 | 8 | IRQ0 | Timer Tick | Double Exception Detected |
| 09 | 9 | IRQ1 | Keyboard Input | Coprocessor Segment Overrun |
| 0A | 10 | IRQ2 | BIOS Reserved | Invalid Task State Segment |
| 0B | 11 | IRQ3 | COM2 Serial I/O | Segment Not Present |
| 0C | 12 | IRQ4 | COM1 Serial I/O | Stack Segment Overrun |
| 0D | 13 | IRQ5 | Ethernet | General Protection Violation |
| 0E | 14 | IRQ6 | Floppy Disk Controller | Page Fault |
| 0F | 15 | IRQ7 | LPT1 Parallel I/O | Unassigned |
| 10 | 16 | | BIOS Video I/O | Coprocessor Error |
| 11 | 17 | | Eqpt Configuration Check | Same as Real Mode |
| 12 | 18 | | Memory Size Check | Same as Real Mode |
| 13 | 19 | | XT Floppy/Hard Drive | Same as Real Mode |
| 14 | 20 | | BIOS Comm I/O | Same as Real Mode |
| 15 | 21 | | BIOS Cassette Tape I/O | Same as Real Mode |
| 16 | 22 | | BIOS Keyboard I/O | Same as Real Mode |
| 17 | 23 | | BIOS Printer I/O | Same as Real Mode |
| 18 | 24 | | ROM BASIC Entry Point | Same as Real Mode |
| 19 | 25 | | Bootstrap Loader | Same as Real Mode |
| 1A | 26 | IRQ8 | Real-Time Clock | Same as Real Mode |
| 1B | 27 | | Control/Break Handler | Same as Real Mode |
| 1C | 28 | | Timer Control | Same as Real Mode |
| 1D | 29 | | Video Parameter Table Pntr | Same as Real Mode |
| 1E | 30 | | Floppy Parm Table Pntr | Same as Real Mode |
| 1F | 31 | | Video Graphics Table Pntr | Same as Real Mode |



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

**Table 3-6** PC/AT Interrupt Vector Table (Continued)

| INTERRUPT # | | IRQ LINE | REAL MODE | PROTECTED MODE |
|---|---|---|---|---|
| HEX | DEC | | | |
| 20 | 32 | | DOS Terminate Program | Same as Real Mode |
| 21 | 33 | | DOS Function Entry Point | Same as Real Mode |
| 22 | 34 | | DOS Terminate Handler | Same as Real Mode |
| 23 | 35 | | DOS Control/Break Handler | Same as Real Mode |
| 24 | 36 | | DOS Critical Error Handler | Same as Real Mode |
| 25 | 37 | | DOS Absolute Disk Read | Same as Real Mode |
| 26 | 38 | | DOS Absolute Disk Write | Same as Real Mode |
| 27 | 39 | | DOS Program Terminate, Stay Resident | Same as Real Mode |
| 28 | 40 | | DOS Keyboard Idle Loop | Same as Real Mode |
| 29 | 41 | | DOS CON Dev. Raw Output | Same as Real Mode |
| 2A | 42 | | DOS 3.x+ Network Comm | Same as Real Mode |
| 2B | 43 | | DOS Internal Use | Same as Real Mode |
| 2C | 44 | | DOS Internal Use | Same as Real Mode |
| 2D | 45 | | DOS Internal Use | Same as Real Mode |
| 2E | 46 | | DOS Internal Use | Same as Real Mode |
| 2F | 47 | | DOS Print Spooler Driver | Same as Real Mode |
| 30-60 | 48-96 | | Reserved by DOS | Same as Real Mode |
| 61-66 | 97-102 | | User Available | Same as Real Mode |
| 67-71 | 103-113 | | Reserved by DOS | Same as Real Mode |
| 72 | 114 | IRQ10 | | |
| 73 | 115 | IRQ11 | | |
| 74 | 116 | IRQ12 | | |
| 75 | 117 | IRQ13 | | |
| 76 | 118 | IRQ14 | | |
| 77 | 119 | IRQ15 | | |
| 78-7F | 120-127 | | Reserved by DOS | Same as Real Mode |
| 80-F0 | 128-240 | | Reserved for BASIC | Same as Real Mode |
| F1-FF | 241-255 | | Reserved by DOS | Same as Real Mode |



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

The maskable interrupts are prioritized in hardware by the equivalent of two cascaded Intel 8259A Priority Interrupt Controller (PIC) chips. At boot-up time, the BIOS writes to each PIC an 8-bit vector that maps each Interrupt Request line (IRQx) to its corresponding interrupt vector in memory. Also at boot-up time, the correct 32-bit interrupt vector must be loaded at the right place in the interrupt table. Later, when the IRQx line is acknowledged, the CPU reads the 8-bit vector returned by the PIC, multiplies it by 4 to create an index into the interrupt table, then retrieves the 32-bit (segment:offset) pointer from the table. The CPU uses that pointer to branch to the interrupt service routine corresponding to the IRQx line.

The interrupt hardware implementation on the VMIVME-7587 is standard for computers built around the PC/AT architecture, which evolved from the IBM PC/XT. In the IBM PC/XT computers, only eight interrupt request lines exist, numbered from IRQ0 to IRQ7 at the PIC. The IBM PC/AT computer added eight more IRQx lines, numbered IRQ8 to IRQ15, by cascading a second slave PIC into the original master PIC. IRQ2 at the master PIC was committed as the cascade input from the slave PIC. To maintain backward compatibility with PC/XT systems, IBM chose to use the new IRQ9 input on the slave PIC to operate as the old IRQ2 interrupt line on the PC/XT Expansion Bus. Thus, in AT systems, the IRQ9 interrupt line connects to the old IRQ2 pin (pin B4) on the AT Expansion Bus (or ISA bus).

## SECTION 5 - PCI INTERRUPTS

Interrupts on Peripheral Component Interconnect (PCI) Local Bus are optional and defined as "level sensitive," asserted low (negative true), using open drain output drivers. The assertion and deassertion of an interrupt line, INTx#, is asynchronous to CLK. A device asserts its INTx# line when requesting attention from its device driver. Once the INTx# signal is asserted, it remains asserted until the device driver clears the pending request. When the request is cleared, the device deasserts its INTx# signal.

PCI defines one interrupt line for a single function device, such as a SCSI-2, and up to four interrupt lines for a multifunction device or connector, such as the PCI Mezzanine Card (PMC). For a single function device, only INTA# may be used while the other three interrupt lines have no meaning. Figure 3-2 on page 3-14 depicts the VMIVME-7587 default interrupt logic pertaining to VMEbus operations and the PMC mezzanine expansion card. This topic is addressed in greater detail in Appendix D.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Any function on a multifunction device can be connected to any of the INTx# lines. The Interrupt Pin register defines which INTx# line the function uses to request an interrupt. If a device implements a single INTx# line, it is called INTA#; if it implements two lines, they are called INTA# and INTB#; and so forth. For a multifunction device, all functions may use the same INTx# line or each may have its own (up to a maximum of four functions) or any combination thereof. A single function can never generate an interrupt request on more than one INTx# line.

The slave PIC accepts the VMEbus interrupts through lines that are defined by the BIOS. The BIOS defines which interrupt line to utilize depending on which system requires the use of the line.

The PCI-to-VME Bridge has the capability of generating a Non-Maskable Interrupt (NMI) via the PCI SERR# line. The SERR interrupt is routed through certain logic back to the NMI input line on the CPU. The CPU reads the NMI Status Control register to determine the NMI source (bits set to 1). After the NMI interrupt routine processes the interrupt, software clears the NMI status bits by setting the corresponding enable/disable bit to 1. The NMI Enable and Real-Time Clock register can mask the NMI signal and disable/enable all NMI sources. Table 3-7 and Table 3-8 describe the register bits that are used by the NMI.

**Table 3-7** NMI Status Control Register Bit Description

| **NMI Status Control Register (I/O Address $061, Read/Write, Read Only)** | |
|---|---|
| Bit 7 | SERR# NMI Source Status (Read Only) - This bit is set to 1 if a system board agent detects a system board error. It then asserts the PCI SERR# line. To reset the interrupt, set bit 2 to 0 and then set it to 1. When writing to port $061, bit 7 must be 0. |
| Bit 2 | PCI SERR# Enable (Read/Write) - 1 = Clear and Disable, 0 = Enable |

**Table 3-8** NMI Enable and Real-Time Clock Address Register Bit Description

| **NMI Enable and Real-Time Clock Address Register (I/O Address $070, Write Only)** | |
|---|---|
| Bit 7 | NMI Enable - 1 = Disable, 0 = Enable |



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

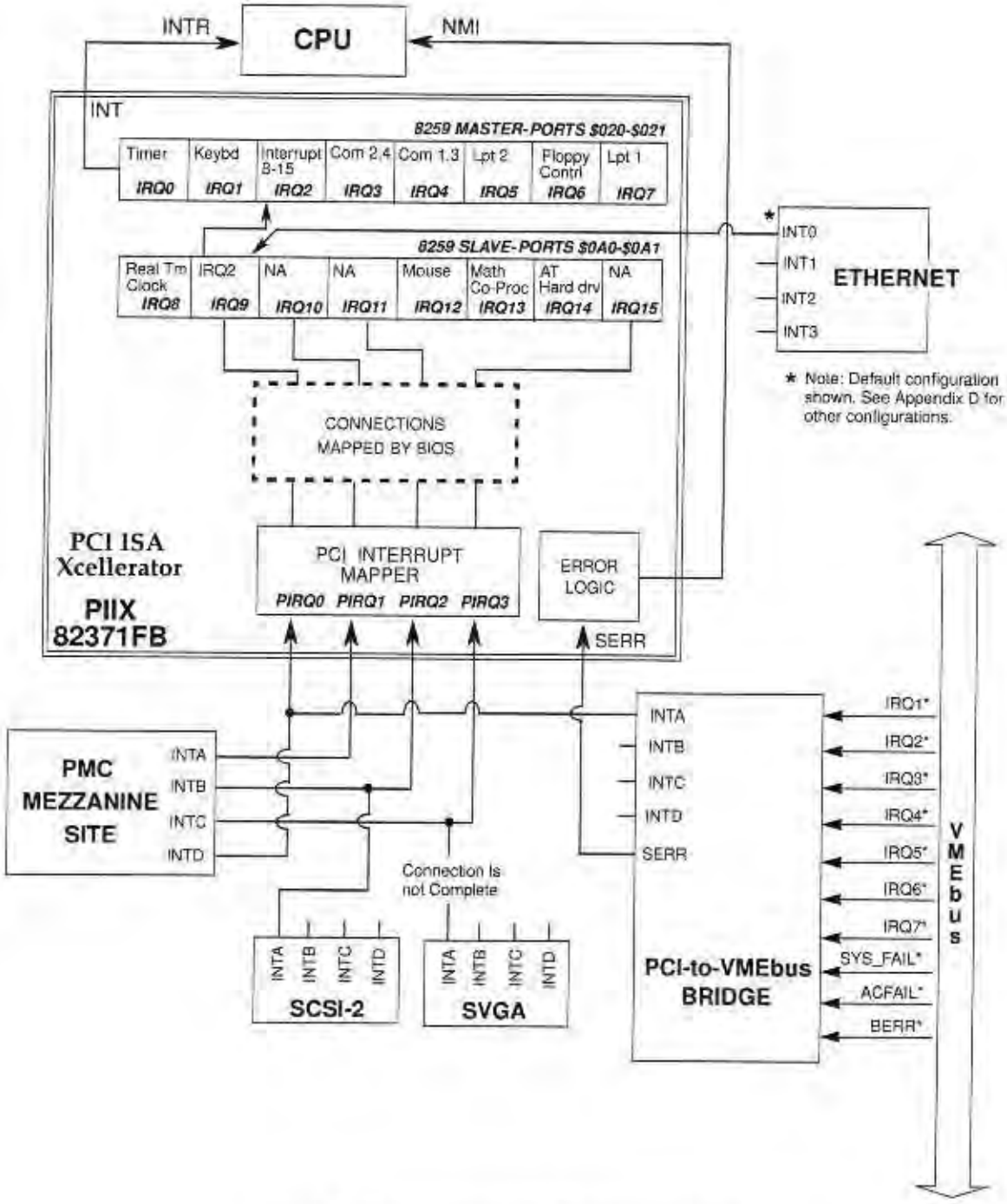



**Figure 3-2**Connections for the PC Interrupt Logic Controller



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

# SECTION 6 - I/O PORTS

The VMIVME-7587 incorporates the SMC Ultra I/O chip. This chip provides the VMIVME-7587 with a standard floppy drive controller, EIDE hard drive interface, two 16550 UART compatible serial ports, and one standard Centronics parallel port. All ports are present in their standard PC/AT locations, using default interrupts.

# SECTION 7 - VIDEO GRAPHICS ADAPTER

The monitor port on the VMIVME-7587 is controlled by a Cirrus Logic CL-GD5436 chip with 2 Mbyte video DRAM. The video controller chip is hardware and BIOS compatible with the IBM EGA and VGA standards and also supports VESA high-resolution and extended video modes. Table 3-9 shows the graphics video modes supported by the Cirrus Logic video chip.

**Table 3-9** Supported Graphics Video Resolutions

| SCREEN RESOLUTION | MAXIMUM COLORS | REFRESH RATES |
|---|---|---|
| 640 x 480 | 256, 64 K, 16 M | 60 Hz, 72 Hz, 75 Hz |
| 800 x 600 | 256, 64 K, 16 M + A | 56 Hz, 60 Hz, 72 Hz, 75 Hz |
| 1024 x 768 (Interlaced) | 256, 32 K, 64 K, 16 M | 43.5 Hz (Interlaced to 87 Hz) |
| 1024 x 768 | 256, 32 K, 64 K | 60 Hz, 70 Hz, 75 Hz |
| 1024 x 768 | 16 M | 60 Hz, 72 Hz, 75 Hz |
| 1280 x 1024 | 16, 256, 32 K, 64 K, 256 K | 43 Hz |
| 1280 x 1024 | 256, 32 K, 256 K | 60 Hz |
| 1280 x 1024 | 256, 256 K | 72 Hz, 75 Hz |

Note that not all VGA monitors support resolutions and refresh rates beyond 640 x 480 at 60 Hz. Do not attempt to drive a monitor to a resolution or refresh rate beyond its capability.

The VMIVME-7587's processor has 32-bit access to video memory with no wait states. Video I/O registers are accessed using PCI bus. In addition, the Cirrus Logic video controller supports up to a 64 x 64 pixel hardware cursor.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Floppy disks supplied with the VMIVME-7587 contain video drivers for Windows™ and other popular programs and operating systems. Follow instructions on the floppy disk label to install the drivers using an interactive installation program.

**NOTE:**

**Windows NT 3.51 and 4.0 autodetect and autoinstall the appropriate video drivers for the on-board Cirrus Logic CL-GD5436 video controller. The video drivers for Windows NT 3.51 are supplied on the VMIVME-7587 distribution diskettes (320-500004-003). Drivers for NT 4.0 are supplied with the NT software package.**

## SECTION 8 - SCSI-2 CONTROLLER

The Small Computer System Interface version two (SCSI-2), also referred to as Fast SCSI-2, is implemented on the VMIVME-7587 system using Adaptec's AIC-7850 PCI based SCSI controller. The SCSI architecture supports one 8-bit Fast SCSI-2 channel, for both internal and external SCSI devices. Fast SCSI-2 provides faster disk access than a traditional disk interface, supporting a synchronous transfer rate of 10 Mbytes per second.

Internally, the SCSI bus is actively terminated, therefore there are no peripherals located on the internal SCSI-2 bus. The Fast SCSI-2 bus does provide external expansion to accommodate single-ended Fast SCSI devices such as external peripherals, plotters, scanners, and CD-ROM drives. Up to seven external SCSI devices can be accommodated. The external Fast SCSI-2 bus must be terminated at the last external SCSI device with an active, single-ended terminator.

The cable from the external devices attaches to the VMIVME-7587 with a Fast SCSI-2 50-pin Micro D-SUB connector. The cable can be a maximum of 19 feet 10 inches, and the recommended impedance is 90 Ω. The Fast SCSI-2 connector and pinout is shown in Appendix A.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

# SECTION 9 - ETHERNET CONTROLLER

The network capability is provided by the Standard Microsystems Corporation's (SMC) SMC91C94. This Ethernet controller is ISA bus based and is software configurable. The VMIVME-7587 supports both 10BaseT and 10base2 type connectors.

## 10BaseT

A network based on the 10BaseT standard uses unshielded twisted-pair cables, providing an economical solution to networking by allowing the use of existing telephone wiring and connectors. The RJ-45 connector is used with the 10BaseT standard. 10BaseT has a maximum length of 100 meters from the wiring hub to the end node. The pin out of the Ethernet 10BaseT connector is shown in Appendix A.

## 10Base2

The VMIVME-7587 also supports the 10Base2 (thin Ethernet) type connector for the Ethernet. This type of Ethernet connection requires a thin (RC58) coaxial cable and has a maximum segment length of 185 meters.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

CHAPTER

# 4 MAINTENANCE

## IN THIS CHAPTER:

SECTION 1 - MAINTENANCE 4-1

## SECTION 1 - MAINTENANCE

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

- 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.**



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

## MAINTENANCE PRINTS

User level repairs are not recommended. The drawings and diagrams in this manual are for reference purposes only.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

APPENDIX

# A CONNECTOR PINOUTS

## IN THIS APPENDIX:


| | |
|---|---|
| SECTION 1 - INTRODUCTION | A-1 |
| SECTION 2 - ETHERNET CONNECTOR PINOUT | A-4 |
| SECTION 3 - SCSI-2 CONNECTOR PINOUT | A-5 |
| SECTION 4 - FLOPPY DRIVE CONNECTOR PINOUT | A-6 |
| SECTION 5 - EIDE HARD DRIVE CONNECTOR PINOUT | A-7 |
| SECTION 6 - PMC CONNECTOR PINOUT | A-8 |
| SECTION 7 - KEYBOARD CONNECTOR PINOUT | A-10 |
| SECTION 8 - MOUSE CONNECTOR PINOUT | A-11 |
| SECTION 9 - PRINTER CONNECTOR PINOUT | A-12 |
| SECTION 10 - SERIAL CONNECTOR PINOUT | A-13 |
| SECTION 11 - VIDEO CONNECTOR PINOUT | A-14 |
| SECTION 12 - VMEbus CONNECTOR PINOUT | A-15 |


## SECTION 1 - INTRODUCTION

The VMIVME-7587 PC/AT Compatible VMEbus Controller has several connectors for its many I/O ports. Figure A-1 on page A-2 and Figure A-2 on page A-3 show the locations of the connectors on the VMIVME-7587. Wherever possible, the VMIVME-7587 uses connectors and pinouts typical for any desktop PC. This ensures maximum compatibility with a minimum of confusion.

Connector diagrams in this appendix are generally shown in a natural orientation with the controller board mounted in a VMEbus chassis.




Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

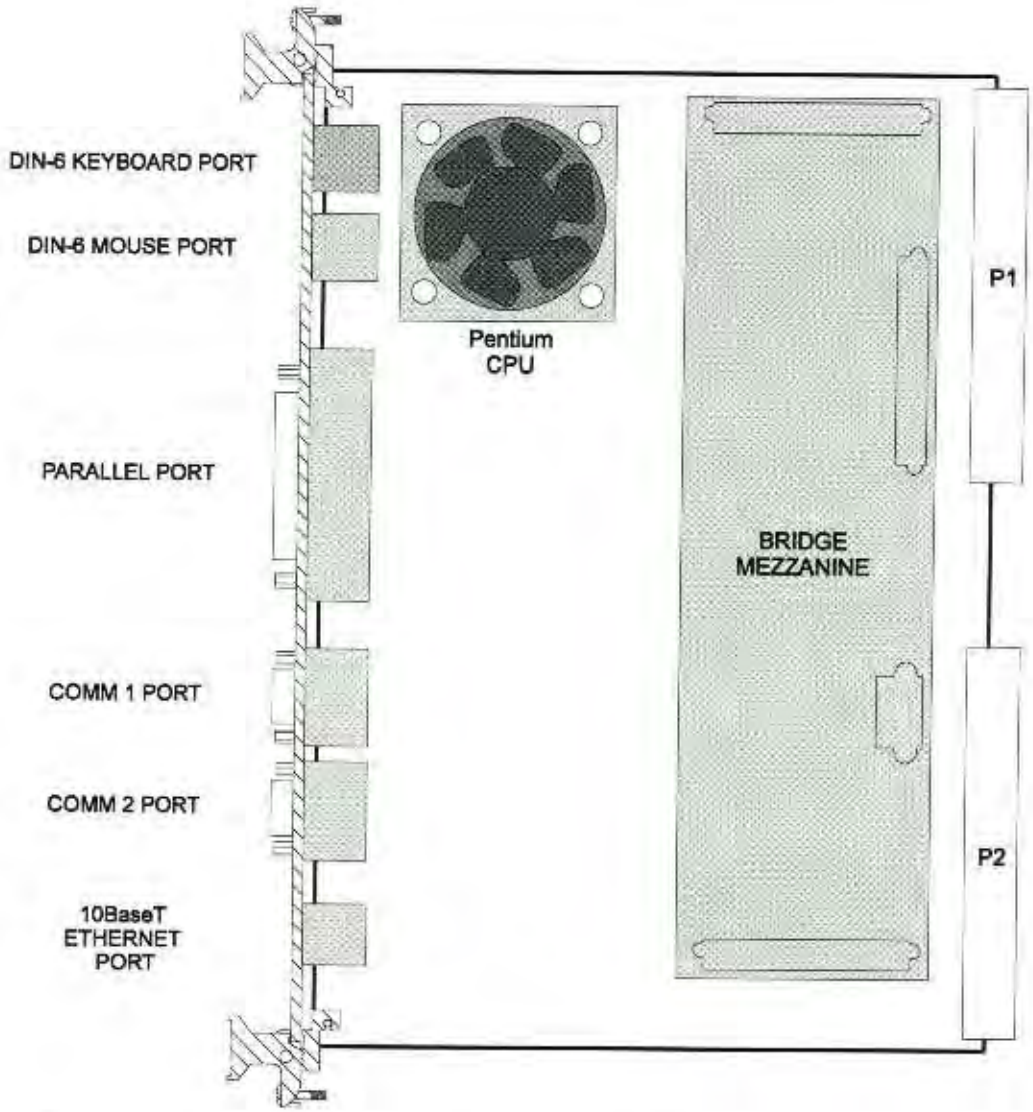



**Figure A-1** VMIVME-7587 CPU Board Connector Locations



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

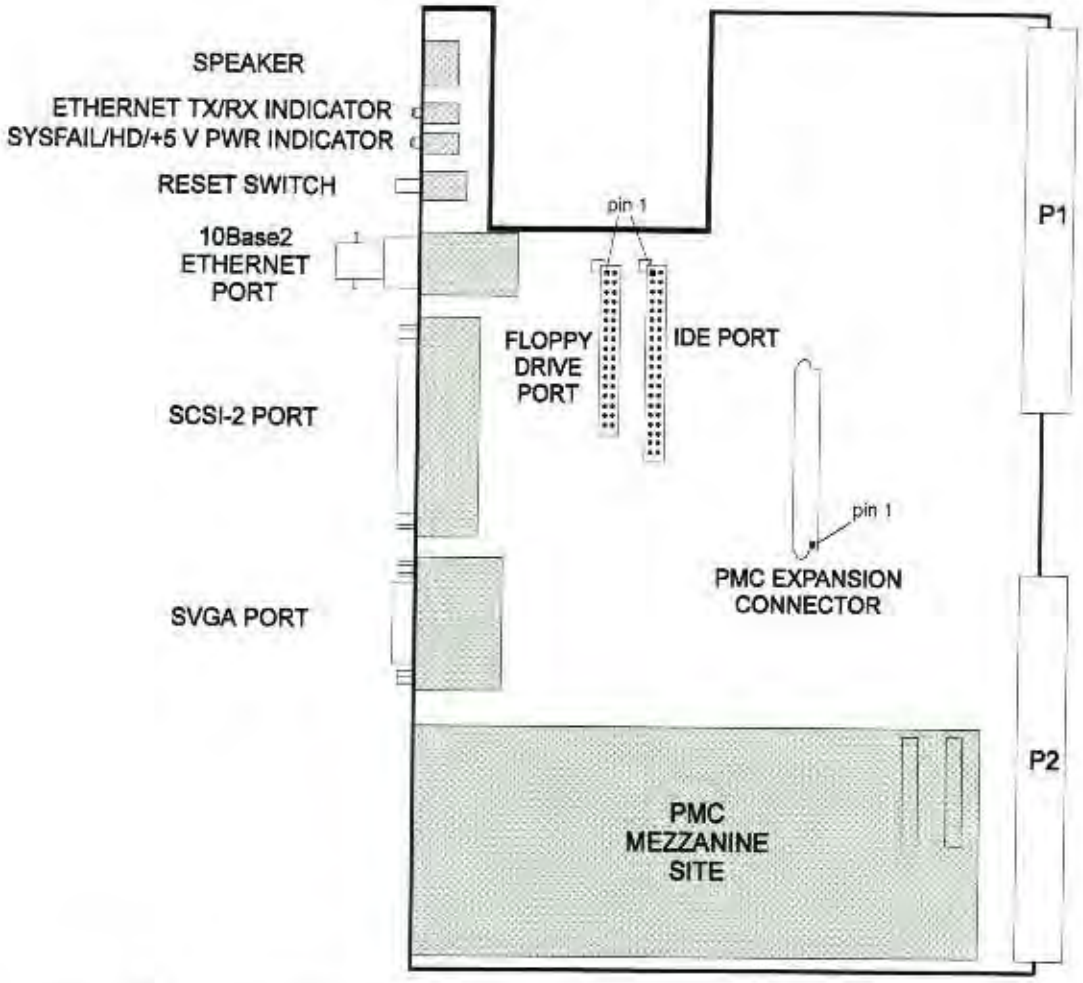



**Figure A-2** VMIVME-7587 I/O Board Connector Locations

**NOTE:**

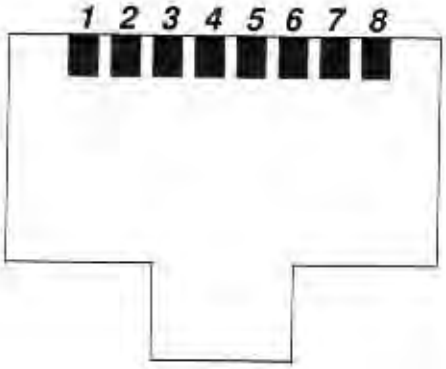
**The PMC Expansion Connectors are not loaded on certain versions of the VMIVME-7587.**



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

# SECTION 2 - ETHERNET CONNECTOR PINOUT

The pinout diagram for the Ethernet 10BaseT connector is shown in Figure A-3.




| ETHERNET CONNECTOR | | |
|---|---|---|
| PIN | Signal Name | |
| 1 | TD+ | Transmit Data |
| 2 | TD- | Transmit Data |
| 3 | RD+ | Receive Data |
| 4 | NC | No Connection |
| 5 | NC | No Connection |
| 6 | RD- | Receive Data |
| 7 | NC | No Connection |
| 8 | NC | No Connection |

**Figure A-3** Ethernet Connector Pinout



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

# SECTION 3 - SCSI-2 CONNECTOR PINOUT

The SCSI-2 connector is a 50-pin Micro D-SUB with a pinout illustrated in the following figure.




| Pin | Signal Name | |
|---|---|---|
| 1-25, 35-37, 39-40, 42 | Ground | GND |
| 26 | Command Data Bus-0 | SSCD0 |
| 27 | Command Data Bus-1 | SSCD1 |
| 28 | Command Data Bus-2 | SSCD2 |
| 29 | Command Data Bus-3 | SSCD3 |
| 30 | Command Data Bus-4 | SSCD4 |
| 31 | Command Data Bus-5 | SSCD5 |
| 32 | Command Data Bus-6 | SSCD6 |
| 33 | Command Data Bus-7 | SSCD7 |
| 34 | Command Data Bus Parity | SSCDP# |
| 38 | Terminator Power | TERMPWR |
| 41 | Bus Attention | SATN# |
| 43 | Bus Busy | SBSY# |
| 44 | Bus Acknowledge | SACK# |
| 45 | Bus Reset | SRESET# |
| 46 | Bus Message | SMSG# |
| 47 | Bus Select | SSEL# |
| 48 | Bus Command | SCD# |
| 49 | Bus Request | SREQ# |
| 50 | Input/Output | SIO# |

**Figure A-4** SCSI-2 Connector Pinout



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

# SECTION 4 - FLOPPY DRIVE CONNECTOR PINOUT

The floppy drive connector is a dual-row 34-pin header connector. Pin 1 marks the beginning of the odd-numbered row. Most standard PC compatible floppy disk drives use this pinout, which is shown in Figure A-5. The user should exercise caution to not misalign the floppy drive connector and cable.




| FLOPPY DRIVE CONNECTOR | | |
|---|---|---|
| PIN | DIRECTION | FUNCTION |
| 1 | | Ground |
| 2 | From Controller | Drive Density 0 (not connected on some controllers) |
| 3 | | Ground |
| 4 | | Reserved |
| 5 | | Ground |
| 6 | From Controller | Drive Density 1 (not connected on some controllers) |
| 7 | | Ground |
| 8 | From Drive | Index |
| 9 | | Ground |
| 10 | From Controller | Motor Enable A |
| 11 | | Ground |
| 12 | From Controller | Drive Select B |
| 13 | | Ground |
| 14 | From Controller | Drive Select A |
| 15 | | Ground |
| 16 | From Controller | Motor Enable B |
| 17 | | Ground |
| 18 | From Controller | Step Motor Direction |
| 19 | | Ground |
| 20 | From Controller | Step Pulse |
| 21 | | Ground |
| 22 | From Controller | Write Data |
| 23 | | Ground |
| 24 | From Controller | Write Enable |
| 25 | | Ground |
| 26 | From Drive | Track 0 |
| 27 | | Ground |
| 28 | From Drive | Write Protect |
| 29 | | Ground |
| 30 | From Drive | Read Data |
| 31 | | Ground |
| 32 | From Controller | Select Head 1 |
| 33 | | Ground |
| 34 | From Drive | Disk Change |

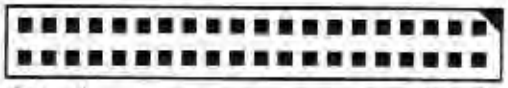
**Figure A-5** Floppy Drive Connector Pinout



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

# SECTION 5 - EIDE HARD DRIVE CONNECTOR PINOUT

Figure A-6 describes the pin assignment for the 40-pin EIDE/ATA hard drive header connector. Like the floppy header connector it has an odd-numbered row and an even-numbered row. The user should exercise caution to not misalign the hard drive connector and cable.




| PIN | DIRECTION | DESCRIPTION | PIN | DIRECTION | DESCRIPTION |
|---|---|---|---|---|---|
| 1 | Out | Reset Drive | 2 | Out | Signal Ground |
| 3 | In/Out | Bidirectional Data 07 | 4 | In/Out | Bidirectional Data 08 |
| 5 | In/Out | Bidirectional Data 06 | 6 | In/Out | Bidirectional Data 09 |
| 7 | In/Out | Bidirectional Data 05 | 8 | In/Out | Bidirectional Data 10 |
| 9 | In/Out | Bidirectional Data 04 | 10 | In/Out | Bidirectional Data 11 |
| 11 | In/Out | Bidirectional Data 03 | 12 | In/Out | Bidirectional Data 12 |
| 13 | In/Out | Bidirectional Data 02 | 14 | In/Out | Bidirectional Data 13 |
| 15 | In/Out | Bidirectional Data 01 | 16 | In/Out | Bidirectional Data 14 |
| 17 | In/Out | Bidirectional Data 00 | 18 | In/Out | Bidirectional Data 15 |
| 19 | Out | Signal Ground | 20 | None | Unused, Keying Position |
| 21 | | Reserved | 22 | Out | Signal Ground |
| 23 | Out | Write Strobe | 24 | Out | Signal Ground |
| 25 | Out | Read Strobe | 26 | Out | Signal Ground |
| 27 | | Reserved | 28 | Out | Address Latch Enable |
| 29 | | Reserved | 30 | Out | Signal Ground |
| 31 | In | Interrupt Request #14 | 32 | In | 16-bit Data Word Size |
| 33 | Out | Address Line #1 | 34 | In | Diagnostic Test Passed |
| 35 | Out | Address Line #0 | 36 | Out | Address Line #2 |
| 37 | Out | Chip Select #0 | 38 | Out | Chip Select #1 |
| 39 | In | Slave/Activity Status | 40 | Out | Signal Ground |

**Figure A-6** EIDE Hard Drive Connector Pinout



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

# SECTION 6 - PMC CONNECTOR PINOUT

The PCI Mezzanine Card (PMC) carries the same signals as the PCI standard, however the PMC standard uses a completely different form factor. Figure A-7 shows the PMC connector and pinout. Table A-1 describes the pins and gives the respective name for each pin.

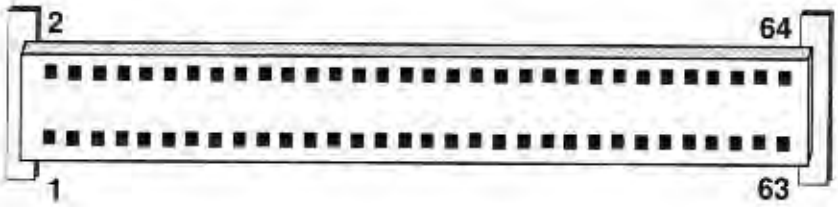



**Figure A-7** PMC Connector

**Table A-1** PMC Connector Pin Description

| PMC CONNECTOR (J7) | | | | PMC CONNECTOR (J8) | | | |
|---|---|---|---|---|---|---|---|
| LEFT SIDE | | RIGHT SIDE | | LEFT SIDE | | RIGHT SIDE | |
| PIN | NAME | PIN | NAME | PIN | NAME | PIN | NAME |
| 1 | TCK | 2 | -12 V | 1 | +12 V | 2 | TRST# |
| 3 | GND | 4 | INTA# | 3 | TMS | 4 | TDO |
| 5 | INTB# | 6 | INTC# | 5 | TDI | 6 | GND |
| 7 | PRSNT1 | 8 | +5 V | 7 | GND | 8 | NC |
| 9 | INTD# | 10 | NC | 9 | NC | 10 | NC |
| 11 | GND | 12 | NC | 11 | PRSNT2 | 12 | +3.3 V |
| 13 | CLK | 14 | GND | 13 | RST# | 14 | GND |
| 15 | GND | 16 | GNT# | 15 | +3.3 V | 16 | GND |
| 17 | REQ# | 18 | +5 V | 17 | NC | 18 | GND |
| 19 | +5 V | 20 | AD[31] | 19 | AD[30] | 20 | AD[29] |
| 21 | AD[28] | 22 | AD[27] | 21 | GND | 22 | AD[26] |
| 23 | AD[25] | 24 | GND | 23 | AD[24] | 24 | +3.3 V |



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

**Table A-1** PMC Connector Pin Description (Continued)

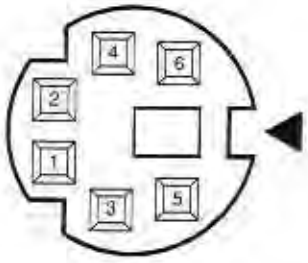
| PMC CONNECTOR (J7) | | | | PMC CONNECTOR (J8) | | | |
|---|---|---|---|---|---|---|---|
| LEFT SIDE | | RIGHT SIDE | | LEFT SIDE | | RIGHT SIDE | |
| PIN | NAME | PIN | NAME | PIN | NAME | PIN | NAME |
| 25 | GND | 26 | C/BE3# | 25 | IDSEL | 26 | AD[23] |
| 27 | AD[22] | 28 | AD[21] | 27 | +3.3 V | 28 | AD[20] |
| 29 | AD[19] | 30 | +5 V | 29 | AD[18] | 30 | GND |
| 31 | +5 V | 32 | AD[17] | 31 | AD[16] | 32 | C/BE2# |
| 33 | FRAME# | 34 | GND | 33 | GND | 34 | NC |
| 35 | GND | 36 | IRDY# | 35 | TRDY# | 36 | +3.3 V |
| 37 | DEVSEL# | 38 | +5 V | 37 | GND | 38 | STOP# |
| 39 | GND | 40 | LOCK# | 39 | PERR# | 40 | GND |
| 41 | SDONE | 42 | SB0# | 41 | +3.3 V | 42 | SERR# |
| 43 | PAR | 44 | GND | 43 | C/BE1# | 44 | GND |
| 45 | +5 V | 46 | AD[15] | 45 | AD[14] | 46 | AD[13] |
| 47 | AD[12] | 48 | AD[11] | 47 | GND | 48 | AD[10] |
| 49 | AD[9] | 50 | +5 V | 49 | AD[8] | 50 | +3.3 V |
| 51 | GND | 52 | C/BE0# | 51 | AD[7] | 52 | NC |
| 53 | AD[6] | 54 | AD[5] | 53 | +3.3 V | 54 | NC |
| 55 | AD[4] | 56 | GND | 55 | NC | 56 | GND |
| 57 | +5 V | 58 | AD[3] | 57 | NC | 58 | NC |
| 59 | AD[2] | 60 | AD[1] | 59 | GND | 60 | NC |
| 61 | AD[0] | 62 | +5 V | 61 | ACK64# | 62 | +3.3 V |
| 63 | GND | 64 | REQ64# | 63 | GND | 64 | NC |



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

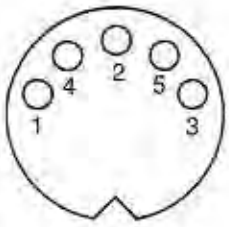
# SECTION 7 - KEYBOARD CONNECTOR PINOUT

The keyboard connector is a standard 6-pin female mini-DIN PS/2 style connector shown in Figure A-8; an adapter is supplied to connect a keyboard with a larger PC/AT-style connector to the VMIVME-7587. The PC/AT-style connector pinout is shown in Figure A-9.




| KEYBOARD CONNECTOR | | |
|---|---|---|
| PIN | DIR | FUNCTION |
| 1 | In/Out | Data |
| 2 | | Reserved |
| 3 | | Ground |
| 4 | | +5 V |
| 5 | Out | Clock |
| 6 | | Reserved |
| Shield | | Chassis Ground |

**Figure A-8** Keyboard Connector Pinout




| KEYBOARD CONNECTOR | |
|---|---|
| PIN | FUNCTION |
| 1 | + Keyboard Clock (+5 VDC Signal Level) |
| 2 | + Keyboard Data (+5 VDC Signal Level) |
| 3 | Free |
| 4 | Ground |
| 5 | +5 VDC |

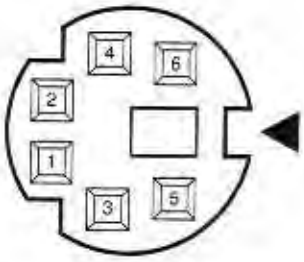
**Figure A-9** PC/AT Keyboard Connector Pinout



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

# SECTION 8 - MOUSE CONNECTOR PINOUT

The mouse connector is a standard 6-pin female mini-DIN PS/2 style connector shown in Figure A-10.




| MOUSE CONNECTOR | | |
|---|---|---|
| PIN | DIR | FUNCTION |
| 1 | In/Out | Data |
| 2 | | Reserved |
| 3 | | Ground |
| 4 | | +5 V |
| 5 | Out | Clock |
| 6 | | Reserved |
| Shield | | Chassis Ground |

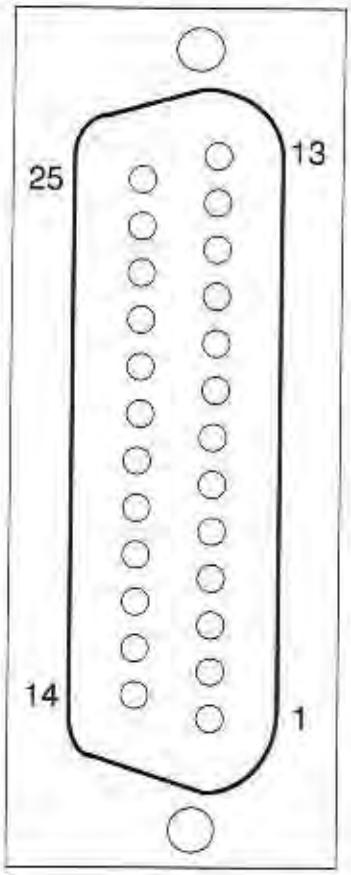
**Figure A-10** Mouse Connector Pinout



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

# SECTION 9 - PRINTER CONNECTOR PINOUT

The printer port shown in Figure A-11 uses a D25 female connector typical of any PC/AT system.




| PRINTER CONNECTOR | | |
|---|---|---|
| PIN | DIRECTION | FUNCTION |
| 1 | In/Out | Data Strobe |
| 2 | In/Out | Bidirectional Data D0 |
| 3 | In/Out | Bidirectional Data D1 |
| 4 | In/Out | Bidirectional Data D2 |
| 5 | In/Out | Bidirectional Data D3 |
| 6 | In/Out | Bidirectional Data D4 |
| 7 | In/Out | Bidirectional Data D5 |
| 8 | In/Out | Bidirectional Data D6 |
| 9 | In/Out | Bidirectional Data D7 |
| 10 | In | Acknowledge |
| 11 | In | Device Busy |
| 12 | In | Out of Paper |
| 13 | In | Device Selected |
| 14 | Out | Auto Feed |
| 15 | In | Error |
| 16 | Out | Initialize Device |
| 17 | In | Device Ready for Input |
| 18 | | Signal Ground |
| 19 | | Signal Ground |
| 20 | | Signal Ground |
| 21 | | Signal Ground |
| 22 | | Signal Ground |
| 23 | | Signal Ground |
| 24 | | Signal Ground |
| 25 | | Signal Ground |
| Shield | | Chassis Ground |

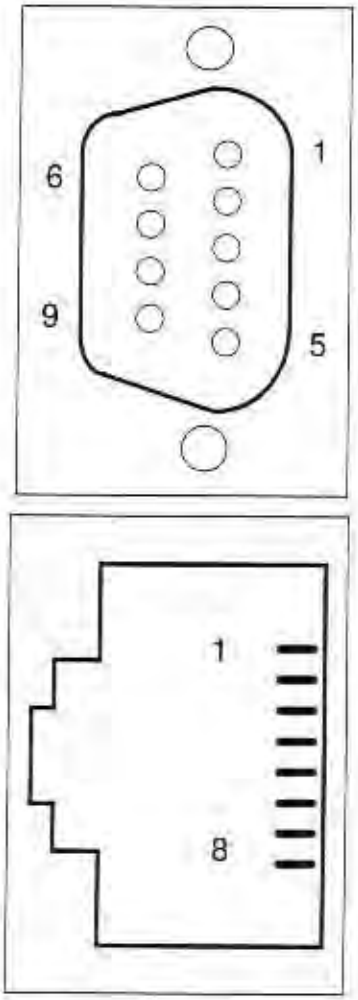
**Figure A-11** Printer Connector Pinout



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

# SECTION 10 - SERIAL CONNECTOR PINOUT

Each standard RS-232 serial port connectors is either a D9 male as shown in the upper drawing in Figure A-12 or an RJ45 jack like the lower drawing in Figure A-12. The controller boards with RJ45 jacks are supplied with adapters to connect standard D9 serial peripherals. Because only eight of the nine RS-232 signals are brought out to the RJ45 connectors, the signal at pin 8 (pin 1 on the D9 adapter) is assigned to either the DCD signal or the RI signal, depending upon a jumper selection (see Chapter 2 for complete board jumper information).




| SERIAL COM PORT CONNECTORS | | | | |
|---|---|---|---|---|
| D9 PIN | RJ45 PIN | DIR | RS-232 SIGNAL | FUNCTION |
| 1* | 8* | In | DCD | Data Carrier Detect |
| 2 | 2 | In | RX | Receive Data |
| 3 | 3 | Out | TX | Transmit Data |
| 4 | 4 | Out | DTR | Data Terminal Ready |
| 5 | 1 | | GND | Signal Ground |
| 6 | 5 | In | DSR | Data Set Ready |
| 7 | 6 | Out | RTS | Request to Send |
| 8 | 7 | In | CTS | Clear to Send |
| 9* | 8* | In | RI | Ring Indicator |
| Shield | Shield | | | Chassis Ground |

* RJ45 pin 8 is either assigned to the DCD or the RI signal, depending upon a jumper on the controller board. If the supplied RJ45-to-D9 adapter is being used, D9 pin 9 is not connected and D9 pin 1 is the DCD or RI signal from RJ45 pin 8.

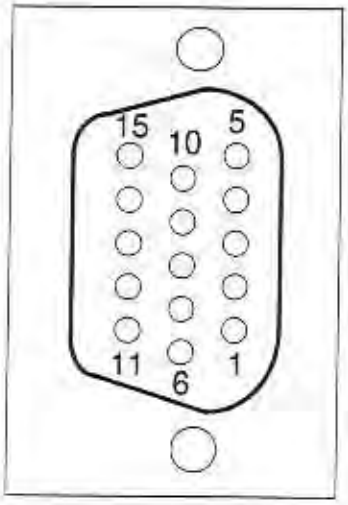
**Figure A-12** Serial Connector Pinouts



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

# SECTION 11 - VIDEO CONNECTOR PINOUT

The video port uses a standard high-density D15 VGA connector. Figure A-13 shows the pinout.




| VIDEO CONNECTOR | | |
|---|---|---|
| PIN | DIRECTION | FUNCTION |
| 1 | Out | Red |
| 2 | Out | Green |
| 3 | Out | Blue |
| 4 | | Reserved |
| 5 | | Ground |
| 6 | | Ground |
| 7 | | Ground |
| 8 | | Ground |
| 9 | | Reserved |
| 10 | | Ground |
| 11 | | Reserved |
| 12 | | Reserved |
| 13 | Out | Horizontal Sync |
| 14 | Out | Vertical Sync |
| 15 | | Reserved |
| Shield | | Chassis Ground |

**Figure A-13** Video Connector Pinout



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

# SECTION 12 - VMEbus CONNECTOR PINOUT

Figure A-14 shows the location of the VMEbus P1 and P2 connectors and their orientation. Table A-2 shows the pin assignments for the VMEbus connectors. Note that only Row B of connector P2 is used: all other pins on P2 are reserved and should not be connected.

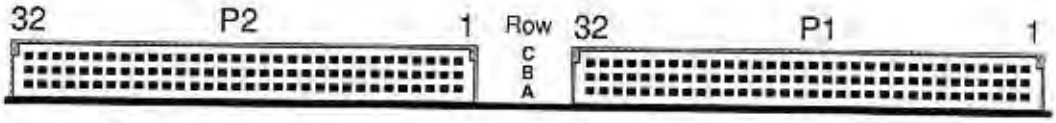



**Figure A-14** VMEbus Connector Diagram

**Table A-2** VMEbus Connector Pinout

| PIN NUMBER | P1 ROW A SIGNAL | P1 ROW B SIGNAL | P1 ROW C SIGNAL | P2 ROW B SIGNAL |
|---|---|---|---|---|
| 1 | D00 | BBSY | D08 | +5 V |
| 2 | D01 | BCLR | D09 | GND |
| 3 | D02 | ACFAIL | D10 | Reserved |
| 4 | D03 | BG0IN | D11 | A24 |
| 5 | D04 | BG0OUT | D12 | A25 |
| 6 | D05 | BG1IN | D13 | A26 |
| 7 | D06 | BG1OUT | D14 | A27 |
| 8 | D07 | BG2IN | D15 | A28 |
| 9 | GND | BG2OUT | GND | A29 |
| 10 | SYSCLK | BG3IN | SYSFAIL | A30 |
| 11 | GND | BG3OUT | BERR | A31 |
| 12 | DS1 | BR0 | SYSRESET | GND |
| 13 | DS0 | BR1 | LWORD | +5 V |
| 14 | WRITE | BR2 | AM5 | D16 |
| 15 | GND | BR3 | A23 | D17 |
| 16 | DTACK | AM0 | A22 | D18 |
| 17 | GND | AM1 | A21 | D19 |
| 18 | AS | AM2 | A20 | D20 |
| 19 | GND | AM3 | A19 | D21 |



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

**Table A-2** VMEbus Connector Pinout (Continued)

| PIN NUMBER | P1 ROW A SIGNAL | P1 ROW B SIGNAL | P1 ROW C SIGNAL | P2 ROW B SIGNAL |
|---|---|---|---|---|
| 20 | IACK | GND | A18 | D22 |
| 21 | IACKIN | SERCLK | A17 | D23 |
| 22 | IACKOUT | SERDAT | A16 | GND |
| 23 | AM4 | GND | A15 | D24 |
| 24 | A07 | IRQ7 | A14 | D25 |
| 25 | A06 | IRQ6 | A13 | D26 |
| 26 | A05 | IRQ5 | A12 | D27 |
| 27 | A04 | IRQ4 | A11 | D28 |
| 28 | A03 | IRQ3 | A10 | D29 |
| 29 | A02 | IRQ2 | A09 | D30 |
| 30 | A01 | IRQ1 | A08 | D31 |
| 31 | -12 V | +5 V STDBY | +12 V | GND |
| 32 | +5 V | +5 V | +5 V | +5 V |



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

APPENDIX

# B ETHERNET

## IN THIS APPENDIX:


| | |
|---|---|
| SECTION 1 - INTRODUCTION | B-1 |
| SECTION 2 - ETHERNET DRIVER SOFTWARE | B-1 |
| SECTION 3 - ETHERNET SETUP | B-2 |


## SECTION 1 - INTRODUCTION

The VMIVME-7587 provides local area network access by means of an on-board SMC91C94 Ethernet controller chip. The VMIVME-7587 controller board has two different types of connectors located on its front panel for accessing a local area network. The front panel includes a 10Base2 (Thin Coax) and a 10BaseT (Twisted Pair) type of Ethernet connectors.

## SECTION 2 - ETHERNET DRIVER SOFTWARE

The SMC91C94 Ethernet controller uses certified SMC9000 drivers which operate with every major network operating system. The software driver utilizes the full capability of a 32 bit microprocessor. The software drivers are supplied on a 1.44 Mbyte floppy disk.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

# SECTION 3 - ETHERNET SETUP

## WINDOWS FOR WORKGROUPS™ (VERSION 3.11) SETUP

1. Format IDE hard drive with MS-DOS®.
2. Type the following command lines:

```
MKDIR C:\CIRRUS <ENTER>
CD CIRRUS <ENTER>
MKDIR W311 <ENTER>
```

3. Insert floppy 320-500004-002 into drive A: and type

```
COPY A:5436W311.EXE C:\CIRRUS\W311\ <ENTER>
```

4. Execute '5436W311' by typing the following:

```
CD W311 <ENTER>
5436W311 <ENTER>
```

5. At the command prompt, type the following lines:

```
MKDIR C:\SMC9000
CD SMC9000
```

6. Insert floppy 320-500004-007 into drive A: and type:

```
COPY A:*.* C:\SMC9000

C:\SMC9000\SMC9000 -d
```

7. Execute the ISMC9000.EXE utility found in C:\SMC9000 by typing:

```
ISMC9000 -d
```

8. Move cursor down to 'MODIFY SETTINGS' and press <ENTER>.
9. Move cursor to 'INTERRUPT LINE' and press <ENTER>.
10. Select '2'.
11. Move cursor to 'I/O PORT ADDRESS' and press <ENTER>.
12. Select '320' and press <ENTER>.
13. Move cursor to 'MEDIA TYPE' and press <ENTER>.
14. Select '10BASET' for twisted-pair or 'AUI' for 10BASE2 (coax) and press <ENTER>.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

15. Move the cursor to 'SAVE SETTINGS TO EEPROM' and press <ENTER>.
16. Wait for three tones from speaker then press <ESC> to exit the ISMC9000 utility.
17. Begin installation of Windows for Workgroups™ 3.11 following the instructions provided by Microsoft. Enter the 'WINDOWS SETUP'.
18. Click on 'OPTIONS'.
19. Click on 'CHANGE NETWORK SETTINGS'.
20. Click on 'NETWORKS...'.
21. Select 'INSTALL MICROSOFT WINDOWS NETWORK', and click 'OK' (click on 'SHARING' if desired).
22. Click on 'DRIVERS'.
23. Click on 'ADD ADAPTER'.
24. Double-click on 'UNLISTED OR UPDATED NETWORK ADAPTER'.
25. In the pathname box, type the following line: `C:\SMC9000\NDIS201`, and click on 'OK'.
26. At the 'UNLISTED OR UPDATED NETWORK ADAPTER' window, click 'OK'.
27. Click on 'CLOSE'.
28. At the 'NETWORK SETUP' window, double-click on 'SMC9000 ETHERNET ADAPTER' under 'NETWORK DRIVERS'.
29. Setup IRQ = 0x10, BASE I/O PORT = 0x0320 and click on 'OK'.
30. Then finish the Windows installation per Microsoft instructions.

**NOTE:**

**Under 'network Drivers' There is an option called 'advanced'. Do not select this option. This is where the physical media type is selected. If The media type 10BaseT is selected, then the user must edit the PROTOCOL.INI file and remove the line 'media=10BaseT' under 'SMC9000'. The usable media type is set up in the ISMC9000 utility.**

31. After Windows for Workgroups™ (Version 3.11) setup has completed, you may choose to install Adaptec SCSI drivers. To do this, complete the following.
32. Insert floppy 320-500004-008 into drive A:. From the File Manager, under 'FILE'.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

33. Select 'RUN'.
34. Type: `A:\SETUP`
35. Reboot the CPU for these changes to take effect.

## WINDOWS 95® SETUP

If a previous version of Windows has been installed on your system without a network, the Adaptec SCSI drivers must be installed. Follow the steps in the Windows for Workgroups™ (Version 3.11) section to install these drivers.

1. **To install the video drivers**, type the following command lines:

```
MKDIR C:\CIRRUS
CD CIRRUS
MKDIR WIN95
CD WIN95
```

   Insert floppy 320-500004-003 into A: and type

```
COPY A:5436W95.EXE
```

   Execute '5436W95' to unzip the Windows 95® Drivers. To execute '5436W95', type the following:

```
5436W95
```

2. Install the **Ethernet drivers**. See the description in the Windows for Workgroups™ (Version 3.11) section.
3. Begin the Windows 95® installation. When the Windows 95® setup Wizard displays 'ANALYZING YOUR COMPUTER' window, check the box 'NEXT'.
4. On the next window, select 'NO, I WANT TO MODIFY THE HARDWARE LIST'.
5. Select 'NETWORK ADAPTER' in the 'HARDWARE TYPES' menu.
6. Select 'SMC NETWORK ADAPTER' in the 'MANUFACTURER AND MODEL MENU'.
7. Click 'OK'. Now, finish the Windows 95® installation as normal
8. To configure the **Cirrus 5436 Video Drivers**. In Windows 95®, click on 'MY COMPUTER'.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

9. Double-click on 'CONTROL PANEL'.
10. Double-click on 'DISPLAY'.
11. Click on the 'SETTINGS' folder tab.
12. Click on 'CHANGE DISPLAY TYPE'.
13. Click on 'CHANGE' under Adapter Type.
14. Click on 'HAVE DISK....'
15. Type in the following pathname, C:\CIRRUS\WIN95, then click on 'OK'.
16. When 'SELECT DEVICE' window shows 'CIRRUS LOGIC 5436 PCI', click on 'OK' and then 'CLOSE'.
17. Adjust the screen resolution if so desired, then click on 'APPLY'.
18. Windows 95® must then be restarted for the changes to take effect.
19. Setting up the **Ethernet Adapter.**
20. Double-click on 'MY COMPUTER'.
21. Double-click on 'CONTROL PANEL'.
22. Double-click on 'NETWORK'.
23. Click on 'ADD', double-click on 'ADAPTER' and scroll to 'SMC' then highlight 'SMC9000'.
24. Next, click on 'HAVE DISK'.
25. Type in the following pathname: C:\SMC9000\NDIS30\WIN95, and then click 'OK'.
26. Highlight 'SMC' and click on 'OK'.
27. At the 'NETWORK' window, double-click on 'SMC9000 ETHERNET ADAPTER'. Driver type should be 'ENHANCED MODE'.
28. Click on 'ADVANCED' folder tab.
29. Click on 'CONNECTOR TYPE / 16-BIT DRIVERS'.
30. Set value to either '10BASET' for twisted pair cable or 'AUI' for 10BASE2 (coax) cable.
31. Click on 'CONNECTOR TYPE / 32-BIT DRIVERS'. Set the value to either '10BASET' for twisted pair cable or 'BNC' for 10BASE2 (coax) cable.
32. Click on the 'RESOURCES' folder tab and set the I/O address to '320-33F' and the IRQ to '9', then click 'OK'.
33. Again, at the 'NETWORK' window, double-click on 'NetBEUI', click on 'ADVANCED', and click the box for 'SET THIS



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

PROTOCOL TO BE THE DEFAULT PROTOCOL', then click 'OK'.

34. At the 'NETWORK' window, click 'OK' and re-boot Windows 95® for network settings to take effect.
35. When the 'ENTER NETWORK PASSWORD' window appears, fill in the blanks and click 'OK'.
36. To verify the network connection, there should now be a desktop icon labelled 'NETWORK NEIGHBORHOOD', double-click on this icon to access other network resources.

## WINDOWS NT™ (VERSION 3.51) SETUP

1. From the DOS prompt, type the following command lines:

   ```
   MKDIR C:\SMC9000
   CD SMC9000
   ```

   Insert floppy 320-500004-007 into drive A: and type the following line:

   ```
   COPY A:\SMC9000.EXE C:\SMC9000
   ```

   To unzip the compressed file, execute SMC9000 by typing,

   ```
   SMC9000 -d
   ```

2. Reboot into DOS and type the following line to configure the Ethernet controller on the VMIVME-7587,

   ```
   ISMC9000
   ```

   From within this utility, select 'MODIFY CONFIGURATION'.

3. Set the IRQ level at '2' and the I/O Base Address to '0x0320'.
4. Change the media type to either '10BASET' for twisted pair cable or 'AUI' for 10BASE2 (coax).
5. Select 'SAVE SETTINGS TO EEPROM'.
6. Exit the ISMC9000 utility. Completely power-down the system and reboot the VMIVME-7587 into Windows NT™.
7. *If the user does not have DOS loaded on his machine then a DOS boot disk will need to be made.* After the boot disk is made, copy the file ISMC9000.EXE onto the boot disk. Insert the disk into the floppy drive and re-boot the machine.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

8. When the floppy drive prompt appears, type in the following line to configure the Ethernet controller,

   ```
   ISMC9000
   ```

   From within this utility, select 'MODIFY CONFIGURATION'.
9. Set the IRQ level at '2' and the I/O Base Address to '0x0320'.
10. Change the media type to either '10BASET' for twisted pair cable or 'AUI' for 10BASE2 (coax).
11. Select 'SAVE SETTINGS TO EEPROM'.
12. Exit the ISMC9000 utility. Completely power-down the system and reboot the VMIVME-7587 into Windows NT™.
13. In Windows NT™, activate the 'CONTROL PANEL' and click on the 'NETWORK' icon.
14. Click on 'ADD ADAPTER....'
15. Click on '<OTHER> REQUIRES DISK FROM MANUFACTURER' and click on 'CONTINUE'.
16. Type in the following pathname:
    C:\SMC9000\NDIS30\MINIPORT and press <ENTER>.
17. A window appears with 'SMC9000 ETHERNET ADAPTER' highlighted, double-click on this line.
18. Another window appears which allows the Ethernet adapter parameters to be setup for Windows NT™.
19. Select the IRQ level '9' and the I/O Base Address '0x0320'.
20. Change the media type to either '10BASET' for twisted pair or 'BNC' for 10BASE2 (coax).
21. Click on 'CONTINUE'.
22. When the 'Bus Location' window appears, leave the choices 'ISA' and '0' alone and click 'OK'.
23. Since Windows NT™ cannot verify these parameters, click on 'OK' when asked 'Use Them Anyway?'.
24. Click on 'OK' to close the network settings window.
25. Restart Windows NT™ for the changes to take effect.
26. The Windows NT™ network driver installation may be verified by activating 'FILE MANAGER', and then 'CONNECT NETWORK DRIVE'.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

27. When the VMIVME-7587 is attached to a network of other Windows computers, the shared drives should appear as choices.
28. Double-click on one of the network drive choices (other than the local one) to connect the directory.
29. Copy files back and forth to verify the network connection.

## WINDOWS NT™ (VERSION 4.0) SETUP

1. From the DOS prompt, type the following command lines:

   ```
   MKDIR C:\SMC9000
   CD SMC9000
   ```

   Insert floppy 320-500004-007 into drive A. Type the following line:

   ```
   COPY A:\SMC9000.EXE C:\SMC9000
   ```

   To unzip the compressed file, execute SMC9000 by typing,

   ```
   SMC9000 -d
   ```

   The files will be unzipped into their proper subdirectories.

2. Next, change to the C:\SMC9000\NDIS30 directory by typing the command:

   ```
   CD NDIS30
   ```

   Within the NDIS30 directory, create a new directory called WINNT4.0. Change to the WINNT4.0 directory:

   ```
   MKDIR \WINNT4.0
   CD WINNT4.0
   ```

3. With the distribution disk still inserted into drive A, copy the file WINNT4.EXE from the floppy disk to the WINNT4.0 directory by typing the following commands:

   ```
   COPY A:\WINNT4.EXE C:\WINNT4.EXE
   ```

4. Extract the file WINNT4.EXE by typing the following line,

   ```
   WINNT4 -d
   ```

   The SMC9000 drivers for Windows NT 4.0 are contained here and will be unzipped into their proper subdirectories.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

**NOTE:**

**If the machine has MS-DOS loaded, proceed with the setup procedures. If MS-DOS is not loaded, then an MS-DOS boot disk will have to be made and the system booted up into MS-DOS. This will allow the user to setup the SMC Ethernet configuration utility. Once this has been accomplished, the machine can be rebooted into Windows NT 4.0.**

5. Once the machine has been booted into MS-DOS, run the configuration utility by typing the following command:

   `C:\SMC9000C\ISMC9000`

6. From within this utility, select the 'MODIFY CONFIGURATION' option.
7. Set the INT LEVEL to '2' and the I/O BASE ADDRESS to '0x0320'.
8. Change the media type to either '10BASET' for 10BASET (twisted pair cable) or 'AUI' for 10BASE2 (coax cable). The remaining options should be left in the default state.
9. Select 'SAVE SETTINGS TO EEPROM'. There should be three consecutive audible beeps.
10. Exit the ISMC9000 utility by selecting 'QUIT'. Completely power-down the system and reboot the VMIVME-7587 into Windows NT™ 4.0.
11. Enter into the CONTROL PANEL as shown in Figure B-1.




**Figure B-1** Accessing the Control Panel



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

12. Double-click on the 'NETWORK' icon as shown in Figure B-2.

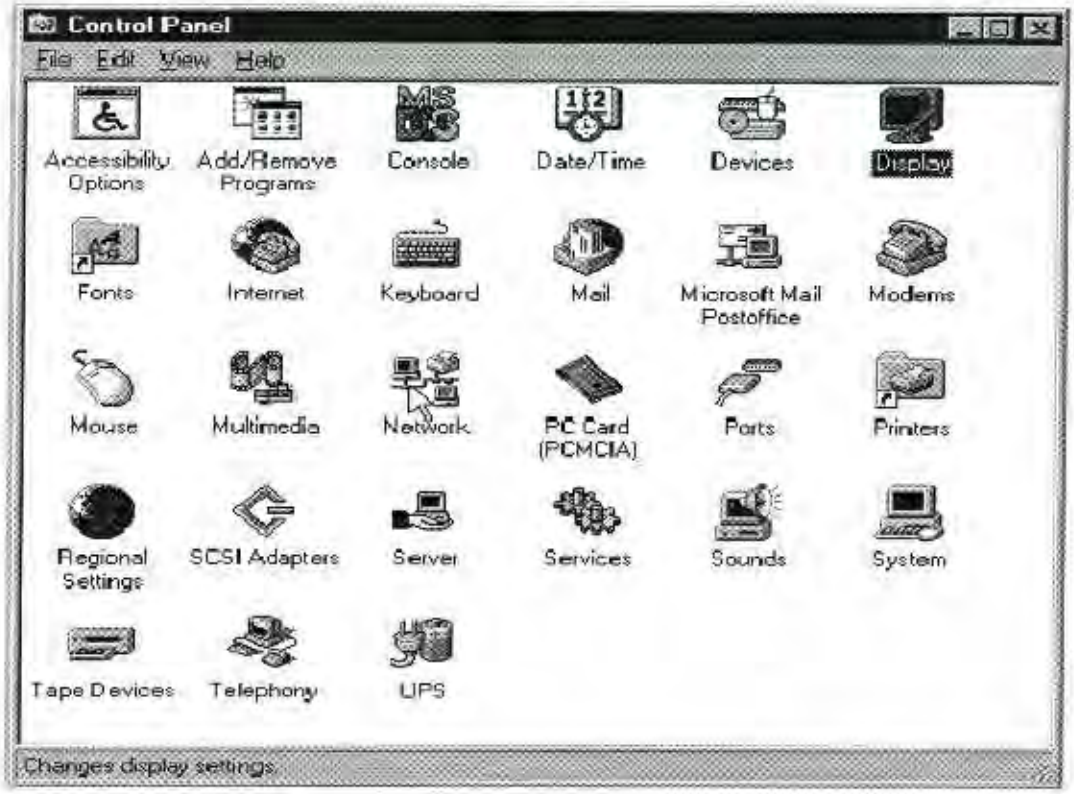



**Figure B-2** Accessing the Network Icon

13. The message in Figure B-3 will appear, click **'YES'**.

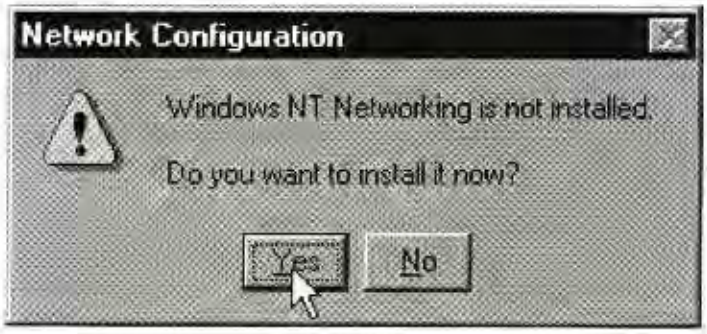



**Figure B-3** Installing the Network NT Option



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

14. The following diagloue box will appear. Select the proper configuration, then click **'NEXT'**.

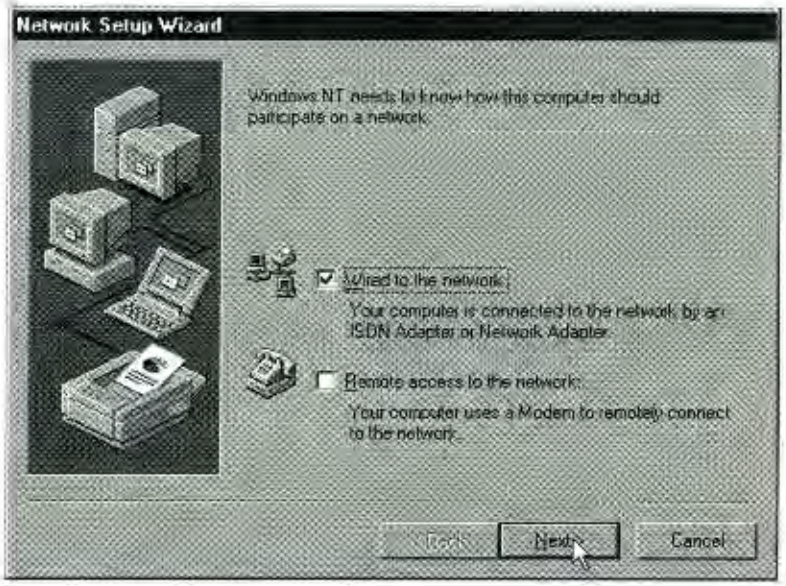



**Figure B-4** Configuring the Computer's Participation on a Network

15. When the following menu will appears, click on **'SELECT FROM LIST. . . '**.




**Figure B-5** Searching for the Network Adapters



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

16. Select **'HAVE DISK...'** from the following menu.

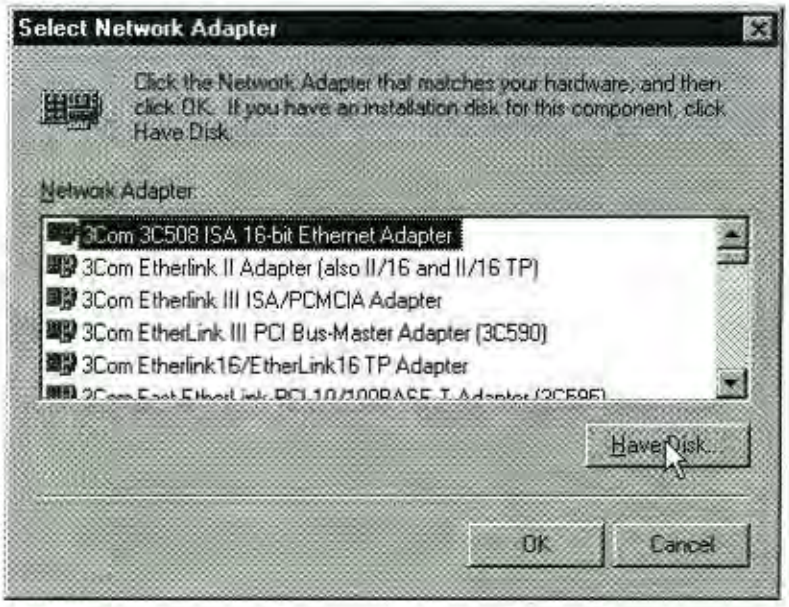



**Figure B-6** Selecting the Network Adapter

17. Next, enter the path for the SMC 9000 drivers as shown in Figure B-7. Then, click on **'OK'**.

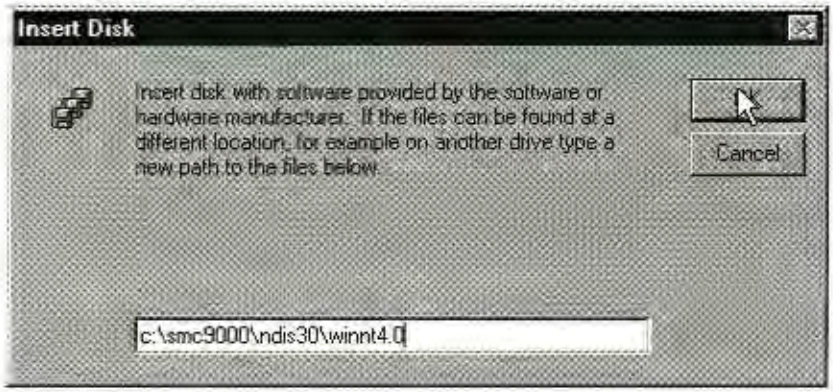



**Figure B-7** Creating the Drive Path



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

18. Select **'SMC 9000 ETHERNET ADAPTER'** and click **'OK'**.




**Figure B-8** Loading the SMC 9000 Ethernet Adapter into Setup Wizard

19. The SMC 9000 adapter is now loaded into the Setup Wizard. Click on **'NEXT'**.




**Figure B-9** Searching for the SMC 9000 Ethernet Adapter



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

20. Select the appropriate protocol. Click on 'NEXT'.




**Figure B-10** Selecting the Appropriate Network Protocols

21. Select the appropriate network services.




**Figure B-11** Selecting the Appropriate Network Services



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

22. Then, click on **'NEXT'** to install the components.

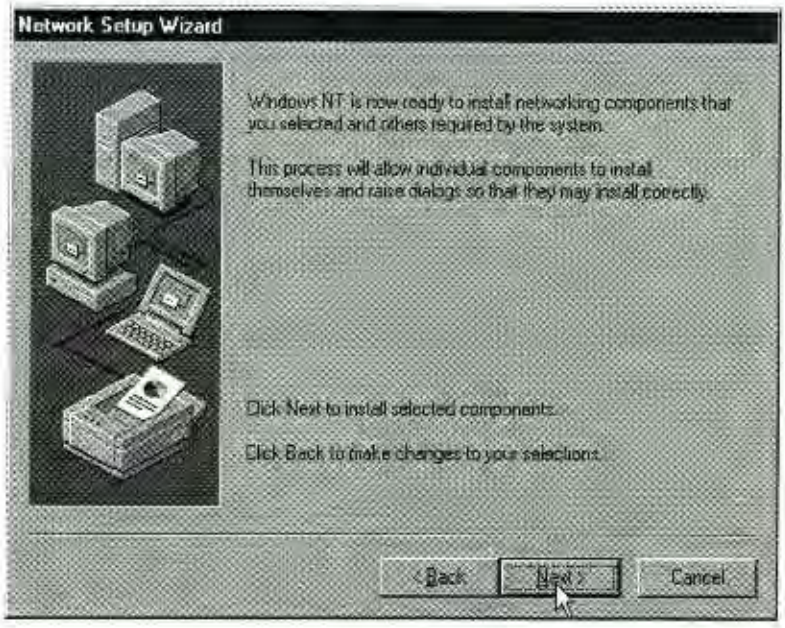



**Figure B-12** Installing the Selected Networking Components

23. Enter the path in which Setup can find the Windows NT 4.0 installation CD-ROM.

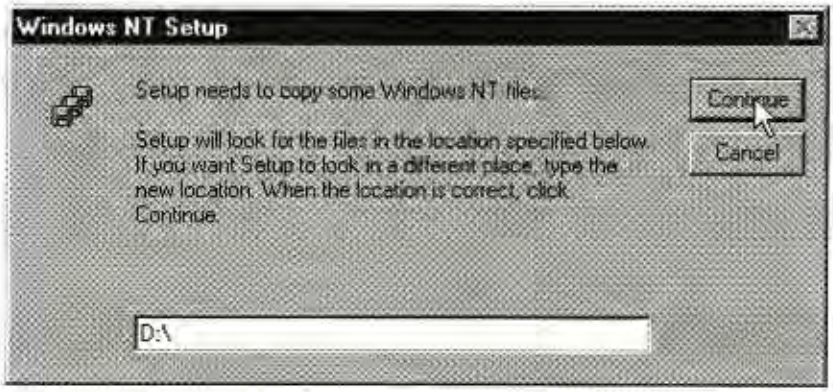



**Figure B-13** Entering the CD-ROM Path for Windows NT 4.0 Setup



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

24. The adapter card setup menu appears. Match the settings in Figure B-14, except for the Media Type. Set the Media Type to AUI for use with the 10Base2 option or 10BaseT for use with the 10BaseT option.

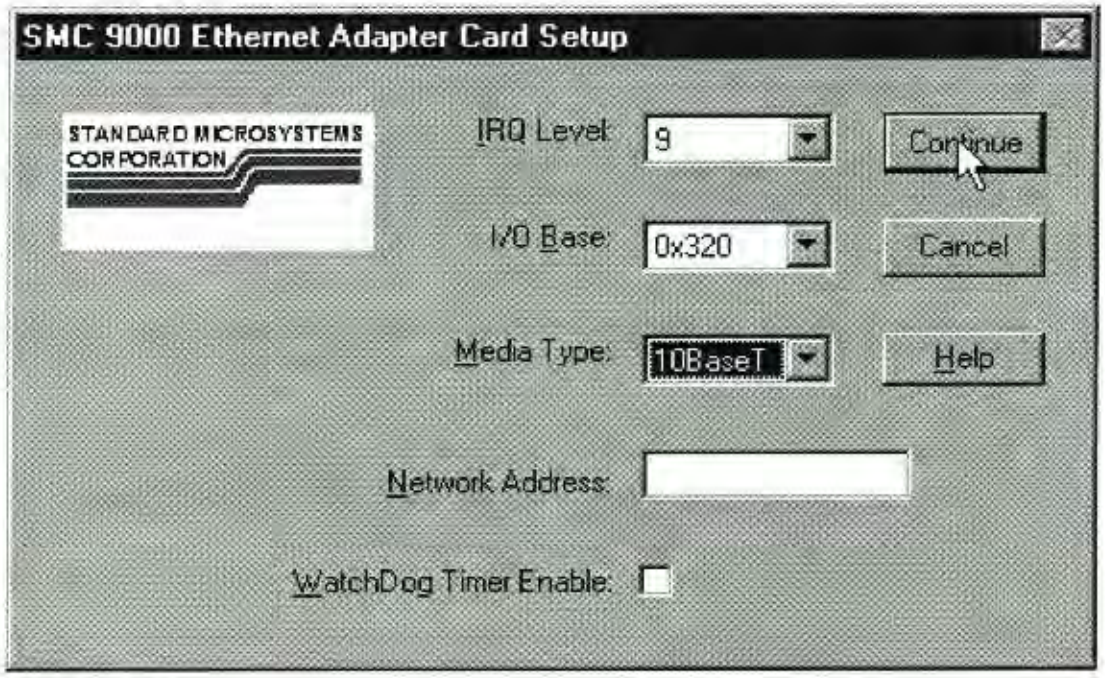



**Figure B-14** Selecting SMC 9000 Ethernet Adapter Card Options



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

25. The next dialogue box should have the path for finding the SMC 9000 drivers for Windows NT 4.0. Ensure the path is the same as shown in Figure B-15.

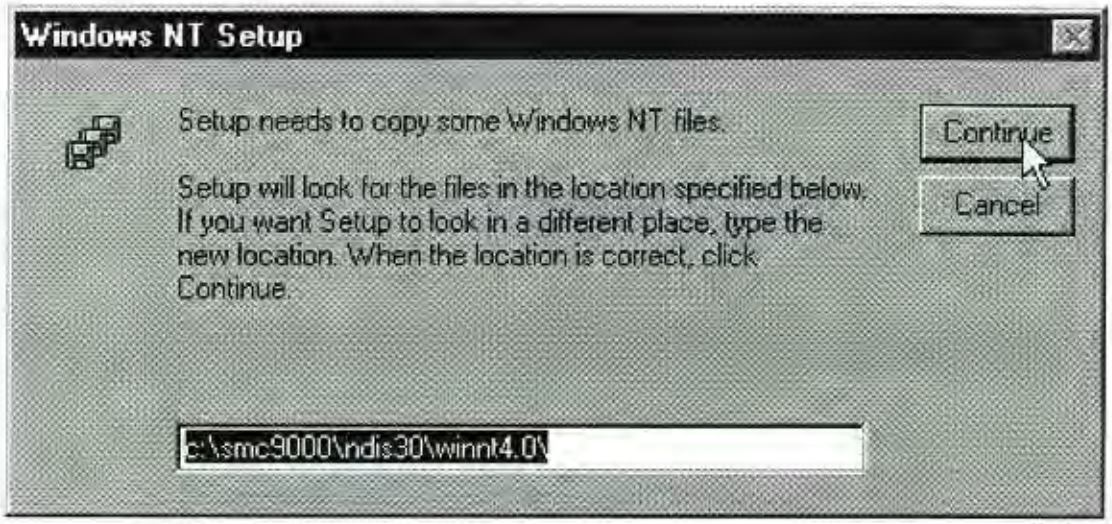



**Figure B-15** Verifying the SMC 9000 Drivers' Path

26. The next dialogue box resembles Figure B-16. Click on **'NEXT'** to continue.

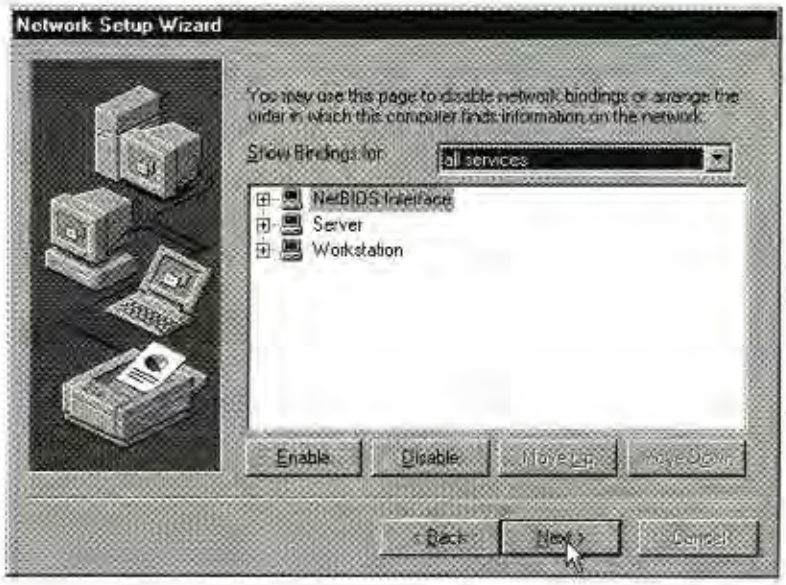



**Figure B-16** Disabling or Arranging Network Bindings



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

27. When the following dialogue box appears, click on **'NEXT'** to continue.




**Figure B-17** Completing Network Installation



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

28. The dialogue box below shows the Computer Name and the Workgroup or Domain in which the computer is connected. Ensure the settings are correct.




**Figure B-18** Verifying the Computer Name and the Workgroup or Domain



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

29. The next dialogue box explains that the network components have been installed. Click on **FINNISH** to continue.




**Figure B-19** Exiting the Network Setup Wizard

30. The computer must reboot in order for the network settings to take effect. Click on **'YES'** to restart the computer. When the computer restarts, the network should be configured and running. To check the network, enter into **NETWORK NEIGHBORHOOD**. If the network is functioning properly, the other computers on the network should be seen within this icon.




**Figure B-20** Rebooting to Include Network Settings and Changes



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

## OS/2 WARP SETUP

In order for the Ethernet to be configured using OS/2 Warp, an extra software package must be used. *Warp Connect* must be used when configuring the network capabilities of OS/2 Warp on the VMIVME-7587. Use the installation instructions for Warp Connect to configure OS/2 Warp for networking the VMIVME-7587.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

APPENDIX

# C BASIC INPUT OUTPUT SYSTEM

## IN THIS APPENDIX:


SECTION 1 - INTRODUCTION C-1
SECTION 2 - SYSTEM BIOS C-1


## SECTION 1 - INTRODUCTION

The VMIVME-7587 has three types of BIOS contained in a single Flash Memory device: AMI (system) BIOS, Cirrus Logic CL-GD5436 SVGA BIOS, and Adaptec SCSI BIOS.

## SECTION 2 - SYSTEM BIOS

During boot-time, continuously press the DEL key until the BIOS setup screen is displayed. From this screen, the user can select any part of the BIOS that needs to be changed, such as floppy drive configuration or system memory.




Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

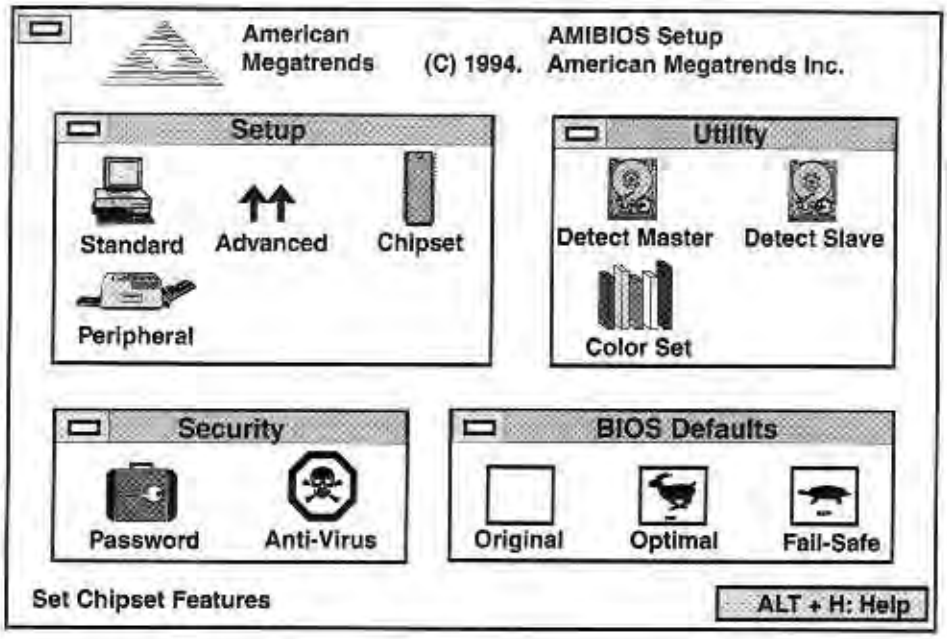



**Figure C-1** BIOS Setup Main Menu

## HELP MENU

Press the `Alt + H` keys simultaneously to access the **Keystroke/Mouse Convention** help screen shown in Figure C-2 below.

Keystroke/Mouse Convention

| | | |
|---|---|---|
| Mouse click | : | Point/Select item |
| Tab | : | Select window |
| Enter | : | Select item |
| ESC | : | Return to previous level |
| ALT+H | : | Help |
| ALT+Space | : | Global exit |
| Cursor Keys | : | Usual meaning |

**Figure C-2** BIOS Setup Help Menu



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

## EXITING THE BIOS SETUP

In the main menu, there is a small box in the upper left-hand corner of the screen, this is the exit button. Clicking on the exit button will bring up the menu in Figure C-3 below.

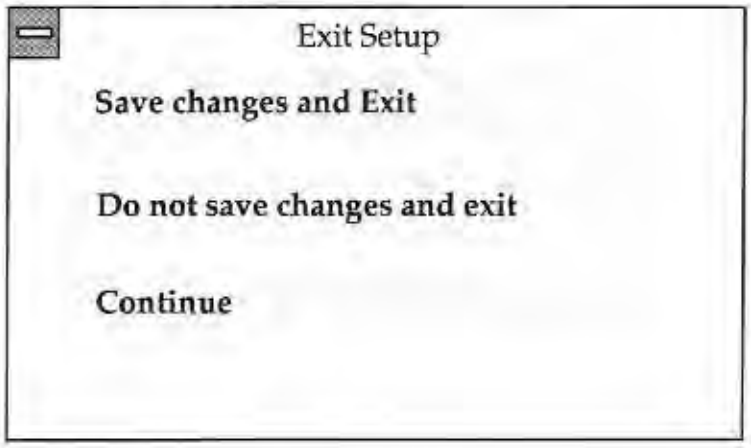



**Figure C-3** BIOS Exit Menu

## STANDARD SETUP

The **Standard Setup** option sets the date and time and defines the parameters for the disk drives. The `Standard Setup` menu is shown below in Figure C-4.

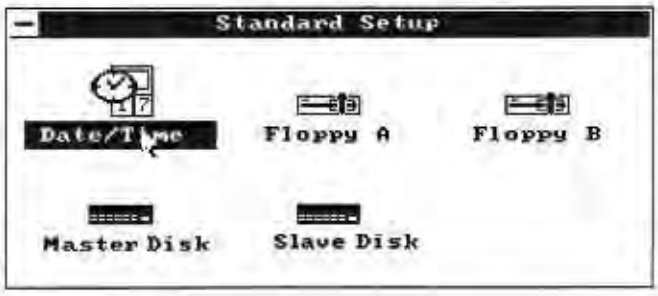



**Figure C-4** Standard Setup Menu



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

## Date/Time Configuration

The Date/Time configuration menu is shown below. Selecting this option causes the current values to be displayed. Use the mouse or the tab key on the keyboard to move between fields.




**Figure C-5** Date/Time Menu

The **Time** field displays the time in the 24-hour clock format. (For p.m., add 12 to the hour. Enter 4:30 p.m. as 16:30:00.)

## Floppy Disk Drive Configuration

The Floppy Disk Drive Configuration menu is shown below.

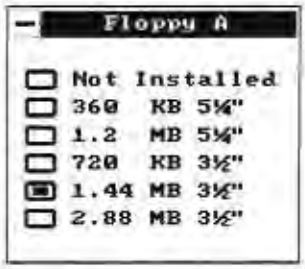



**Figure C-6** Floppy Disk Drive Configuration Menu

Floppy Drive A: Supports a 720 Kbyte 3.5-inch drive, a 1.44 Mbyte 3.5-inch drive or a system without a floppy drive. The default setting is 1.44 Mbyte 3.5-inch.

Floppy Drive B: The system uses only one floppy drive, so the default setting is **Not Installed**.

Use the arrow keys to select the floppy drive type.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

### Master and Slave Disk Drive Configuration

The VMIVME-7587 has the capability of utilizing up to two hard disk drives. Secondary master/slave configurations are not supported.

## ADVANCED SETUP

From the Main Menu, select the Advanced Setup option to modify the settings described in this section.

### Quick Boot

This option has no effect on the VMIVME-7587.

### Bootup Sequence

The BIOS Setup Program boots the system from the device selected in the **Bootup Sequence** option. The default setting enables the BIOS to boot the system from floppy disk drive A:, if unsuccessful, it will try to boot from hard disk drive C:, if again unsuccessful, it will then boot from CDROM. If the **Bootup Sequence** option is set to **C:, A:,CDROM:**, the system will attempt to boot from hard drive C: then from floppy drive A:, and finally from CDROM. The same procedure holds true if the **CDROM:, C:, A:** option is selected. Set this option to **A:, C:, CDROM:** to use the EISA Configuration Utility, AMI Flash Utility, diagnostics, and other utilities.

### Bootup Num-Lock

The **Bootup Num-Lock** option enables the `Num Lock` option on the keyboard to be turned off when the system is powered on. This option allows use of the arrow keys on the numeric keypad. The BIOS defaults to turning the Num Lock on.

### Floppy Drive Swap

This option logically swaps floppy drives A: and B:, allowing the VMIVME-7587 to boot from B:.

### Mouse Support

The **Mouse Support** option is used to enable or disable mouse support in the BIOS Setup program. The BIOS Setup program supports a PS/2-type mouse. If disabled, the mouse will not function in the BIOS Setup program. The default is **Enabled**.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

### Primary Display

This option configures the primary display subsystem in the computer. The settings are Absent, VGA/EGA, CGA40 x 25, CGA80 x 25, and Mono. The default is VGA/EGA.

### Password Check

When enabled, the **Password Check** option prevents unauthorized system boot-up or unauthorized use of BIOS Setup. The password check function is enabled by choosing **Always** or **Setup**. If **Always** is chosen, the prompt appears each time the system is powered on. If **Setup** is chosen, the prompt appears only when an attempt is made to enter the Setup program. The password feature is disabled by entering the **Change Password** option and entering a carriage return at the prompt for a new password. The default setting is **Setup**.

### OS/2 Compatible Mode

The **OS/2 Compatible Mode** option allows the BIOS to configure the system to operate on IBM's OS/2 platform or any other operating system that does not support Plug and Play. The default setting is **Disabled**.

### Internal Cache

This option allows the user to select the type of internal cache algorithm to be used by the BIOS and the CPU. The selections include **Writeback**, **Write-Through**, or **Disabled**. The **Disabled** option allows the CPU to set the caching algorithm. The Optimal default setting is **Reserved** and the Fail-Safe default setting is **Disabled**.

### External Cache

This option allows the user to select the type of external cache algorithm to be used by the BIOS and the CPU. The selections include **Writeback**, **Write-Through**, or **Disabled**. The **Disabled** option allows the CPU to set the caching algorithm. The Optimal default setting is **Reserved** and the Fail-Safe default setting is **Disabled**.

### System BIOS Cachable

When enabled, the **System BIOS Cachable** option allows caching of the system BIOS. This option causes BIOS that has been shadowed from ROM to RAM using the **System ROM Shadow** option to be cached. Caching means that a block of data is stored in cache memory, providing faster access time and execution speed of the BIOS. The default setting is **Enabled**.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

### C000, 16K Shadow

### C400, 16K Shadow

These options specify how the contents of the video ROM are handled. The default setting is **Disabled**.

### C800, 16K Shadow

### CC00, 16K Shadow

These options specify how the contents of the SCSI-2 ROM are handled. The default setting is **Disabled**.

### D000, 16K Shadow

### D400, 16K Shadow

### D800, 16K Shadow

### DC00, 16K Shadow

These options should remain at **Disabled** on the VMIVME-7587.

## CHIPSET SETUP

From the **Main Menu**, select the **Chipset Setup** option to modify the settings described in this section.

### Memory Hole

This option allows the user to select a memory hole. The settings are **Disabled**, **512-640 K**, or **15-16 M**. The default setting is **Disabled**.

### DRAM Speed

This option specifies the RAS access time for the DRAM used in the computer for system memory. The default setting is **70 ns**.

### IRQ12/M Mouse Function

This option should be set according to the mouse hardware implementation. The default setting is **Enabled**. The **Disabled** setting should be used if the mouse hardware uses IRQ12 . Choose **Enabled** if a keyboard controller mouse interrupt is used.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

### 8 bit I/O Recovery Time (SYSCLK)

This option specifies the length of a delay inserted between consecutive 8-bit I/O operations. The default setting is **2**.

### 16 bit I/O Recovery Time (SYSCLK)

This option specifies the length of a delay inserted between consecutive 16-bit I/O operations. The default setting is **2**.

### OnBoard SCSI

This option will allow the user to **Disable** the onboard SCSI controller. The settings are enabled or disabled.

## POWER MGMT SETUP

### Power Management/APM

Set this option to **Enabled** to enable the Intel Triton power management features and APM (Advanced Power Management). The default setting is **Disabled**.

### Instant-on Timeout (Minute)

This option specifies the length of a period of system inactivity while the computer is in full power on state. When this length of time expires, the BIOS takes the computer to a lower power consumption state, but the computer can return to full power instantly when any system activity occurs. The default setting is **Disabled**.

### Green PC Monitor Power State

This option specifies the power state that the green PC-compliant video monitor enters when the BIOS places it in a power savings state after the specified period of display inactivity has expired. The default setting is **Standby**.

### Video Power Down Mode

This option specifies the power conserving state that the VESA VGA video subsystem enters after the specified period of display inactivity has expired. The default setting is **Disabled**.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

### Hard Disk Power Down Mode

This option specifies the power conserving state that the hard disk drive enters after the specified period of hard drive inactivity has expired. The default setting is **Disabled**.

### Hard Disk Time Out

This option specifies the length of a period of hard disk drive inactivity. When this length of time expires, the computer enters the power-conserving state specified in the **Hard Disk Power Down Mode** option. The default setting is **Disabled**.

### Standby Time Out (Minute)

This option specifies the length of a period of system inactivity while in full power-on state. When this length of time expires, the computer enters Standby power state. The default setting is **Disabled**.

### Suspend Time Out (Minute)

This option specifies the length of a period of system inactivity while in full power-on state. When this length of time expires, the computer enters Suspend power state. The default setting is **Disabled**.

### Slow Clock Ratio

This option specifies the speed at which the system clock runs in power-saving states. The settings are expressed as a ratio between the normal CPU clock speed and the CPU clock speed when the computer is in the power-conserving state. The default setting is **1:8**.

### Display Activity

This option specifies if the BIOS is to monitor display activity for power conservation purposes. When this option is set to **Monitor** and there is no display activity for the length of time specified in the **Standby Timeout (Minutes)** option, the computer enters a power savings state. The default setting is **Ignore**.

## PCI/PnP SETUP

### Plug and Play Aware O/S

Set this option to **Yes** if the operating system is aware of and follows the Plug and Play specification.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

### PCI Burst Mode

When this option is set to **Enabled**, the PCI Bursting bit in the Intel Triton chipset is enabled. Graphics display problems can occur if certain devices are installed and the **PCI Burst mode** is enabled. The default setting is **Disabled**.

### PCI Concurrency

Set this option to **Enabled** to permit concurrent operations on the PCI bus. The default setting is **Disabled**.

### PCI Streaming

Set this option to **Enabled** to permit streaming operations on the PCI bus. The default setting is **Disabled**.

### PCI Latency Timer (PCI Clocks)

This option specifies the latency timings (in PCI clocks) for all PCI devices on the PCI bus. The default setting is **64**.

### PCI VGA Palette Snoop

When this option is set to **Enabled**, multiple VGA devices operating on different buses can handle data from the CPU on each set of palette registers on every video device. Bit 5 of the command register in the PCI device configuration space is the VGA Palette Snoop bit (0 is disabled). For example: if there are two VGA devices in the computer (one PCI and one ISA) and if the **PCI VGA Palette Snoop** option is set to **Disabled**, then data read and written by the CPU is only directed to the PCI VGA device's palette registers. However, if the **PCI VGA Palette Snoop** option is set to **Enabled**, then data read and written by the CPU is directed to both the PCI VGA device's palette registers and the ISA VGA device's palette registers, permitting the palette registers of both devices to be identical.

### PCI EIDE Bus Master

Set this option to **Enabled** to specify that the EIDE controller on the PCI local bus includes a bus mastering capability. The default setting is **Disabled**.

### Off Board PCI EIDE Card

This option specifies if an off-board PCI EIDE controller adapter card is installed in the computer. This function is not supported by the VMIVME-7587 and should remain in the default setting. The default setting is **Auto**.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

### Off Board PCI EIDE Primary IRQ & Secondary IRQ

These options specify the PCI interrupt used by the Primary (or Secondary) EIDE channel on the off-board PCI EIDE controller. These functions are not supported by the VMIVME-7587 and should remain in the default settings. The default settings are **Disabled**.

### IRQx

These options specify the bus that the specified IRQ line is used on. These options allow the user to reserve IRQs for legacy ISA adapter cards. The default setting for these options is **PCI/PnP**.

### Reserved Memory Size

This option specifies the size of the memory area reserved for legacy ISA adapter cards. The default setting is **Disabled**.

### Reserved Memory Address

This option specifies the beginning address (in hex) of the reserved memory area. The specified ROM memory area is reserved for use by legacy ISA adapter cards. The default setting is **C4000**.

## PERIPHERAL SETUP

### On Board FDC

This option enables the FDC (Floppy Drive Controller) on the motherboard. The default setting is **Auto**.

### On Board Serial Port 1

This option specifies the base I/O port address of serial port 1. The default setting is **Auto**.

### On Board Serial Port 2

This option specifies the base I/O port address of serial port 2. The default setting is **Auto**.

### On Board Parallel Port

This option specifies the base I/O port address of the parallel port. The default setting is **Auto**.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

### Parallel Port IRQ

This option specifies the interrupt that is to be used by the parallel port. The default setting is **Auto**.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

### Parallel Port Mode

This option specifies the parallel port mode. The settings are:

| | |
|---|---|
| **Normal** | The normal parallel port mode is used. |
| **Bi-Dir** | Use this setting to support bidirectional transfers on the parallel port. |
| **EPP** | The parallel port can be used with devices that adhere to the Enhanced Parallel Port (EPP) specification. EPP uses the existing parallel port signals to provide asymmetric bidirectional data transfer driven by the host device. |
| **ECP** | The parallel port can be used with devices that adhere to the Extended Capabilities Port (ECP) specification. ECP uses the DMA protocol to achieve data transfer rates up to 2.5 Mbytes/sec. ECP provides symmetric bidirectional communication. |

The default setting is **Normal**.

### Parallel Port DMA Channel

This option is only available if the setting of the **Parallel Port Mode** option is **ECP**. The user can select the DMA channel that is to be used in conjunction with the **ECP** mode of the **Parallel Port Mode** option. The default setting is **None**.

### On Board PCI EIDE

This option specifies the onboard Triton EIDE controller channels to be used. The default setting is **Primary**.

## SECURITY MENU

The VMIVME-7587 BIOS gives the capability of setting up two passwords, a supervisor and a user. The **Supervisor** password must be set before the BIOS will allow the **User** password to be set.

### Supervisor

Click on the **Supervisor** icon and the screen in Figure C-7 on page C-14 will appear. Using the keyboard or the mouse, enter the password and hit `Enter`. The BIOS will then ask to confirm the password. If the



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

confirmation password is entered correctly, then the new password will be set.

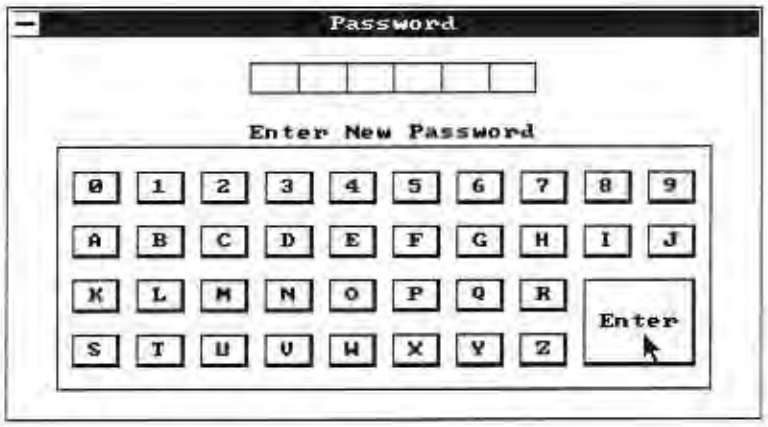



**Figure C-7** Supervisor Password Menu

## User

Click on the **User** icon and the following screen will appear. Using the keyboard or the mouse, enter the password and hit `Enter`. The BIOS will then ask to confirm the password. If the confirmation password is entered correctly, then the new password will be set.

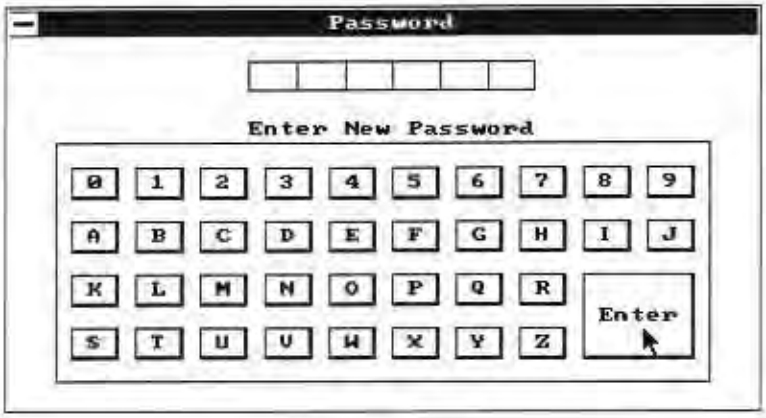



**Figure C-8** User Password Menu



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

## ANTI-VIRUS

The BIOS contains a feature to check for the presence of a virus on the boot sector of the boot device preventing a save to the boot sector, and system files on the hard disk. When **Enabled**, floppy disks cannot be formatted. The default is **Disabled** to allow formatting of floppy disks.

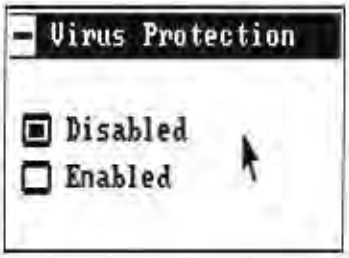



**Figure C-9** Virus Protection Menu

## UTILITY MENU

### Color Set

This option allows the user to set the BIOS screen and menu color. The default is **LCD**.

### Language

This option sets the BIOS interface language. The default is **English**

## DEFAULT MENU

The system BIOS is delivered with three BIOS configurations stored in CMOS RAM: **Original** BIOS defaults, **Optimal** BIOS defaults, and **Fail-safe** BIOS defaults. The **Original** BIOS defaults are the last current BIOS values used in the system. The **Optimal** BIOS defaults are used in the delivered system. The **Fail-safe** BIOS defaults are recommended when there has been a system failure.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

### Original

The **Original** BIOS default option is used to select the last BIOS values. These values are the most stable values to choose for system performance. Use this option as a diagnostic aid if the system is unstable. Selecting this option causes the following message to display.

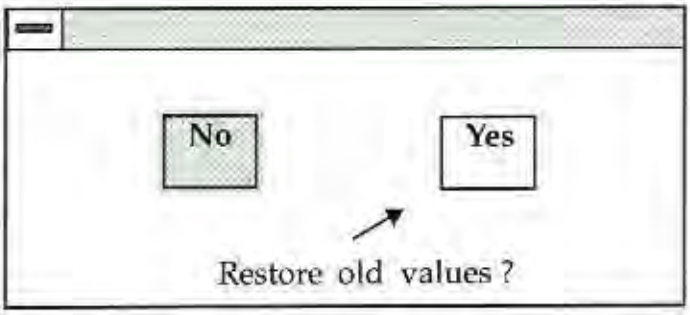



**Figure C-10** Original BIOS Defaults Menu

Select **Yes** to restore the old BIOS values.

### Optimal

The **Optimal** BIOS Defaults option loads the best-case values that optimize system performance. The system is delivered using the **Optimal** BIOS default values. After using the AMI Flash Utility to reprogram the system BIOS, select this option to ensure that the best-case values are being used. Selecting this option causes the following message to display (Figure C-11 on page C-17).



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

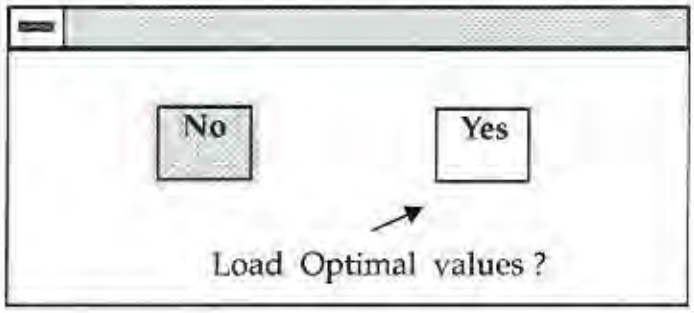



**Figure C-11** Optimal BIOS Defaults Menu

Select **Yes** to load the optimal values.

### Fail-safe

The **Fail-safe** BIOS Defaults option loads settings that are most likely to configure a workable computer when something is wrong. If you cannot boot the computer successfully, select the **Fail-safe** BIOS options and try to diagnose the problem after the computer boots. These settings do not provide optimal performance. If CMOS RAM becomes corrupt, the **Fail-safe** BIOS defaults loads automatically. Selecting this option causes the following message to display.

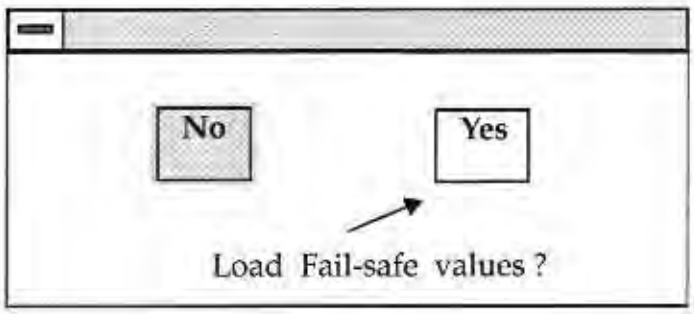



**Figure C-12** Fail-safe BIOS Defaults Menu

Select **Yes** to use the BIOS defaults.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

APPENDIX

# D DEVICE CONFIGURATION: I/O AND INTERRUPT CONTROL

## IN THIS CHAPTER:


| | |
|---|---|
| SECTION 1 - INTRODUCTION | D-1 |
| SECTION 2 - DEVICE ADDRESS DEFINITION | D-5 |
| SECTION 3 - DEVICE INTERRUPT DEFINITION | D-8 |


## SECTION 1 - INTRODUCTION

This appendix provides the user with the information needed to develop custom applications for the VMIVME-7587. The CPU board on the VMIVME-7587 is unique in that the BIOS can not be removed; it must be used in the initial boot cycle. A custom application, like a revised operating system for example, can only begin to operate after the BIOS has finished initializing the CPU. The VMIVME-7587 will allow the user to either maintain the current BIOS configuration or alter this configuration to be more user specific, but this alteration can only be accomplished after the initial BIOS boot cycle has completed.

When the VMIVME-7587 is powered on, control immediately jumps to the BIOS. The BIOS initiates a Power-on Self Test (POST) program which instructs the microprocessor to initialize system memory as well as the rest of the system. The BIOS establishes the configuration of all on-board devices by initializing their respective I/O and Memory addresses and



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

interrupt request lines. The BIOS then builds an interrupt vector table in main memory, which is used for interrupt handling. The default interrupt vector table and the default address map is described in Chapter 3 of this manual. Finally, the BIOS jumps to the hard drive or floppy drive to execute the operating system's boot program. This is the point at which a custom operating system could take over control of the board and proceed with a custom configuration and/or custom application. A user application could override the configuration set by the BIOS and reconfigure the system or it could accept what the BIOS initialized.

There are two areas on the VMIVME-7587 with which the user must be familiar in order to override the initial BIOS configuration. These include the device addresses and the device interrupts. This appendix reviews the details of these addresses and interrupts, and provides a reference list for the individual devices used on the board.

The VMIVME-7587 utilizes the high performance Peripheral Component Interconnect (PCI) bus along with the Industrial Standard Architecture (ISA) bus. In general, the PCI bus is plug-and-play compatible. The components that are connected to the PCI bus are not always placed at a standard I/O or Memory address nor are they connected to a standard interrupt request line as is the case with ISA bus devices. These PCI bus devices are re-established by the BIOS meaning that these devices will not always be located at the same address or connected to the same interrupt request line every time the CPU is booted. This appendix lists the defaults that are found by powering-up a specific VMIVME-7587.

## Functional Overview and References

The block diagram included in Figure D-1 on page D-3 illustrates the VMIVME-7587 emphasizing the I/O features, including the optional PCI-to-VMEbus bridge.

The circled number in the upper left corner of a function block references the appropriate data book necessary for the programming of the function block.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

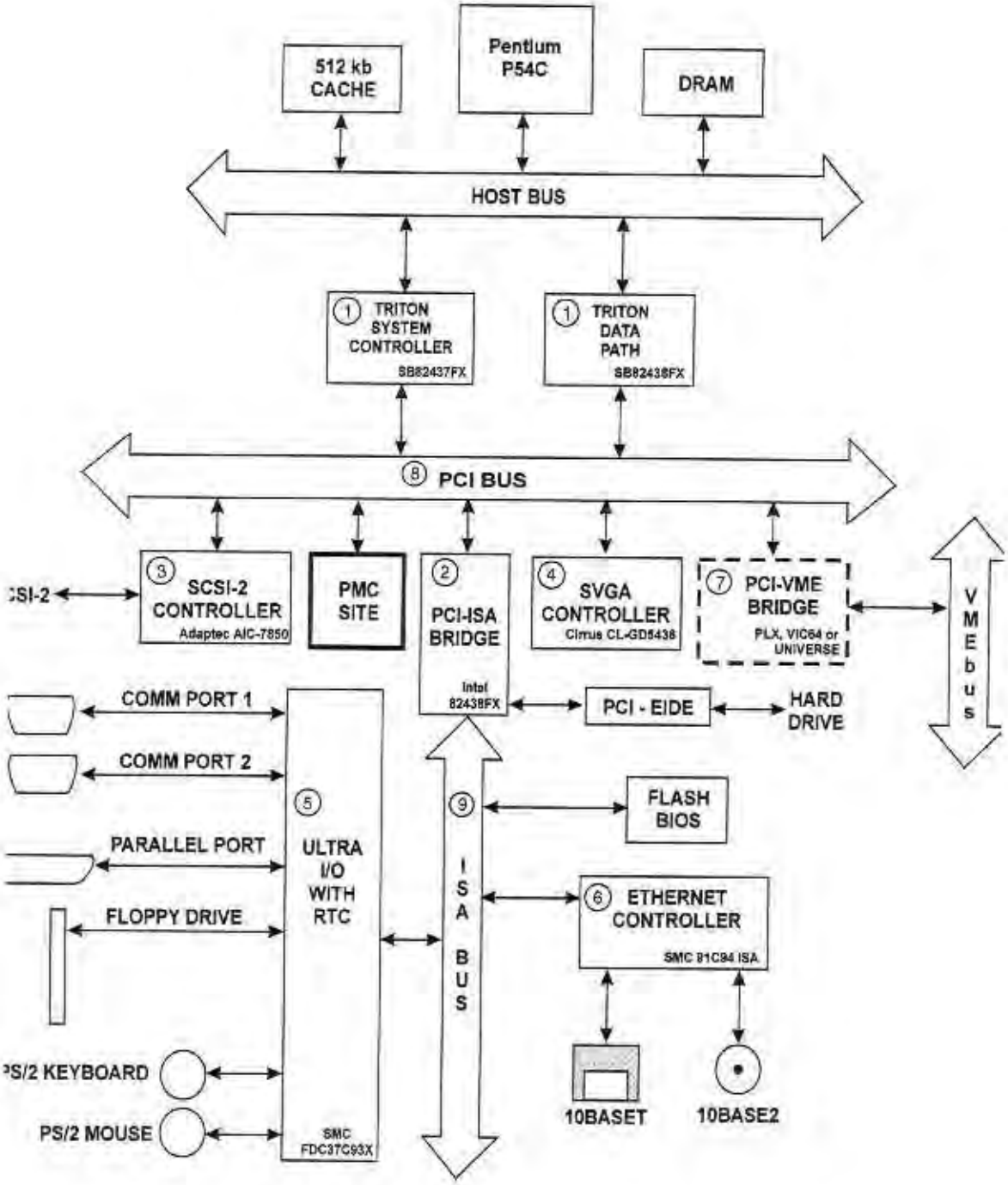



**Figure D-1** VMIVME-7587 Block Diagram



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

## Data Book References

1. Intel 82430FX PCIset Cache/Memory Subsystem

   82437FX System Controller (TSC)

   82438FX Data Path (TDP)

   Intel Corporation
   2200 Mission College Boulevard
   P.O. Box 58119
   Santa Clara, CA 95052-8119

2. Intel 82430FX PCIset ISA Bridge

   82371FB PCI ISA IDE Xcellerator (PIIX)

   Same: Intel Corporation

3. Adaptec AIC-7850 Single-Chip SCSI Host Adapter

   Adaptec, Inc.
   691 South Milpitas Boulevard
   Milpitas, CA 95035

4. Cirrus Logic Alpine VGA Family - CL-GD543X/'4X Technical Reference Manual, February 1995

   Cirrus Logic
   3100 West Warren Avenue
   Fremont, CA 94538
   (510) 623-8300

5. SMC FDC37C93X Plug-and-Play Compatible Ultra I/O Controller

   SMC Component Products Division
   300 Kennedy Drive
   Hauppauge, NY. 11788
   (516) 435-6000
   FAX (516) 231-6004

6. SMC 91C94 ISA/PCMCIA Single-Chip Ethernet Controller with RAM

   Same: SMC Component Products Division

7. VMIVME-7587 User Manual

   500-007587-000 Product Manual

   500-007587-001 Tundra Universe ™ Based VMEbus



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Interface Option

or

500-007587-002 Cypress VIC64-Based VMEbus Interface Option

8. PCI Local Bus Specification, Rev 2.1

PCI Special Interest Group
P.O. Box 14070
Portland, OR 97214
(800) 433-5177 (U.S.)
(503) 797-4207 (International)
(503) 234-6762 (FAX)

9. ISA & EISA, Theory and Operation

Solari, Edward
Annabooks
15010 Avenue of Science, Suite 101
San Diego, CA 92128, USA
ISBN 0-929392 -15-9

# SECTION 2 - DEVICE ADDRESS DEFINITION

The standard PC/AT architecture defines two distinctive types of address spaces for the devices and peripherals on the CPU board. These spaces have typically been named memory address space and I/O address space. The boundaries for these areas are limited to the number of address bus lines that are physically located on the CPU board. The VMIVME-7587 has 32 address bus lines located on the board, thereby defining the limit of the address space as 4 gigabytes. The standard PC/AT architecture defines Memory address space from zero to 4 gigabytes and the separate I/O address space from zero to 64 kilobytes.

## ISA DEVICES

The ISA devices on the VMIVME-7587 are configured by the BIOS at Boot-up and fall under the realm of the standard PC/AT architecture. They are mapped in I/O address space within standard addresses and their interrupts are mapped to standard interrupt control registers. However, all



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

of the ISA devices with the exception of the real-time clock and the keyboard are re-locatable to almost anywhere within the standard 1 Kbyte of I/O address space. Table D-1, "ISA Device Mapping Configuration" defines the spectrum of addresses available for reconfiguration of ISA devices.

As previously stated, in the standard PC/AT system, all I/O devices are mapped in I/O address space; however, one exception exists. The Dynamic Random Access Memory (DRAM) is addressed in Memory address space. The BIOS places DRAM at address zero and extends to the physical limit of the on-board DRAM.

The Ethernet is an ISA device that is addressed differently from the BIOS configuration. The Ethernet is addressed by a configuration utility. Within the utility, the user sets up the I/O address and the interrupt request line. Refer to Appendix B Ethernet for instructions on how to enter into the configuration utility.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

**Table D-1** ISA Device Mapping Configuration

| DEVICE | MEMORY SPACE | I/O ADDRESS SPACE | PIC INTERRUPT OPTIONS | BYTE ADDRESS BOUNDARY | DEFAULT |
|---|---|---|---|---|---|
| Floppy | N/A | [0x100 - 0xFF8] | IRQ1 - IRQ15 | 8 | $3F0 |
| Parallel Port | N/A | [0x100 - 0xFFC]<br>[0x100 - 0xFF8] | IRQ1 - IRQ15 | 4<br>8 | $378 |
| Serial Port 1 | N/A | [0x100 - 0xFF8] | IRQ1 - IRQ15 | 8 | $3F8 |
| Serial Port 2 | N/A | [0x100 - 0xFF8] | IRQ1 - IRQ15 | 8 | $2F8 |
| Real Time Clock | Non - Relocatable | | | | |
| Keyboard | Non - Relocatable | | | | |
| Auxiliary I/O | N/A | - Primary I/O [0x000 - 0xFFF]<br>- Secondary I/O [0x000 - 0xFFF] | IRQ1, IRQ3-IRQ15 | 1<br>1 | |
| Ethernet | N/A | 280, 2E0, 300, 320, 340, 360, 380, 3A0 | IRQ3, IRQ9-IRQ11 | N/A | 0x320 |

## PCI DEVICES

PCI devices are fully configured under I/O and/or Memory address space. Table D-1, "ISA Device Mapping Configuration" describes the PCI bus devices that are on-board the VMIVME-7587 along with each device's configuration spectrum.

The PCI bus includes three physical address spaces. As with ISA bus, PCI bus supports Memory and I/O address space, but PCI bus includes an additional Configuration address space. This address space is defined to support PCI bus hardware configuration (refer to the PCI bus Specification for complete details on the configuration address space). PCI bus targets are required to implement Base Address registers in configuration address space to access internal registers or functions. The BIOS uses the Base Address register to determine how much space a device requires in a given



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

address space and then assigns where in that space the device will reside. This functionality enables PCI devices to be located in either Memory or I/O address space.

**Table D-2** PCI Device Mapping Configuration

| DEVICE | MEMORY SPACE | I/O ADDRESS SPACE | PIC INTERRUPT OPTIONS | DEFAULT |
|---|---|---|---|---|
| SVGA | Anywhere | N/A | N/A | |
| SCSI | Anywhere | Anywhere | PCI Defined | |
| Universe** PCI-to-VMEbus Bridge | Anywhere | N/A | PCI Defined | |
| PLX9060, VIC64 *** PCI-to-VMEbus Bridge | Anywhere | Anywhere | PCI Defined | |

** refer to the VMIVME-7587-001 Users Manual
*** refer to the VMIVME-7587-002 Users Manual

# SECTION 3 - DEVICE INTERRUPT DEFINITION

## PC/AT Interrupt Definition

The interrupt hardware implementation on the VMIVME-7587 is standard for computers built around the PC/AT architecture. The PC/AT evolved from the IBM PC/XT architecture. In the IBM PC/XT systems, only eight Interrupt Request (IRQ) lines exist, numbered from IRQ0 to IRQ7. These interrupt lines were included originally on a 8259A Priority Interrupt Controller (PIC) chip.

The IBM PC/AT computer added eight more IRQx lines, numbered IRQ8 to IRQ15, by cascading a second slave 8259A PIC into the original master 8259A PIC. The interrupt line IRQ2 at the master PIC was committed as the cascade input from the slave PIC. This master/slave architecture, the standard PC/AT interrupt mapping, is illustrated in Figure D-2 on page D-11 within the PCI-ISA Bridge PIIX 82371FB section of the diagram.

To maintain backward compatibility with PC/XT systems, IBM chose to use the new IRQ9 input on the slave PIC to operate as the old IRQ2



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

interrupt line on the PC/XT Expansion Bus. Thus, in AT systems, the IRQ9 interrupt line connects to the old IRQ2 pin on the AT Expansion Bus (or ISA bus).

The BIOS defines the PC/AT interrupt line to be used by each device. The BIOS writes to each of the two cascaded 8259A PIC chips an 8-bit vector which maps each IRQx to its corresponding interrupt vector in memory.

## ISA Device Interrupt Map

The VMIVME-7587 BIOS maps the IRQx lines to the appropriate device per the standard ISA architecture. Reference Figure D-2. This initialization operation can not be changed; however, a custom application could reroute the interrupt configuration after the BIOS has completed the initial configuration cycle.

The Ethernet is unique in its interrupt mapping in that the interrupt is set up using the configuration utility. Refer to Appendix B for information on setting up the Ethernet.

The Ethernet device on the VMIVME-7587 is built around the SMC 91C94 ISA/PCMCIA Single-Chip Ethernet Controller. The chip includes four interrupt lines (INTx), 0 through 3, that are physically connected to the PIIX ISA IRQx Lines. These lines, listed in Table D-3, "Ethernet Interrupt Line Mapping", are hardwired together.

The Configuration Register of the SMC chip holds bits that define the device configuration and are not expected to change during run-time. The register is part of the EEPROM saved setup. The user and the configuration utility sets up which line the device uses as an interrupt. When this decision is made, the other three lines are tri-stated and are no longer used. The default setting for the mapping is device INT0 mapped to IRQ9.

**Table D-3** Ethernet Interrupt Line Mapping

| **Ethernet Controller** SMC 91C94 ISA | **PIC Interrupt Line** |
|---|---|
| *INT0* | *IRQ9* |
| INT1 | IRQ3 |
| INT2 | IRQ10 |



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

**Table D-3** Ethernet Interrupt Line Mapping

| | |
|---|---|
| INT3 | IRQ11 |



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

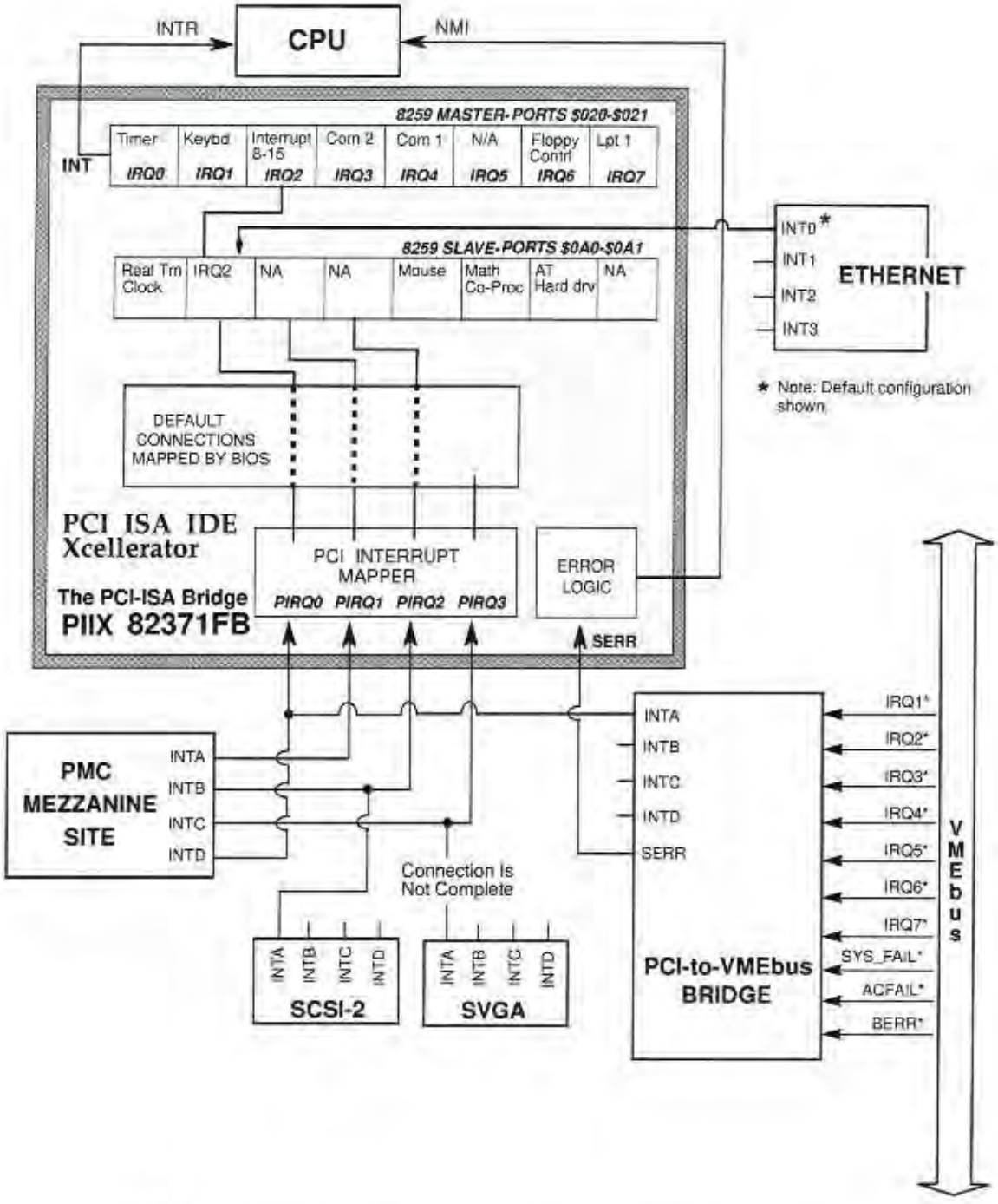



**Figure D-2** BIOS Default Connections for the PC Interrupt Logic Controller



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

## PCI Device Interrupt Map

The PCI bus based external devices include the PCI Mezzanine Card (PMC) mezzanine site, the SCSI-2 Controller, the PCI-to-VMEbus bridge, and the VGA reserved connection. The default BIOS maps these external devices to the PCI Interrupt Request (PIRQx) lines of the PIIX. This mapping is illustrated in Figure D-2 on page D-11 and is defined in Table D-1.

The device PCI interrupt lines (INTA through INTD) that are present on each device cannot be modified.

**Table D-4** Device PCI Interrupt Mapping by the BIOS

| DEVICE | COMPONENT | VENDOR ID | DEVICE ID | CPU ADDRESS MAP ID SELECT | DEVICE PCI INTERRUPT | MOTHER-BOARD PCI INTERRUPT MAPPER | DATA BOOK REF. # | REVISION ID |
|---|---|---|---|---|---|---|---|---|
| PCI-VME BRIDGE OPTION Cypress VIC64 | PLX * PCI9060 | 0x114A | 0x7587 | AD19 | INTA | PIRQ0 | 7 | 0x80 |
| | AMCC * S5933Q | 0x114A | 0x7587 | AD20 | N/A | N/A | 7 | 0x0 |
| PCI-VME BRIDGE OPTION: Tundra Universe™ | Universe CA91C042 | 0x10E3 | 0x0 | AD20 | INTA | PIRQ0 | 7 | N/A |
| | PLX PCI9060ES | 0x114A | 0x0001 | AD20 | N/A | N/A | 7 | N/A |
| PMC SITE | N/A | Board Specific | Board Specific | AD22 | INTA | PIRQ1 | N/A | N/A |
| | N/A | Board Specific | Board Specific | N/A | INTB | PIRQ2 | N/A | N/A |
| | N/A | Board Specific | Board Specific | N/A | INTC | PIRQ3 | N/A | N/A |
| | N/A | Board Specific | Board Specific | N/A | INTD | PIRQ0 | N/A | N/A |
| PCI ISA IDE Xcellerator | PIIX 82371FB | 0x8086 | 0x122E | AD18 | N/A | N/A | 2 | N/A |
| SCSI CONTROLLER | Adaptec AIC-7850 | 0x9004 | 0x5078 | AD21 | INTA | PIRQ2 | 3 | N/A |
| SVGA CONTROLLER | Cirrus CL-GD5436 | 0x1013 | 0x00AC | AD24 | INTA** | PIRQ3** | 4 | N/A |

* To access these parts use the revision number as the distinguishing factor.
** Not connected, for reference only.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

The motherboard accepts these PCI device interrupts through the PCI interrupt mapper function. The BIOS defaults map the PCI Interrupt Request (PIRQx) external device lines to one of the available slave PIC Interrupt Request lines, IRQ(9, 10, 11, or 15). The BIOS default mapping of the PIRQx to the slave PIC is defined in Table D-5.

**Table D-5** Default PIRQx to IRQx BIOS Mapping

| PCI INTx | PIC IRQx |
|---|---|
| PIRQ0 | IRQ9 |
| PIRQ1 | IRQ11 |
| PIRQ2 | IRQ10 |



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

# Index


## Numerics

10Base2 3-17
10BaseT 3-17

## A

AMCC PCI Controller chip 3-6

## B

BIOS 2-11, 3-6, 3-13
block diagram 1-7

## C

Centronics parallel port 3-15
Cirrus Logic CL-GD5436 chip 3-15
Cirrus Logic video chip 3-15
CMOS configuration 2-12
connectors 2 2
CPU board diagram 2-3
Cypress 'VIC64' 1-4

## D

DMA Controller 3-7
DMA page registers 3-7
DRAM 3-3

## E

EPROM 3-3
Ethernet 3-8
Ethernet controller, SMC91C94 3-17
Ethernet, LED definition 2-10
Extended Data Out (EDO) mode 3-2

## F

fast page mode 3-2
features of the board 1-9
functional diagram 1-10

## G

graphics video resolutions 3-15

## H

hexadecimal 1-2

## I

I/O addressing space 3-6
I/O board diagram 2-4
I/O features 1-6
I/O port map 3-6
installation 2-8
Intel programmers 1-2
interrupt line assignment 3-9
Interrupt Request line (IRQx) 3-12
IOWorks Access 1-2, 1-5

## J

jumper (JB1), CPU socket frequency 2-2
jumper (JB2), CPU clock multiplier 2-2
jumpers
  Universe factory installed 2-7
  VIC64 factory installed 2-6

## L

LED Definition, front panel 2-10
LPT1 Parallel I/O 3-8
LPT2 Parallel I/O 3-8

## M

master interrupt controller 3-7
memory address map
  Universe based interface 3-5
  VIC64 based interface 3-4
memory map 3-4
memory sharing 3-3
Motorola programmers 1-2





Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

## N

Non-Maskable Interrupt (NMI) 3-7, 3-9, 3-13

## O

offset address conversions 1-3
on-board extended memory 3-4

## P

PCI Configuration Space 3-6
PCI interrupt lines 3-12
PCI local bus 3-12
PCI Mezzanine Card (PMC) 2-10, 3-12
Pentium® CPU block diagram 3-1
PLX 9060 PCI Controller chip 3-6
PMC specifications, Type I & II 2-11
Priority Interrupt Controller (PIC) chips 3-12
programmable time 3-7
protected mode 3-4, 3-5, 3-10

## R

real mode 3-4, 3-5, 3-10
real-time clock 3-7
references 1-4
refresh rates 3-15
Return Material Authorization (RMA) number 4-1

## S

screen resolutions 3-15
SCSI controller 3-16
Serial I/O (COM1,2,3 & 4) 3-8
serial ports 3-15
SERR interrupt 3-13
SIMM sockets 3-2
SMC 3-15
SMC Ultra I/O chip 3-15
SMC9000 chip 3-8

## U

Universe interface option 1-3, 1-4
Universe™ PCI/VME controller 3-6
unpacking procedures 2-1

## V

vector interrupt table 3-9
VIC64 interface option 1-3, 1-4
video BIOS 3-3
video DRAM 3-15
VMEbus Interface Controller chip (VIC64) 3-6



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

**Artisan Technology Group** is an independent supplier of quality pre-owned equipment

## Gold-standard solutions

Extend the life of your critical industrial, commercial, and military systems with our superior service and support.

## We buy equipment

Planning to upgrade your current equipment? Have surplus equipment taking up shelf space? We'll give it a new home.

## Learn more!

Visit us at **artisantg.com** for more info on price quotes, drivers, technical specifications, manuals, and documentation.

Artisan Scientific Corporation dba Artisan Technology Group is not an affiliate, representative, or authorized distributor for any manufacturer listed herein.

We're here to make your life easier. How can we help you today?

(217) 352-9330 | sales@artisantg.com | artisantg.com

ARTISAN® TECHNOLOGY GROUP