VMIVME-7750

Intel 133MHz Front-Side Bus Pentium III Processor - VMEBus SBC

Product Manual

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500-007750-000 Rev. D

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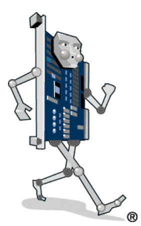

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Overview

Introduction

VMIC's VMIVME-7750 is a full-featured Pentium III compatible computer in a single-slot, passively cooled, Eurocard form factor that utilizes the advanced technology of Intel's 815E chipset running at a front-side bus rate of 133 MHz. The VMIVME-7750 is compliant with the VME Specification Rev. C.1 and features a transparent PCI-to-VME bridge, allowing the board to function as a system controller or peripheral CPU in multi-CPU systems.

The VMIVME-7750 provides features typically found on desktop systems such as:

- Up to 512MB PC133 SDRAM
- Built-in SVGA support with 4 Mbytes DRAM display cache
- Built-in dual 10/100 Mbit Ethernet
- IDE drive support
- Floppy drive support
- Two RS232 serial ports
- Dual USB ports
- Real-Time clock/calendar
- Front panel reset switch
- Miniature speaker
- Keyboard/Mouse port

The 815E chipset allows the VMIVME-7750 to provide enhanced features such as 133MHz front-side bus support and ATA-100 IDE support. The VMIVME-7750 is capable of executing many of today's desktop operating systems such as Microsoft's Windows 95, Windows 98SE, Windows NT 4.0, Windows 2000 and a wide variety of Linux-based operating systems. The standard desktop features of the VMIVME-7750 are described in Chapter 2 of this manual.

The VMIVME-7750 provides features useful to embedded applications such as:

- I^2C bus support
- Remote Ethernet booting
- Up to 512 Mbytes of bootable compact flash (optional)
- Four general-purpose programmable timers (two 16-bit and two 32-bit)
- Software-selectable Watchdog Timer with reset
- 32KB Non-volatile SRAM

Additionally, the VMIVME-7750 offers a PMC expansion site with front-panel access. The VMIVME-7750 is capable of executing many of today's embedded operating systems such as VxWorks, QNX, Solaris, LynxOS and Microsoft's embedded Windows NT. The embedded features of the VMIVME-7750 are described in Chapter 3 of this manual.

The VMIVME-7750 is suitable for use in a variety of applications, such as: telecommunications, simulation, instrumentation, industrial control, process control and monitoring, factory automation, automated test systems, data acquisition systems and anywhere that the highest performance processing power in a single VME slot is desired.

Intel 815E Chipset

The VMIVME-7750 incorporates the latest Intel chipset technology, the 815E. This chipset departs from previous generation devices by utilizing a new Advanced Hub Architecture (AHA). The AHA allows for increased system performance by separating many high-bandwidth I/O accesses (like IDE or USB devices) from PCI accesses, relieving bottlenecks on the PCI bus. Furthermore, the 815E chipset brings new levels of integration to motherboard chipsets and provides additional features (like ATA-100 support) over other chipsets.

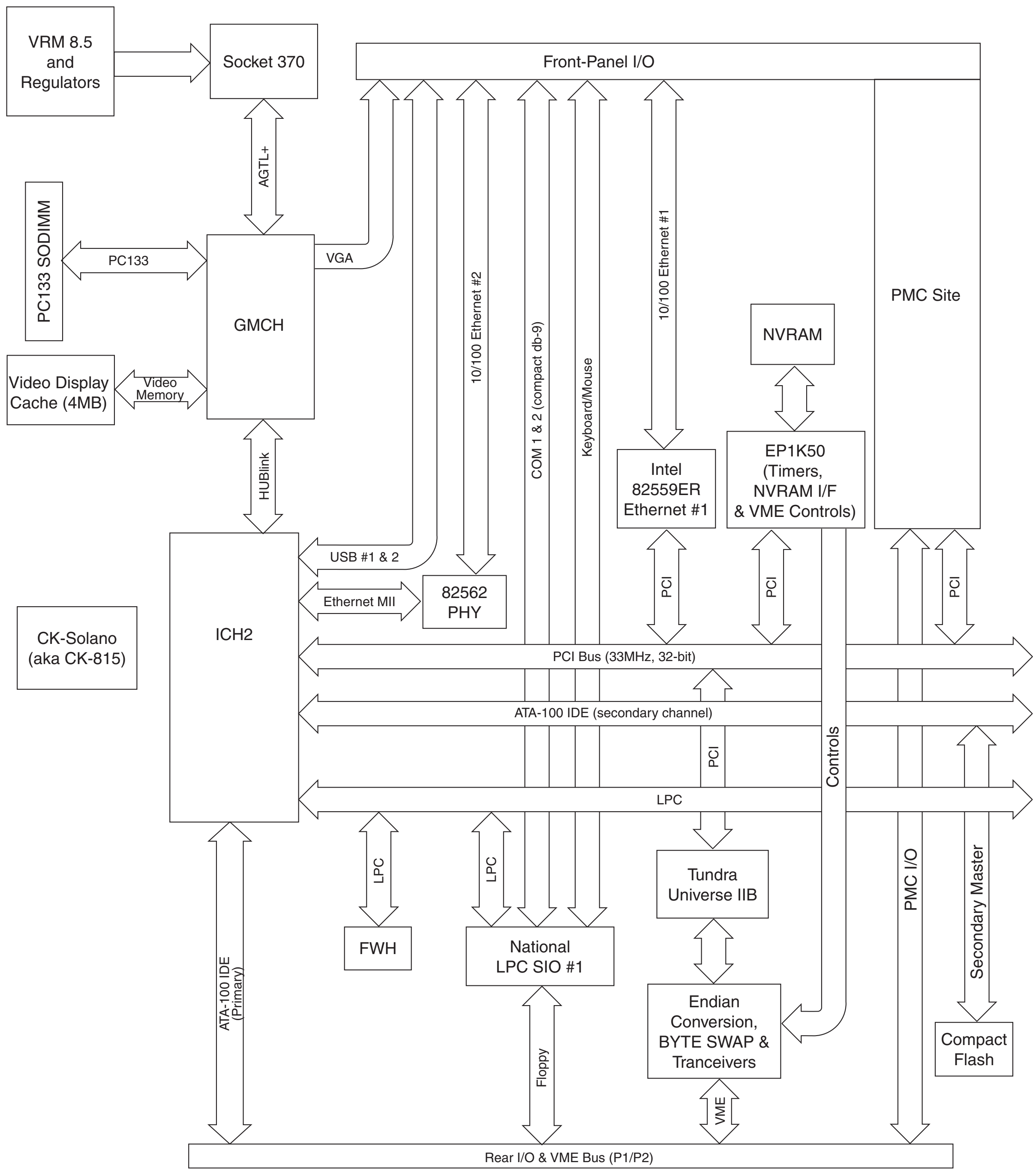


Figure 1 VMIVME-7750 Block Diagram

Organization of the Manual

This manual is composed of the following chapters and appendices:

Chapter 1 - Installation and Setup describes unpacking, inspection, hardware jumper settings, connector definitions, installation, system setup and operation of the VMIVME-7750.

Chapter 2 - Standard Features describes the unit design in terms of the standard PC memory and I/O maps, along with the standard interrupt architecture.

Chapter 3 - Embedded PC/RTOS Features describes the unit features that are beyond standard functions.

Chapter 4 - Maintenance provides information relative to the care and maintenance of the unit.

Appendix A - Connector Pinouts illustrates and defines the connectors included in the unit's I/O ports.

Appendix B** - **System Driver Software provides details for installing drivers under Windows 98 SE and Windows NT.

Appendix C - Phoenix BIOS describes the menus and options associated with the Phoenix (system) BIOS.

Appendix D - LANWorks BIOS describes the menus and options associated with the LANWorks BIOS.

Appendix E - Sample C Software provides example code to use with the VMIVME-7750.

References

Pentium III Processor for the PGA370 Socket at 500MHz to 1.0 GHz
August 2000, Order Number 245264-006

Intel 815 Chipset Family: 82815 Graphics and Memory Controller Hub (GMCH)
June 2000, Order Number 290687-001

Intel 82801 BA I/O Controller Hub 2 (ICH2)
June 2000, Order Number 290687-001

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)

PC87366 128-Pin LPC Super I/O with System Hardware Monitoring, MIDI and Game Ports

National Semiconductor
2900 Semiconductor Dr.
P.O. Box 58090
Santa Clara, CA 95052-8090
(800) 272-9959
(800) 737-7018 (FAX)

CMC Specification, P1386/Draft 2.0 from:
IEEE Standards Department
Copyrights and Permissions
445 Hoes Lanes, P.O. Box 1331
Piscataway, NJ 08855-1331, USA

PMC Specification, P1386.1/Draft 2.0 from:
IEEE Standards Department
Copyrights and Permissions
445 Hoes Lanes, P.O. Box 1331
Piscataway, NJ 08855-1331, USA

VMISFT-9420 IOWorks Access User's Guide
Doc. No. 520-009420-910
VMIC
12090 South Memorial Pkwy.
Huntsville, AL 35803-3308
(800) 322-3616
www.vmic.com

Tundra Universe II Based VMEbus Interface
Doc. No. 500-000211-000
VMIC
12090 South Memorial Pkwy.
Huntsville, AL 35803-3308
(800) 322-3616
www.vmic.com

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

VMEbus Specification Rev. C. and the VMEbus Handbook
VMEbus International Trade Assoc. (VITA)
7825 East Gelding Dr.
Suite 104
Scottsdale, AZ 85260
(602) 951-8866
(602) 951-0720 (FAX)
www.vita.com

The following is useful information related to remote Ethernet booting of the VMIVME-7750:

Microsoft Windows NT Server Resource Kit
Microsoft Corporation
ISBN: 1-57231-344-7
www.microsoft.com

The following is useful information related to the operation of the I^2C controllers:

The I^2C Specification version 2.0
Philips Semiconductor
811 East Arques Ave.
Sunnyvale, CA 94088-3409
(800) 234-7381
www.semiconductors.philips.com

Safety Summary

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

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

Ground the System

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

Do Not Operate in an Explosive Atmosphere

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

Keep Away from Live Circuits

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

Do Not Service or Adjust Alone

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

Do Not Substitute Parts or Modify System

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

Dangerous Procedure Warnings

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

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

Warnings, Cautions and Notes

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

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

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

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

Notation and Terminology

This product bridges the traditionally divergent worlds of Intel-based PC's and Motorola-based VMEbus controllers; therefore, some confusion over "conventional" notation and terminology may exist. Every effort has been made 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 "doubleword."
- 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 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, for example, $C000, $E000, etc. When using this formula, make sure to round the offset calculation properly!

CHAPTER

1

Installation and Setup

Contents

Introduction

This chapter describes the hardware jumper settings, connector descriptions, installation, system setup and operation of the VMIVME-7750.

Unpacking Procedures

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 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 Service along 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.

Hardware Setup

The VMIVME-7750 is factory populated with user-specified options as part of the VMIVME-7750 ordering information. The CPU speed, RAM size and flash memory size are not user-upgradable. To change CPU speeds or RAM/Flash size, contact customer service to receive a Return Material Authorization (RMA).

VMIC Customer Service is available at: 1-800-240-7782.

Or E-mail us at customer.service@vmic.com

The VMIVME-7750 is tested for system operation and shipped with factory-installed header jumpers. The physical location of the jumpers and connectors for the single board CPU are illustrated in Figure 1-1 on page 27. The definitions of the CPU board jumpers and connectors are included in Table 1-1 through Table 1-7.

CAUTION: All jumpers marked *User Configurable* in the following tables may be changed or modified by the user. All jumpers marked factory configured should not be modified by the user.

Care must be taken when making jumper modifications to ensure against improper settings or connections. Improper settings may result in damage to the unit.

Modifying any jumper not marked "User Configurable" will void the Warranty and may damage the unit. The default jumper condition of the VMIVME-7750 is expressed in Table 1-1 through Table 1-7 with **bold text** in the table cells.

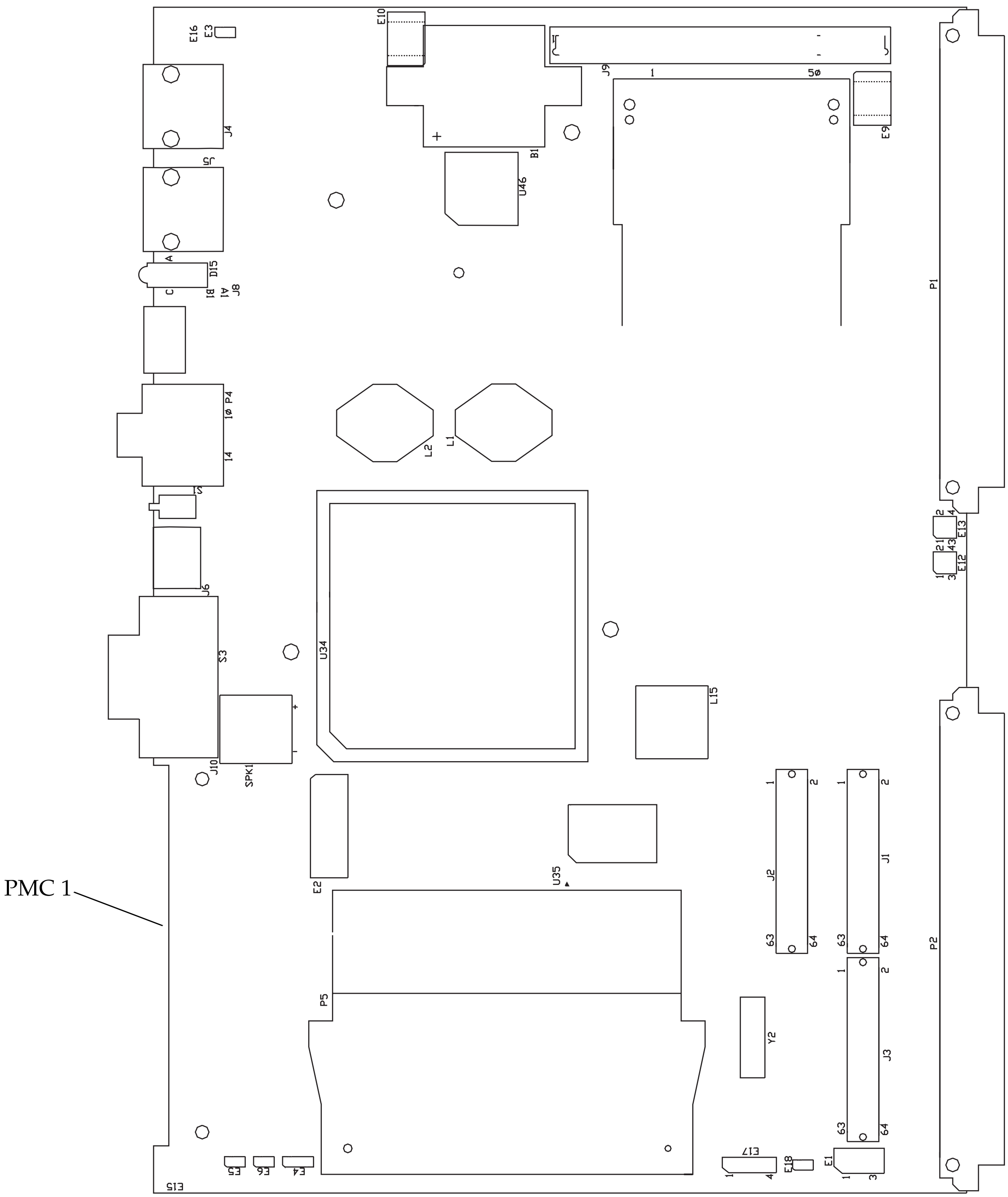


Figure 1-1 VMIVME-7750 PMC and Jumper Locations

Table 1-1 CPU Board Connectors

Connector	Function
J6	Mouse/Keyboard
J4, J5	Ethernet 1 & 2
P2	IDE (PRI), Floppy
J8	Dual USB
J10	Video
E2, E4, E5, E6, E9, E10, E18	Factory Reserved Do Not Use
E2	ITP
E17	I^2C Header
E1	Fan
J1, J2, J3	PMC Slot 1
P4	COM 1, COM 2
P1, P2	VME

NOTE: The BIOS has the capability (not currently enabled) of password protecting casual access to the unit's CMOS set-up screens. The Password Clear jumper allows the user to clear the password in the case of a forgotten password.

To clear the CMOS password:

1. Turn off power to the unit.
2. Momentarily short the pins of E3 for approximately five seconds.
3. Power up the unit.

When power is reapplied to the unit, the CMOS password will be cleared.

Table 1-2 Password Clear (**User Configurable**) - Jumper (E3)

Select	Jumper Position
Normal	**Open**
Clear CMOS/Password	Momentarily Short

Table 1-3 Factory Configured - BIOS Block Lock - Jumper (E5)

Select	Jumper Position
Locked	In
Not Locked	**OUT**

Table 1-4 Factory Configured - BIOS Write Protect - Jumper (E6)

Select	Jumper Position
Write Protected	In
Not Write Protected	**OUT**

Table 1-5 VME Jumper (**User Configurable**) - Jumper (E12)

Select	Jumper Position
Map UNIV2 to I/O Space	**1-3**
Enable SYSFAIL Generation	**2-4**

Table 1-6 VME Jumper (**User Configurable**) - Jumper (E12)

Select	Jumper Position
Map UNIV2 to I/O Space	**1-3**
Enable SYSFAIL Generation	**2-4**

Table 1-7 VME Jumper (**User Configurable**) - Jumper (E13)

Select	Jumper Position
Enable VME SYSRESET Driver	**1-3**
Enable SYSRESET Receiver	**2-4**

Power Requirements

The VMIVME-7750 requires +5V, +12V and -12V from the VME backplane. Below are the voltage and current requirements.

Supply	**Current (Typical)**	**Current (Maximum)**
+5V	5.8A	7A
+12V	105mA	200mA
-12V	50mA	75mA

The VMIVME-7750 provides power to the PMC site in accordance with the PMC specification. The maximum current provided on the +5V supply is 1.5A per PMC site. The maximum current provided on the +3.3V supply is 1.5A per PMC site.

The +12V and -12V supplies are provided to the PMC site and to the rear-transition board (such as the ACC-0562 board). The total +12v or -12v current provided to the VMIVME-7750 (as indicated above), the PMC site and the rear-transition board must not exceed 750mA each, in accordance with the VMEbus Specification.

Installation

The VMIVME-7750 conforms to the VMEbus physical specification for a single slot 6U dual Eurocard (dual height). It can be plugged directly into any standard chassis accepting this type of board.

CAUTION: Do not install or remove the board while power is applied.

The following steps describe the VMIC recommended method for VMIVME-7750 installation and power-up:

1. Make sure power to the equipment is off.
2. Choose chassis slot. The VMIVME-7750 ***must*** be attached to a dual P1/P2 VMEbus backplane.

   If the VMIVME-7750 is to be the VMEbus system controller, choose the first VMEbus slot. If a different board is the VMEbus system controller, choose any slot **except** slot one. The VMIVME-7750 does not require jumpers for enabling/disabling the system controller function.

NOTE: Air flow requirements as measured at output side of heatsink is to be greater than 350LFM.

3. 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.
4. 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-7750.
5. The VMIVME-7750 features a Flash Disk resident on the board. Refer to Chapter 4 for set up details.
6. If an external drive module is installed, the BIOS Setup program must be run to configure the drive types. See Appendix C to properly configure the system.
7. If a drive module is present, install the operating system according to the manufacturer's instructions.

See Appendix B for instructions on installing VMIVME-7750 peripheral driver software during operating system installation.

BIOS Setup

The VMIVME-7750 has an on-board BIOS Setup program that controls many configuration options. These options are saved in a special non-volatile, 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-7750 is shipped from the factory with hard drive type configuration set to AUTO in the CMOS.

Details of the VMIVME-7750 BIOS setup program are included in Appendix C.

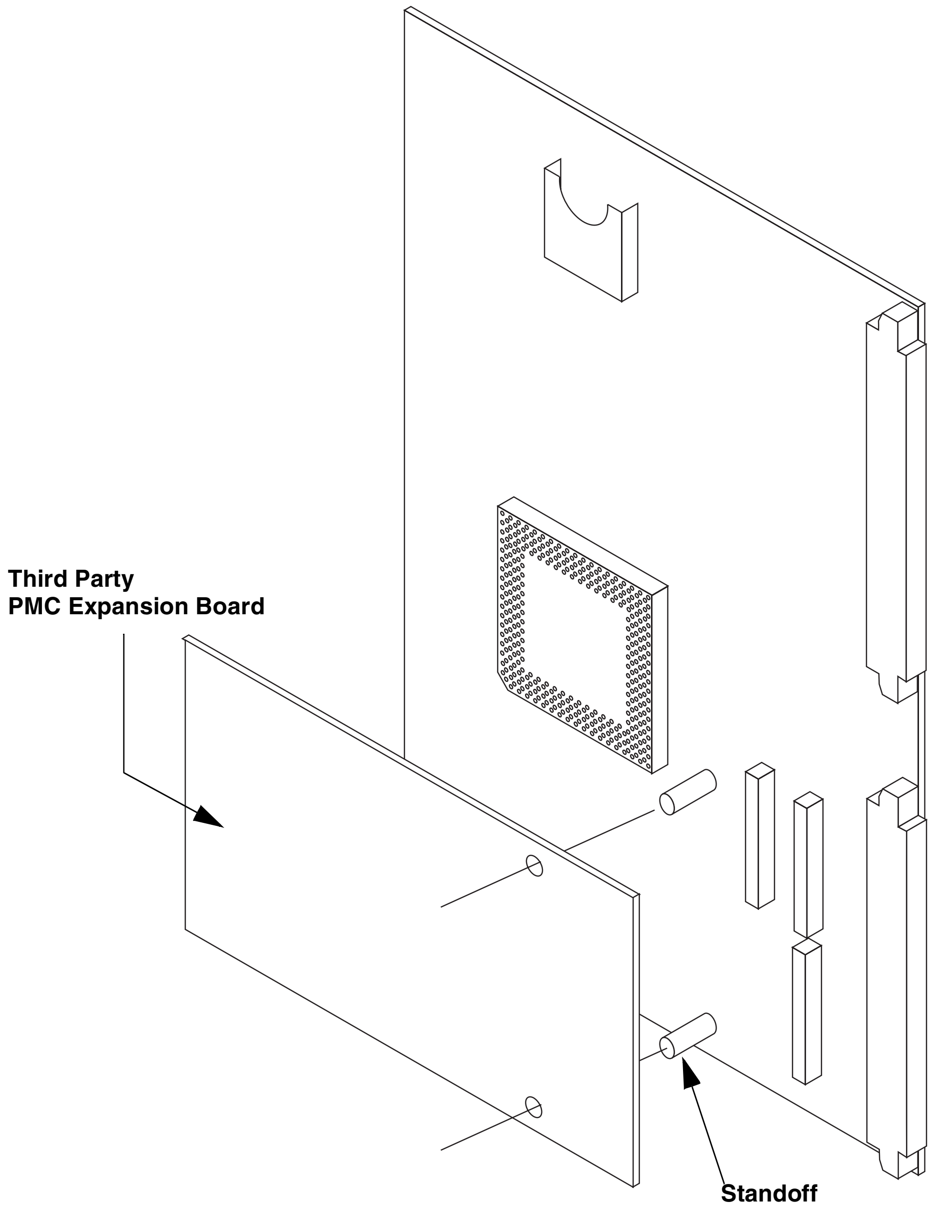


Figure 1-2 Installing a PMC Card on the VMIVME-7750

Front/Rear Panel Connectors

The VMIVME-7750 provides front-panel access to the PMC expansion site, the VGA connector, both 10/100 Ethernet connectors, the manual reset switch, COM 1 and 2, dual USB and the status LEDs. A drawing of the VMIVME-7750 front-panel is shown in Figure 1-3. The front-panel connectors and indicators are labeled as follows:

- LAN 1 10/100 Mbit Ethernet connector
- LAN 2 10/100 Mbit Ethernet connector
- SVGA SVGA video connector
- RST Manual reset switch
- COM 1:2 Two COM ports
- M/K Dual mouse/keyboard connector
- USB Dual USB connector
- RPIB Status LEDs

The VMIVME-7750 provides rear I/O support for the following: PMC, IDE drive and floppy drive. These signals are accessed by the use of a rear-panel transition board such as the VMIACC-0562, which terminate into industry standard connectors.

The front panel connectors, including connector pinouts and orientation, for the VMIVME-7750 are defined in Appendix A. Rear panel connections are defined in the appropiate rear panel transition utility board Installation Guide. See the VMIVME-7750 product specification for compatible rear panel transistion utility boards offered by VMIC.

LED Definition

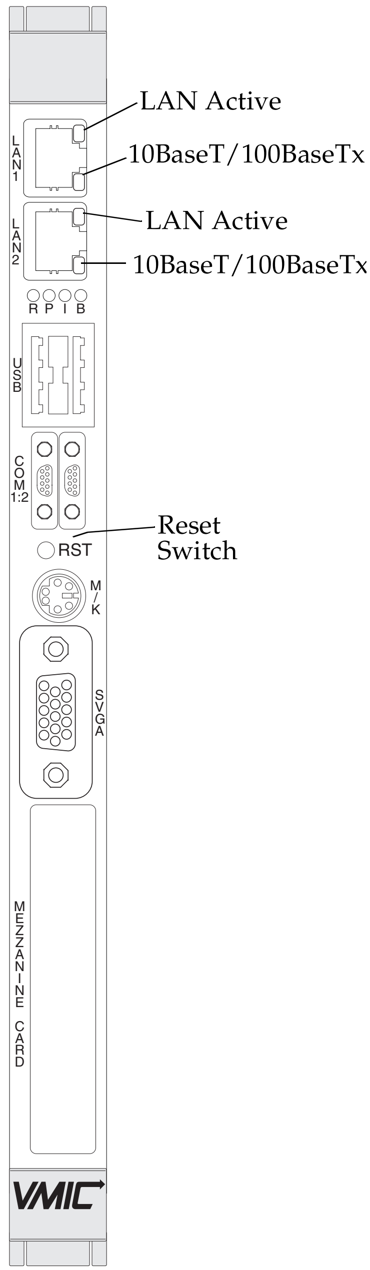


Figure 1-3 Front Panel LED Positions

Reset Switch	*Reset* - Allows the system to be reset from the front panel.
LED R	*Reset* - Lights during reset condition, (Red LED).
LED P	*Power* - Indicates when power is applied to the board, (Green LED). This LED also indicates throttling by blinking slowly.
LED I	*IDE Indicator* - Indicates when IDE activity is occurring, (Yellow LED).
LED B	*Booting* - Indicates BIOS Boot is in progress. When LED is off, CPU has finished POST and is ready, (Red LED). Once booting has completed, any VME ‘SYSFAILS’ will be indicated by this LED.
LAN1 Active	Indicates the Ethernet is active, (Yellow LED).
LAN1 10/100BaseTx	Indicates whether 10BaseT or 100BaseTx mode. Yellow LED indicates 10BaseT, and Green LED indicates 100BaseTx.
LAN2 Active	Indicates the Ethernet is active, (Yellow LED).
LAN2 10/100BaseTx	Indicates whether 10BaseT or 100BaseTx mode. Yellow LED indicates 10BaseT, and Green LED indicates 100BaseTx.

In addition, the front-panel LEDs are used to indicate various modes of operational status that can occur with the VMIVME-7750. The table below is a summary of these indications.

Table 1-8 Status Indications

State	Indication
Board is in Reset	“LAN 10BaseT/100BaseT” LED rapidly alternates Yellow/Green and the Red “Reset” LED is illuminated.
CPU Not Present	Green “Power” LED is illuminated and the Red “Reset” LED flashes at a rapid rate.
VME SYSFAIL	Red “B” LED illuminates with each VME SYSFAIL ‘seen’ on the bus. The LED will remain on as long as the failure lasts.
VRM Failure	Green “Power” LED is off and the Red “Reset” LED flashes at a rapid rate.
Throttling Active (Not a Fault Mode)	Green “Power” LED flashes at a slow rate. If CPU throttling has not been selected from the BIOS Setup screen, yet the Green LED continually blinks every time bootup is attempted (but won’t run), clear the CMOS or return the product to VMIC for servicing.
Normal Operation	LED R = Off (out of reset) LED P = On (power is good) LED I = Off, or Flashing (IDE activity) LED B = Off (boot completed)

CHAPTER 2

Standard Features

Contents

Introduction

The VMIVME-7750 is an Intel Pentium III processor-based single board computer compatible with modern industry standard desktop systems. The VMIVME-7750 therefore retains industry standard memory and I/O maps along with a standard interrupt architecture. The integrated peripherals described in this section (such as serial ports, USB ports, IDE drives, floppy drives, video controller and Ethernet controller) are all memory mapped the same as similarly equipped desktop systems, ensuring compatibility with modern operating systems.

The following sections describe the standard features of the VMIVME-7750.

CPU Socket

The VMIVME-7750 CPU socket is factory populated with a high-speed Pentium III processor. The CPU speed and RAM/flash size are user specified as part of the VMIVME-7750 ordering information.

To change CPU speeds, RAM size or flash size contact customer service to receive a Return Material Authorization (RMA).

VMIC Customer Service is available at: 1-800-240-7782.

Physical Memory

The VMIVME-7750 provides Synchronous DRAM (SDRAM) as on-board system memory. Memory can be accessed as bytes, words or longwords.

The VMIVME-7750 accepts one 144-pin SDRAM SODIMM for a maximum capacity of 512 Mbytes. The on-board DRAM is dual-ported to the VME bus through the PCI-to-VME bridge and is addressable by the local processor, as well as 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.

NOTE: When using the Configure utility of VMIC's IOWorks Access with Windows NT 4.0 to configure RAM, do not request more than 25 percent of the physical RAM. Exceeding the 25 percent limit may result in a known Windows NT bug that causes unpredictable behavior during the Windows NT boot sequence, and requires the use of an emergency repair disk to restore the computer. The bug is present in Windows NT 4.0 service pack level 3. It is recommended that an emergency repair disk be kept up-to-date and easily accessible.

The VMIVME-7750 includes 32 Kbyte of non-volatile SRAM which can be accessed by the CPU at any time, and is used to store system data that must not be lost during power-off conditions.

NOTE: Memory capacity may be extended as parts become available.

Memory and Port Maps

Memory Map - Tundra Universe II-Based PCI-to-VMEbus Bridge

The memory map for the Tundra Universe II-based interface VMIVME-7750 is shown in Table 2-1. All systems share this same memory map, although a VMIVME-7750 with less than the full 256 Mbyte of SDRAM does not fill the entire space reserved for On-Board Extended Memory.

Table 2-1 VMIVME-7750, Universe II-Based Interface Memory Address Map

MODE	MEMORY ADDRESS RANGE	SIZE	DESCRIPTION
PROTECTED MODE	$FFFF 0000 - $FFFF FFFF	64 Kbyte	ROM BIOS Image
	$0400 0000 - $FFFE FFFF	3.9 Gbyte	Unused *
	$0010 0000 - $0FFF FFFF	255 Mbyte	Reserved for ** On-Board Extended Memory (not filled on all systems)
REAL MODE	$E0000 - $FFFFF	128 Kbyte	ROM BIOS
	$D8018 - $DFFFF	32 Kbyte	Reserved
	$D8016 - $D8017	2 bytes	Board ID Register (0x7750)
	$D8014 - $D8015	2 bytes	VMEBERR Address Modifier Register
	$D8010 - $D8013	2 bytes	MEBERR Address Register
	$D800E - $D800F	2 bytes	System COMM Register
	$D8000 - $D800D	14 bytes	Reserved
	$C8000 - $D7FFF	64 Kbyte	LANWorks BIOS
	$C0000 - $C7FFF	32 Kbyte	Video ROM
	$A0000 - $BFFFF	128 Kbyte	Video RAM
	$00000 - $9FFFF	640 Kbyte	User RAM/DOS RAM

* This space can be used to set up protected mode PCI-to-VMEbus windows (also referred to as PCI slave images). BIOS will also map on-board PCI based NVRAM, Timers and Watchdog Timers in this area.

** This space can be allocated as shared memory (for example, between the Pentium processor-based CPU and VMEbus Master). Note that if a PMC board is loaded, the expansion BIOS may be placed in this area.

I/O Port Map

Like a desktop system, the VMIVME-7750 includes special input/output instructions that access I/O peripherals residing in I/O addressing space (separate and distinct from memory addressing space). Locations in I/O address space are 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 to A15 and identifies the I/O cycle with the M/I/O control line. Thus, the CPU includes an independent 64 Kbyte I/O address space, which is accessible as bytes, words or longwords.

Standard hardware circuitry reserves only 1,024 byte of I/O addressing space from I/O $000 to $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; adjusting these I/O ports directly is not normally necessary.

The assigned and user-available I/O addresses are summarized in the I/O Address Map, Table 2-2.

Table 2-2 VMIVME-7750 I/O Address Map

I/O ADDRESS RANGE	SIZE IN BYTES	HW 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, System Configuration (Intel 8042 Compatible)
$065 - $06F	11		Reserved
$070 - $071	2		Real-Time Clock
$072 - $07F	14		Reserved
$080 - $08F	16		DMA Page Registers
$090 - $091	2		Reserved
$092	1		Alt. Gate A20/Fast Reset Register
$093 - $09F	11		Reserved

Table 2-2 VMIVME-7750 I/O Address Map (Continued)

I/O ADDRESS RANGE	SIZE IN BYTES	HW DEVICE	PC/AT FUNCTION
$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	ICH2	Secondary Hard Disk Controller
$178 - $1EF	120		User I/O
$1F0 - $1F7	8	ICH2	Primary Hard Disk Controller
$1F8 - $277	128		User I/O
$278 - $27F	8	I/O Chip*	LPT2 Parallel I/O*
$280 - $2E7	104		Reserved
$2E8 - $2EE	7	UART*	COM4 Serial I/O*
$2EF - $2F7	9		User I/O
$2F8 - $2FE	7	Super-I/O Chip	COM2 Serial I/O (16550 Compatible)
$2FF - $36F	113		Reserved
$370 - $377	8	Super-I/O Chip	Secondary Floppy Disk Controller
$378 - $37F	8	Super-I/O Chip*	LPT1 Parallel I/O*
$380 - $3E7	108		Reserved
$3E8 - $3EE	7	UART*	COM3 Serial I/O*
$3F0 - $3F7	8	Super-I/O Chip	Primary Floppy Disk Controller
$3F8 - $3FE	7	Super-I/O Chip	COM1 Serial I/O (16550 Compatible)
$3FF - $4FF	256		Reserved
$500 - CFF	2048		Reserved

* While these I/O ports are reserved for the listed functions, they are not implemented on the VMIVME-7750. They are listed here to make the user aware of the standard PC usage of these ports.

Interrupts

System 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 2-3 along with their functions. Table 2-4 on page 43 details the vectors in the interrupt vector table. The interrupt number in HEX and decimal are also defined for real and protected mode in Table 2-4 on page 43.

The interrupt hardware implementation on the VMIVME-7750 is standard for computers built around the PC 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. This architecture is represented in Figure 2-1 on page 47.

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).

Table 2-3 PC Hardware Interrupt Line Assignments

IRQ	AT FUNCTION	COMMENTS
NMI	Parity Errors (Must be enabled in BIOS Setup)	Used by VMIVME-7750 PCIbus Interface
0	System Timer	Set by BIOS Setup
1	Keyboard	Set by BIOS Setup
2	Duplexed to IRQ9	
3	COM2	
4	COM1	
5	Unused	
6	Floppy Controller	
7	Unused	
8	Real-Time Clock	
9	Old IRQ2	SVGA or Network I/O
10	Not Assigned	Determined by BIOS
11	Not Assigned	Determined by BIOS

Table 2-3 PC Hardware Interrupt Line Assignments (Continued)

IRQ	AT FUNCTION	COMMENTS
12	Mouse	
13	Math Coprocessor	
14	AT Hard Drive	
15	Flash Drive	

Table 2-4 PC Interrupt Vector Table

INTERRUPT NO.		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, VME 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	Unassigned	Unassigned
0E	14	IRQ6	Floppy Disk Controller	Page Fault
0F	15	IRQ7	Unassigned	Unassigned
10	16		BIOS Video I/O	Coprocessor Error
11	17		System 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

Table 2-4 PC Interrupt Vector Table (Continued)

INTERRUPT NO.		IRQ LINE	REAL MODE	PROTECTED MODE
HEX	DEC			
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		Time of Day	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
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

Table 2-4 PC Interrupt Vector Table (Continued)

INTERRUPT NO.		IRQ LINE	REAL MODE	PROTECTED MODE
HEX	DEC			
67-6F	103-111		Reserved by DOS	Same as Real Mode
70	112	IRQ8	Real Time Clock	
71	113	IRQ9	Redirect to IRQ2	
72	114	IRQ10	Not Assigned	
73	115	IRQ11	Not Assigned	
74	116	IRQ12	Mouse	
75	117	IRQ13	Math Coprocessor	
76	118	IRQ14	AT Hard Drive	
77	119	IRQ15	Flash Drive	
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

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 de-assertion 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 de-asserts its INTx# signal.

PCI defines one interrupt line for a single function device and up to four interrupt lines for a multifunction device or connector. For a single function device, only INTA# may be used while the other three interrupt lines have no meaning. Figure 2-1 on page 47 depicts the VMIVME-7750 interrupt logic pertaining to VME operations and the PMC site.

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 VME 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.

PCI Device Interrupt Map

The PCI bus-based external devices include the PMC sites, Ethernet controller and the PCI-to-VME bridge. The default BIOS maps these external devices to the PCI Interrupt Request (PIRQx) lines of the ICH2. This mapping is illustrated in Figure 2-1 on page 47 and is defined in Table 2-5.

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

Table 2-5 PCI Device Interrupt Mapping by the BIOS

DEVICE	COMPONENT	VENDOR ID	DEVICE ID	CPU ADDRESS MAP ID SELECT	PCI IRQ	Arbitration Request Line
PCI-to-VME Bridge	Tundra Universe IIB	0x10E3	0x0000	AD19	INTA	REQ0
Timer/SRAM FPGA	VMIC Proprietary	0x114A	0x6504	AD20	INTE	N/A
PMC1	N/A	N/A	N/A	AD31	INTC	REQ2
Ethernet Controller	Intel 82559ER	0x8086	0x1209	AD22	INTB	REQ1
PCI Host Bridge	GMCH	0x8086	0x1130	N/A	N/A	N/A
VGA Controller	GMCH	0x8086	0x1132	N/A	N/A	N/A
PCI-LPC Bridge	ICH2	0x8086	0x2440	N/A	N/A	N/A
VGA Controller	ICH2	0x8086	0x2442	N/A	N/A	N/A
USB Controller #1	ICH2	0x8086	0x2443	N/A	N/A	N/A
SMBus Controller	ICH2	0x8086	0x2444	N/A	N/A	N/A
LAN Controller	ICH2	0x8086	0x2449	N/A	N/A	N/A
USB Controller #2	ICH2	0x8086	0x244B	N/A	N/A	N/A
PCI-to-Hub Bridge	ICH2	0x8086	0x244B	N/A	N/A	N/A

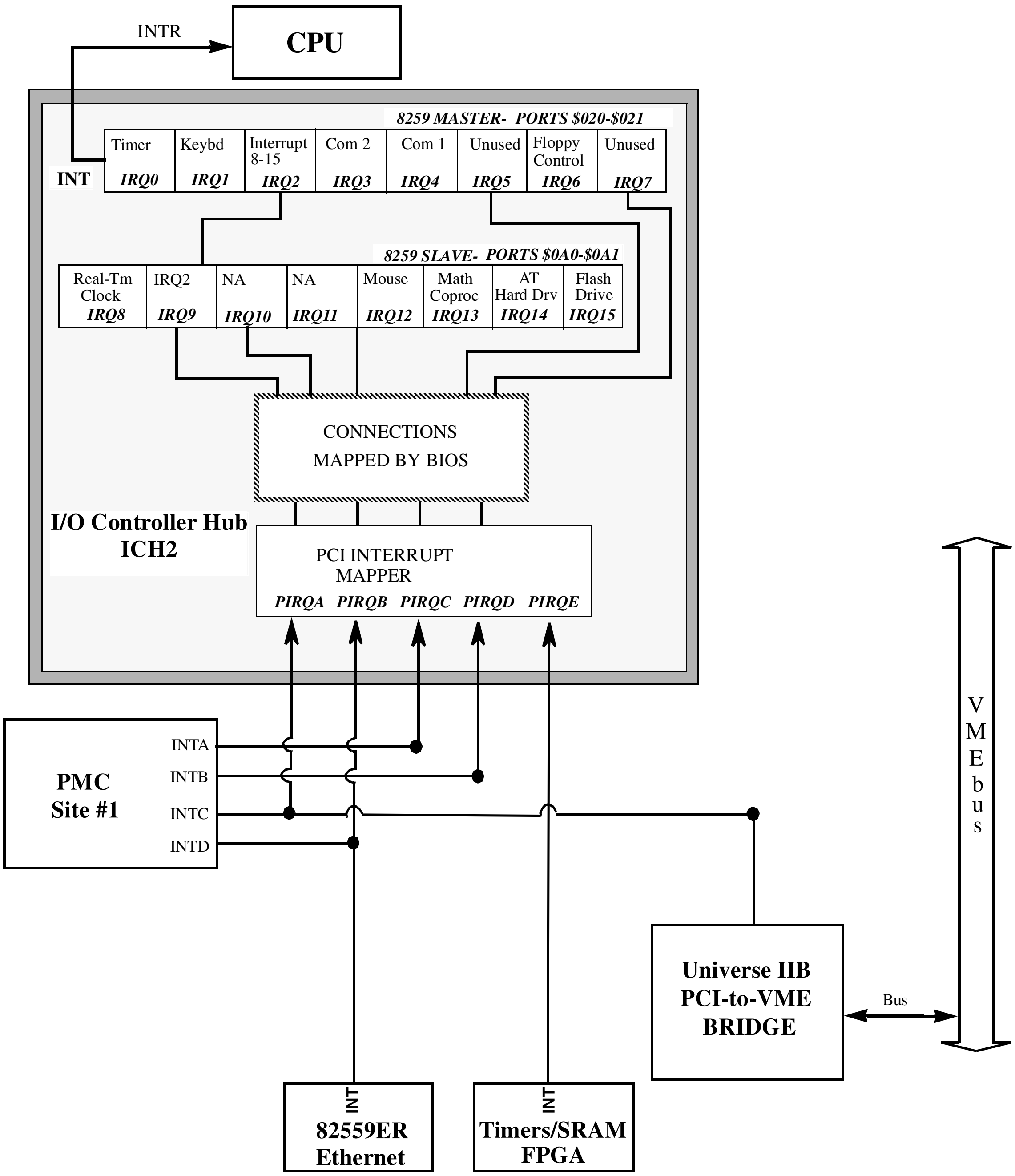


Figure 2-1 Connections for the PC Interrupt Logic Controller

The PCI-to-VME Bridge has the capability of generating a Non-Maskable Interrupt (NMI) via the PCI SERR# line. Table 2-6 describes the register bits that are used by the NMI. The SERR interrupt is routed through 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 2-6 NMI Register Bit Descriptions

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

Integrated Peripherals

The VMIVME-7750 incorporates a National Semiconductor Super I/O (SIO) chip. The SIO provides the VMIVME-7750 with a standard floppy drive controller, two 16550 UART-compatible serial ports, keyboard and mouse ports and general purpose I/O for system monitoring functions. Both serial port signals are available from the front panel. The floppy signals are available via the VME backplane connectors and can be accessed with the appropriate transition utility board (VMIACC-0562).

The IDE interface is provided by the Intel I/O Controller Hub (ICH2) chip. The IDE interface supports two channels known as the primary and secondary channels. The secondary channel is routed on-board to the optional compact flash socket. The primary channel is routed out the VME backplane to a VMIACC-0562 transition utility board which terminates into a standard 40-pin header. This channel can support two drives, a master and slave. The IDE interface on the VMIVME-7750 supports ATA-33, ATA-66 and ATA-100 drives and automatically determines the proper operating mode based on the type of drive used. In order to properly function in the ATA-100 mode, a special 80 conductor cable must be used instead of the standard 40 conductor cable. This cable is typically available from the ATA-100 drive manufacturer.

Ethernet Controllers

The dual network capability is provided by an external Intel 82559ER Ethernet Controller and a MAC internal to the Intel ICH2 chip. Both Ethernet controllers are PCI-based and are software configurable. The VMIVME-7750 supports dual 10BaseT and 100BaseTx Ethernet.

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.

100BaseTx

The VMIVME-7750 also supports the 100BaseTx Ethernet. A network based on a 100BaseTx standard uses unshielded twisted-pair cables and a RJ-45 connector. The 100BaseTx has a maximum length of 100 meters.

LANWorks

The VMIVME-7750 supports booting on either LAN1 or LAN2 using LANWorks Ethernet BIOS. Refer to Appendix D for more information on remote Ethernet booting.

Video Graphics Adapter

The SVGA port on the VMIVME-7750 is controlled by the Intel Graphic and Memory Controller Hub (GMCH) chip with 4 Mbyte video DRAM. The GMCH is hardware and BIOS compatible with the industry EGA and SVGA standards supporting both VESA high-resolution and extended video modes. Table 3-5 shows the graphics video modes supported by the GMCH video controller.

Table 2-7 Supported Graphics Video Resolutions

Screen Resolution	Maximum Colors	Maximum Refresh Rates (Hz)
640 x 480	16 M	85
800 x 600	16 M	85
1024 x 768	16 M	85
1280 x 1024	16 M	85
1600 x 900	64 K	85
1600 x 1200	256	75

Not all SVGA monitors support resolutions and refresh rates beyond 640 x 480 at 85 Hz. Do not attempt to drive a monitor to a resolution or refresh rate beyond its capability.

Universal Serial Bus

The VMIVME-7750 provides a dual Universal Serial Bus (USB) connection on the front panel. The on-board USB controllers completely support the standard USB interface.

The USB Host Controller moves data between system memory and the USB by processing and scheduling data structures. The controller executes the scheduled lists, and reports status back to the system.

NOTE: Default CMOS settings of the VMIVME-7750 have USB functions disabled. This allows more interrupts and less Interrupt Latency for Real Time system. If USB is enabled, the user must be aware that Interrupt Sharing and Latency will be effected.

CHAPTER

3

Embedded PC/RTOS Features

Contents

Introduction

VMIC’s VMIVME-7750 features additional capabilities beyond those of a typical desktop computer system. The unit provides four software-controlled, general-purpose timers along with a programmable Watchdog Timer for synchronizing and controlling multiple events in embedded applications. The VMIVME-7750 also provides a bootable Flash Disk system and 32 Kbyte of non-volatile SRAM. Also, the VMIVME-7750 supports an embedded intelligent VME bridge to allow compatibility with the most demanding VME applications. These features make the unit ideal for embedded applications, particularly where standard hard drives and floppy disk drives cannot be used. The VMIVME-7750 also supports I^2C by integrating specialized circuitry for these functions.

VMEbus Bridge

In addition to its PC/AT functions, the VMIVME-7750 has the following VMEbus features:

- Complete six-line Address Modifier (AM-Code) programmability
- VME 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)
- System Controller auto detection
- Complete VMEbus master access through five separate Protected-mode memory windows

The VMIVME-7750 supports High Throughput DMA transfers of bytes, words and longwords in both Master and Slave configurations.

If Endian conversion is not needed, VMIC offers a special “Bypass” mode that can be used to further enhance throughput (not available for byte transfers).

The VMIVME-7750 VMEbus interface is provided by the PCI-to-VMEbus bridge built around the Tundra Semiconductor Corporation Universe II VMEbus interface chip. The Universe II provides a reliable high-performance 64-bit VMEbus-to-PCI interface in one design. The functions and programming of the Universe-based VMEbus interface are addressed in detail in a companion manual titled: *VMIC's Tundra Universe II Based VMEbus Interface Product Manual (500-000211-000)*.

I^{2}C Support

The VMIVME-7750 supports the I^{2}C-bus and can operate as an I^{2}C-bus master or slave per the I^{2}C-bus specification, version 2.0, developed by Philips Semiconductor. Communication over the I^{2}C-bus is accomplished through the use of the National Semiconductor Super I/O I^{2}C-bus controller. This controller is capable of communicating on the I^{2}C-bus on a byte-wise basis using interrupt or polled handshaking and supports a programmable clock rate when operating in Master mode. The I^{2}C-bus signals are available through the VMIVME-7750's E17 header as shown in Table 3-1.

Table 3-1 I^{2}C-bus Through E17

Signal Name	Pin
+5.0V	1
I2C_SDA	2
I2C_SCL	3
GND	4

The VMIVME-7750 provides termination on the I^{2}C signals.

The controller can issue interrupts to the VMIVME-7750 when handshaking on the I^{2}C-bus. When the I^{2}C-bus controller drives the interrupt active, software must service and then clear the interrupt. Software can determine the cause of the interrupt by reading the bit of the status register.

For more information related to programming the I^{2}C-bus controller, see the section "Access, Bus Interface (ACB)" in the *"PC87366 128-pin LPC Super I/O with System Hardware Monitoring and MIDI and Game Ports"* datasheet available from National Semiconductor.

Embedded PCI Functions

The VMIVME-7750 provides non-volatile RAM (NVRAM), Timers and a Watchdog Timer via the PCI bus. These functions are required for embedded and real time applications. The PCI configuration space of these embedded functions are shown below.

Table 3-2 PCI Configuration Space Registers

31	16	15	00	Register Address
Device ID 0004		Vendor ID 114A		00h
Status		Command		04h
Class Code			Revision ID	08h
BIST	Header Type	Latency Timer	Cache Line Size	0Ch
PCI Base Address 0 for Memory-Mapped VME Control registers (BAR0)				10h
PCI Base Address 1 for Memory-Mapped 32kB NVRAM (BAR1)				14h
PCI Base Address 2 for memory-mapped Watchdog and other timers (BAR2)				18h
Reserved				1Ch
Reserved				20h
Reserved				24h
Reserved				28h
Subsystem ID 7750		Subsystem Vendor ID 114A		2Ch
Reserved				30h
Reserved				34h
Reserved				38h
Max_Lat	Min_gnt	Interrupt Pin	Interrupt Line	3Ch

The “Device ID” field indicates that the device is for VME products (00) and indicates the supported embedded feature set.

The “Vender ID” and “Subsystem Vendor ID” fields indicate VMIC’s PICMG assigned Vender ID (114A).

The “Subsystem ID” field indicates the model number of the product (7750).

Timers

General

The VMIVME-7750 provides four user-programmable timers (two 16-bit and two 32-bit) which are completely dedicated to user applications and are not required for any standard system function. Each timer is clocked by independent generators with selectable rates of 2MHz, 1MHz, 500kHz and 250kHz. Each timer may be independently enabled and each is capable of generating a system interrupt on timeout.

Events can be timed by either polling the timers or enabling the interrupt capability of the timer. A status register allows for application software to determine which timer is the cause of any interrupt.

Timer Control Status Register 1 (TCSR1)

The timers are controlled and monitored via the Timer Control Status Register 1 (TCSR1) located at offset 0x00 from the address in BAR2. The mapping of the bits in this register are as follows:

Field	Bits	Read or Write
Timer 1 Caused IRQ	TCSR1[0]	R/W
Timer 1 Enable	TCSR1[1]	R/W
Timer 1 IRQ Enable	TCSR1[2]	R/W
Timer 1 Clock Select	TCSR1[4..3]	R/W
Timer 2 Caused IRQ	TCSR1[8]	R/W
Timer 2 Enable	TCSR1[9]	R/W
Timer 2 IRQ Enable	TCSR1[10]	R/W
Timer 2 Clock Select	TCSR1[12..11]	R/W
Timer 3 Caused IRQ	TCSR1[16]	R/W
Timer 3 Enable	TCSR1[17]	R/W
Timer 3 IRQ Enable	TCSR1[18]	R/W
Timer 3 Clock Select	TCSR1[20..19]	R/W
Timer 4 Caused IRQ	TCSR1[24]	R/W
Timer 4 Enable	TCSR1[25]	R/W
Timer 4 IRQ Enable	TCSR1[26]	R/W
Timer 4 Clock Select	TCSR1[28..27]	R/W
Reserved	All Other Bits	R/W

All of these bits default to “0” after system reset.

Each timer has an independently selectable clock source which is selected by the bit pattern in the “Timer x Clock Select” field as follows:

Clock Rate	MSb	LSb
2MHz	0	0
1MHz	0	1
500kHz	1	0
250kHz	1	1

Each timer can be independently enabled by writing a “1” to the appropriate “Timer x Enable” field. Similarly, the generation of interrupts by each timer can be independently enabled by writing a “1” to the appropriate “Timer x IRQ Enable” field.

If an interrupt is generated by a timer, the source of the interrupt may be determined by reading the “Timer x Caused IRQ” fields. If the field is set to “1”, then the respective timer caused the interrupt. Note that multiple timers can cause a single interrupt. Therefore, the status of all timers must be read to ensure that all interrupt sources are recognized.

A particular timer interrupt can be cleared by writing a “0” to the appropriate “Timer x Caused IRQ” field. Alternately, a write to the appropriate Timer x IRQ Clear (TxIC) register will also clear the interrupt. When clearing the interrupt using the “Timer x Caused IRQ” fields, note that it is very important to ensure that a proper bit mask is used so that other register settings are not affected. The preferred method for clearing interrupts is to use the “Timer x IRQ Clear” registers described below.

Timer Control Status Register 2 (TCSR2)

The timers are also controlled by bits in the Timer Control Status Register 2 (TCSR2) located at offset 0x04 from the address in BAR2. The mapping of the bits in this register are as follows:

Field	Bits	Read or Write
Read Latch Select	TCSR2[0]	R/W
Reserved	All Other Bits	R/W

All of these bits default to “0” after system reset.

The “Read Latch Select” bit is used to select the latching mode of the programmable timers (See “Timers” section above). If this bit is set to “0”, then each timer output is latched upon a read of any one of its address. For example, a read to the TMRCCR12 register latches the count of timers 1 and 2. A read to the TMRCCR3 register latches the count of timer 3. This continues for every read to any one of these registers. As a result, it is not possible to capture the values of all four timers at a given instance in time. However, by setting this bit to "1", all four timer outputs will be latched only on reads to the Timer 1 & 2 Current Count Register (TMRCCR12). Therefore, to capture the current count of all four timers at the same time, perform a read to the TMRCCR12 first (with a 32-bit read), followed by a read to TMRCCR3 and TMRCCR4. The first read (to the TMRCCR12 register) causes all four timer values to be latched at the same time. The subsequent reads to the TMRCCR3 and TMRCCR4 registers do not latch new count values, allowing the count of all timers at the same instance in time to be obtained.

Timer 1 & 2 Load Count Register (TMRLCR12)

Timers 1 & 2 are 16-bits wide and obtain their load count from the Timer 1 & 2 Load Count Register (TMRLCR12), located at offset 0x10 from the address in BAR2. The mapping of bits in this register are as follows:

Field	Bits	Read or Write
Timer 2 Load Count	TMRLCR12[31..16]	R/W
Timer 1 Load Count	TMRLCR12[15..0]	R/W

When either of these fields are written (either by a single 32-bit write or separate 16-bit writes), the respective timer is loaded with the written value on the next rising edge of the timer clock, regardless of whether the timer is enabled or disabled. The value stored in this register is also automatically reloaded on terminal count (or timeout) of the timer.

Timer 3 Load Count Register (TMRLCR3)

Timer 3 is 32-bits wide and obtains its load count from the Timer 3 Load Count Register (TMRLCR3), located at offset 0x14 from the address in BAR2. The mapping of bits in this register are as follows:

Field	Bits	Read or Write
Timer 3 Load Count	TMRLCR3[31..0]	R/W

When this field is written, Timer 3 is loaded with the written value on the next rising edge of the timer clock, regardless of whether the timer is enabled or disabled. The value stored in this register is also automatically reloaded on terminal count (or timeout) of the timer.

Timer 4 Load Count Register (TMRLCR4)

Timer 4 is 32-bits wide and obtains its load count from the Timer 4 Load Count Register (TMRLCR4), located at offset 0x18 from the address in BAR2. The mapping of bits in this register are as follows:

Field	Bits	Read or Write
Timer 4 Load Count	TMRLCR4[31..0]	R/W

When this field is written, Timer 4 is loaded with the written value on the next rising edge of the timer clock, regardless of whether the timer is enabled or disabled. The value stored in this register is also automatically reloaded on terminal count (or timeout) of the timer.

Timer 1 & 2 Current Count Register (TMRCCR12)

The current count of timers 1 & 2 may be read via the Timer 1 & 2 Current Count Register (TMRCCR12), located at offset 0x20 from the address in BAR2. The mapping of bits in this register are as follows:

Field	Bits	Read or Write
Timer 2 Count	TMRCCR12[31..16]	R.O.
Timer 1 Count	TMRCCR12[15..0]	R.O.

When either field is read, the current count value is latched and returned. There are two modes that determine how the count is latched depending on the setting of the "Read Latch Select" bit in the WDT Control Status Register (CSR2). See the CSR2 register description for more information on these two modes.

Timer 3 Current Count Register (TMRCCR3)

The current count of Timer 3 may be read via the Timer 3 Current Count Register (TMRCCR3), located at offset 0x24 from the address in BAR2. The mapping of bits in this register are as follows:

Field	Bits	Read or Write
Timer 3 Count	TMRCCR3[31..0]	R.O.

When this field is read, the current count value is latched and returned. There are two modes that determine how the count is latched depending on the setting of the “Read Latch Select” bit in the WDT Control Status Register (CSR2). See the CSR2 register description for more information on these two modes.

Timer 4 Current Count Register (TMRCCR4)

The current count of Timer 4 may be read via the Timer 4 Current Count Register (TMRCCR4), located at offset 0x28 from the address in BAR2. The mapping of bits in this register are as follows:

Field	Bits	Read or Write
Timer 4 Count	TMRCCR4[31..0]	R.O.

When this field is read, the current count value is latched and returned. There are two modes that determine how the count is latched depending on the setting of the “Read Latch Select” bit in the WDT Control Status Register (CSR2). See the CSR2 register description for more information on these two modes.

Timer 1 IRQ Clear (T1IC)

The Timer 1 IRQ Clear (T1IC) register is used to clear an interrupt caused by Timer 1. Writing to this register, located at offset 0x30 from the address in BAR2, causes the interrupt from Timer 1 to be cleared. This can also be done by writing a “0” to the appropriate “Timer x Caused IRQ” field of the timer Control Status Register (CSR1). This register is write only and the data written is irrelevant.

Timer 2 IRQ Clear (T2IC)

The Timer 2 IRQ Clear (T2IC) register is used to clear an interrupt caused by Timer 2. Writing to this register, located at offset 0x34 from the address in BAR2, causes the interrupt from Timer 2 to be cleared. This can also be done by writing a “0” to the appropriate “Timer x Caused IRQ” field of the timer Control Status Register (CSR1). This register is write only and the data written is irrelevant.

Timer 3 IRQ Clear (T3IC)

The Timer 3 IRQ Clear (T3IC) register is used to clear an interrupt caused by Timer 3. Writing to this register, located at offset 0x38 from the address in BAR2, causes the interrupt from Timer 3 to be cleared. This can also be done by writing a “0” to the appropriate “Timer x Caused IRQ” field of the timer Control Status Register (CSR1). This register is write only and the data written is irrelevant.

Timer 4 IRQ Clear (T4IC)

The Timer 4 IRQ Clear (T4IC) register is used to clear an interrupt caused by Timer 4. Writing to this register, located at offset 0x3C from the address in BAR2, causes the interrupt from Timer 4 to be cleared. This can also be done by writing a “0” to the appropriate “Timer x Caused IRQ” field of the timer Control Status Register (CSR1). This register is write only and the data written is irrelevant.

Watchdog Timer

General

The VMIVME-7750 provides a programmable Watchdog Timer (WDT) which can be used to reset the system if software integrity fails.

WDT Control Status Register (WCSR)

The WDT is controlled and monitored by the WDT Control Status Register (WCSR) which is located at offset 0x08 from the address in BAR2. The mapping of the bits in this register are as follows:

Field	Bits	Read or Write
SERR/RST Select	WCSR[16]	R/W
WDT Timeout Select	WCSR[10..8]	R/W
WDT Enable	WCSR[0]	R/W

All of these bits default to “0” after system reset. All other bits are reserved.

The “WDT Timeout Select” field is used to select the timeout value of the Watchdog Timer as follows:

Timeout	WCSR[10]	WCSR[9]	WCSR[8]
135s	0	0	0
33.6s	0	0	1
2.1s	0	1	0
524ms	0	1	1
262ms	1	0	0
131ms	1	0	1
32.768ms	1	1	0
2.048ms	1	1	1

The “SERR/RST Select” bit is used to select whether the WDT generates an SERR# on the local PCI bus or a system reset. If this bit is set to “0”, the WDT will generate a system reset. Otherwise, the WDT will make the local PCI bus SERR# signal active.

The “WDT Enable” bit is used to enable the Watchdog Timer function. This bit must be set to “1” in order for the Watchdog Timer to function. Note that since all registers default to zero after reset, the Watchdog Timer is always disabled after a reset. The Watchdog Timer must be re-enabled by the application software after reset in order for the Watchdog Timer to continue to operate. Once the Watchdog Timer is enabled, the application software must refresh the Watchdog Timer within the selected timeout period to prevent a reset or SERR# from being generated. The Watchdog Timer is refreshed by performing a write to the WDT Keepalive register (WKPA). The data written is irrelevant.

WDT Keepalive Register (WKPA)

When enabled, the Watchdog Timer is prevented from resetting the system by writing to the WDT Keepalive Register (WKPA) located at offset 0x0C from the address in BAR2 within the selected timeout period. The data written to this location is irrelevant.

NVSRAM

The VMIVME-7750 provides 32KBytes of non-volatile SRAM. This memory is mapped in 32K of address space starting at the address in BAR1. This memory is available at any time and supports byte, short word and long word accesses from the PCI bus. The contents of this memory is retained when the power to the board is removed.

VME Control

The following table shows the register definitions for the VMIVME-7750 (offset from BAR0).

Table 3-3 Register Definitions Offset From BAR0

Register Name	Offset	
VMECOMM	0x00	
Bit Name	**Bit**	**Definition**
MEC_SEL	0	Master big-endian enable bit 1=Big Endian 0=Little Endian bit
SEC_SEL	1	Slave Big-Endian enable bit 1=Big Endian 0=Little Endian
ABLE	2	Auxiliary BERR logic enable bit 1=Aux. BERR enabled 0=Aux. BERR disabled
BTO	3	Bus error timer enabled 1=enabled 0=disabled
BTOV [1:0]	5:4	Timeout value
		00 - 16uS
		01 - 64uS
		10 -256uS
		11 - 1.00mS
BERRI	6	BERR interrupt enable 1=Interrupt enabled 0=Interrupt disabled
BERRST	7	BERR status read/clear bit 1=Clear BERR status 0=Do nothing
SFENA	8	Enables generation of VME SYSFAIL upon WDT timeout 1= Enable SYSFAIL generation 0=Disable

Table 3-3 Register Definitions Offset From BAR0 (Continued)

Register Name	Offset	
Unused	9	Not Used
BPENA	10	Endian conversion bypass bit 1=Bypass 0=Not bypassed
ECENA	11	Endian conversion bit 1= Enabled 0=Disabled
Unused	31:12	Not Used
VBAR	**0x04**	
VME_ADDR	All	Latched VME Address
VBAM	**0x08**	
VME_ADDR	5:0	Latched VME Address Modifier
Unused	31:6	Not Used
SEC_SEL	0x001	

Please refer to Table 3-2, "PCI Configuration Space Registers," on page 56 for more information concerning BAR0.

Flash Disk

The VMIVME-7750 features an optional on-board Compact Flash mass storage system with a capacity of up to 512 Mbyte. This Flash Disk appears to the user as an intelligent ATA (IDE) disk drive with the same functionality and capabilities as a "rotating media" IDE hard drive. The VMIVME-7750 BIOS includes an option to allow the board to boot from the Flash Disk.

Configuration

The Flash Disk resides on the VMIVME-7750 as the secondary IDE bus master device (the secondary IDE bus slave device is not assignable). The default setting in the Phoenix BIOS 'STANDARD CMOS SETUP' screen is the 'AUTO' setting. In the Phoenix BIOS 'PERIPHERAL SETUP' screen, the secondary PCI IDE interface must be enabled for the Flash Disk to be functional. Refer to Appendix C for additional details.

Figure 3-1 maps the configuration possibilities for a typical system consisting of the VMIVME-7750 with a resident Flash Disk, a hard drive attached to the Primary IDE interface, and a floppy drive attached to the floppy interface.

	Primary and Secondary PCI IDE Interface Enabled			Primary Only			Secondary Only		
Hard Drive	C:	**C:**	D:	C:	**C:**	**C:**	N/A	N/A	N/A
Flash Disk	D:	D:	**C:**	N/A	N/A	N/A	C:	**C:**	**C:**
Floppy Drive	**A:**	A:	A:	**A:**	A:	A:	**A:**	A:	A:
Selected "Boot Sequence"	A: C; SCSI	C: A; SCSI	Flash Disk						

Figure 3-1 Typical System Configuration

The Primary and Secondary PCI IDE Interfaces are controlled (enabled or disabled) in the Integrated Peripheral Setup screen of the Phoenix BIOS. The First Boot Device is selected in the BIOS Features Setup screen.

Figure 3-1 identifies the drive letter assigned to each physical device, and indicates in bold lettering the device booted from in each configuration, using devices that are bootable. A bootable device is one on which an operating system has been installed, or formatted as a system disk using MS-DOS.

Functionality

The Flash Disk performs identically to a standard IDE hard drive. Reads and writes to the device are performed using the same methods, utilizing DOS command line entries or the file managers resident in the chosen operating system.

Advanced Configuration

The previous discussion is based on using the IDE disk devices formatted as one large partition per device. Some applications may require the use of multiple partitions. The following discussion of these partitions includes special procedures that must be followed to create multiple partitions on the VMIVME-7750 IDE disk devices (including the resident Flash Disk).

Partitions may be either a primary or an extended partition. An extended partition may be subdivided farther into logical partitions. Each device may have up to four main partitions; one of which may be an extended partition. However, if multiple primary partitions are created, only one partition may be active at a time. Data in the non-active partitions are not accessible.

Following the creation of the partitioning scheme, the partitions can be formatted to contain the desired file system.

As discussed earlier, a typical system consists of the VMIVME-7750 with its resident Flash Disk configured as the Secondary IDE device, a hard drive attached to the Primary IDE interface, and a floppy drive attached to the floppy interface.

Using this configuration, it may be desirable to have a logical device on either IDE device, configured as a bootable device, allowing the selection of the first boot device by way of the Advanced CMOS Setup screen. Using this capability, a user could have a system configured with multiple operating systems that would be selectable by assigning the IDE logical device as the boot device.

The DOS utility FDISK is commonly used to configure the partition structure on a hard drive. Comments on the following page pertain to partitioning efforts using FDISK.

CAUTION: Deleting a partition will erase all the data previously stored in that partition.

The Flash Disk will be configured as a single partition device as delivered from the factory. The following sample sequence illustrates a proven method for creating two 8 Mbyte partitions, with one as an active primary partition. Take note of the instructions to exit FDISK. This has been shown to be an important step in a successful partitioning effort.

1. Power up the VMIVME-7750 and enter the CMOS set-up.
2. Set IDE HDD Master to “Not Installed”.

3. Set Flash Disk Master to “AUTO”.
4. Set boot device to floppy.
5. Boot DOS from the floppy, and verify that the System Configuration Screen shows only the Flash Disk.
6. Run FDISK.
7. Delete all current partitions (any data currently stored in the partitions will be lost).
8. Exit FDISK (this will cause a reboot), then run FDISK again.
9. Create an 8 Mbyte primary partition.
10. Create an 8 Mbyte extended partition.
11. Set-up a logical device for the 8 Mbyte extended partition.
12. Set the Primary partition as an active partition.
13. Exit FDISK.

If an operating system has been installed on the Flash Disk that modifies the Master Boot Record (MBR), the following steps are required to rewrite the MBR for DOS.

14. Run FDISK/MBR.
15. Run FORMAT C: (use the extension /s option if you want the Flash Disk as a bootable DOS device).
16. Format D: (this is only required if two partitions were created).
17. Reset the CPU and enter the CMOS set-up.
18. Set Primary Master to “AUTO”.
19. Set boot device to desired boot source.

Drive letter assignments for a simple system are illustrated in Figure 3-1 on page 67. Understanding the order the operating system assigns drive letters is necessary for these multiple partition configurations. The operating system assigns drive letter C to the active primary partition on the first hard disk (the boot device). Drive D is assigned to the first recognized primary partition on the next hard disk. The operating system will continue to assign drive letters to the primary partitions in an alternating fashion between the two drives. The next logical partitions will be assigned drive letters starting on the first hard drive, lettering each logical device sequentially, until all are assigned a drive letter. The system will then perform the same sequential lettering of each logical partition on the second hard disk.

NOTE: Drive letter changes caused by adding an additional drive or changing the initial partitioning scheme may cause difficulties with an operating system installed prior to the changes. Plan your configuration prior to installing the operating system to minimize difficulties.

Remote Ethernet Booting

The VMIVME-7750 is capable of booting from a server using either LAN1 or LAN2 over a network utilizing Lanworks BootWare BIOS. The BootWare BIOS gives you the ability to remotely boot the VMIVME-7750 using a variety of network protocols. The Ethernet must be connected through either LAN front panel (RJ-45) connector to boot remotely. This feature allows users to create systems without the worry of disk drive reliability, or the extra cost of adding Flash drives.

BootWare Features:

- Netware (802.1, 802.3 or EthII), TCP/IP (DHCP or BootP), RPL and PXE boot support
- Unparalleled boot sector virus protection
- Detailed boot configuration screens
- Comprehensive diagnostics
- Optional disabling of local boots
- Dual-boot option lets users select network or local booting

CHAPTER 4

Maintenance

If a VMIC product malfunctions, please verify the following:

1. Software resident on the product
2. System configuration
3. Electrical connections
4. Jumper or configuration options
5. Boards are fully inserted into their proper connector location
6. Connector pins are clean and free from contamination
7. No components or adjacent boards were disturbed when inserting or removing the board from the chassis
8. 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**.

VMIC Customer Service is available at: 1-800-240-7782.
Or E-mail us at customer.service@vmic.com

Maintenance Prints

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

Appendix

A

Connector Pinouts

Contents

Introduction

The VMIVME-7750 VMEbus SBC has several connectors for its I/O ports. Wherever possible, the VMIVME-7750 uses connectors and pinouts typical for any desktop PC. This ensures maximum compatibility with a variety of systems.

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

VMEbus Connector Pinout

Figure A-1 shows the location of the VMEbus P1 and P2 connectors and their orientation on the VMIVME-7750. Table A-1 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.

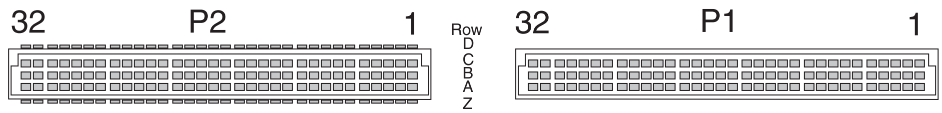


Figure A-1 VMEbus Connector Diagram

Table A-1 VMEbus Connector Pinout (bottom board)

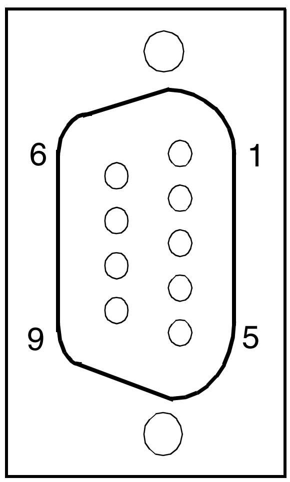
PIN #	P1 ROW A SIGNAL	P1 ROW B SIGNAL	P1 ROW C SIGNAL	P2 ROW Z SIGNAL	P2 ROW A SIGNAL	P2 ROW B SIGNAL	P2 ROW C SIGNAL	P2 ROW D SIGNAL
1	D00	BBSY	D08	CONN [2]	CBL_DETECT	+5 V	IDE RST#	CONN [1]
2	D01	BCLR	D09	GND	DDP8	GND	DDP7	CONN [3]
3	D02	ACFAIL	D10	CONN [5]	DDP9	Reserved	DDP6	CONN [4]
4	D03	BG0IN	D11	GND	DDP10	A24	DDP5	CONN [6]
5	D04	BG0OUT	D12	CONN [8]	DDP11	A25	DDP4	CONN [7]
6	D05	BG1IN	D13	GND	DDP12	A26	DDP3	CONN [9]
7	D06	BG1OUT	D14	CONN [11]	DDP13	A27	DDP2	CONN [10]
8	D07	BG2IN	D15	GND	DDP14	A28	DDP1	CONN [12]
9	GND	BG2OUT	GND	CONN [14]	DDP15	A29	DDP0	CONN [13]
10	SYSCLK	BG3IN	SYSFAIL	GND	IDE REQ0	A30	IOCS1.64#	CONN [15]
11	GND	BG3OUT	BERR	CONN [17]	IDE IOW0 #	A31	GND	CONN [16]
12	DS1	BR0	SYSRESET	GND	IDE IOR0 #	GND	GND	CONN [18]
13	DS0	BR1	LWORD	CONN [20]	IDE IORDY0#	+5 V	GND	CONN [19]
14	WRITE	BR2	AM5	GND	GND	D16	IDESELA	CONN [21]
15	GND	BR3	A23	CONN [23]	GND	D17	IDE DACK0#	CONN [22]
16	DTACK	AM0	A22	GND	GND	D18	IDE IRQ0	CONN [24]
17	GND	AM1	A21	CONN [26]	DAP1	D19	DAP 2	CONN [25]
18	AS	AM2	A20	GND	IDECS01 #	D20	DAP 0	CONN [27]

Table A-1 VMEbus Connector Pinout (bottom board) (Continued)

PIN #	P1 ROW A SIGNAL	P1 ROW B SIGNAL	P1 ROW C SIGNAL	P2 ROW Z SIGNAL	P2 ROW A SIGNAL	P2 ROW B SIGNAL	P2 ROW C SIGNAL	P2 ROW D SIGNAL
19	GND	AM3	A19	CONN [29]	GND	D21	IDE CS03#	CONN [28]
20	IACK	GND	A18	GND	DRATED	D22	REDWC	CONN [30]
21	IACKIN	SERCLK	A17	CONN [32]	DASP	D23	INDEX#	CONN [31]
22	IACKOUT	SERDAT	A16	GND	DRVSB #	GND	MOTEA#	CONN [33]
23	AM4	GND	A15	CONN [35]	GND	D24	DRUSA#	CONN [34]
24	A07	IRQ7	A14	GND	GND	D25	MOTEB#	CONN [36]
25	A06	IRQ6	A13	CONN [38]	GND	D26	STEP#	CONN [37]
26	A05	IRQ5	A12	GND	GND	D27	WD4TA#	CONN [39]
27	A04	IRQ4	A11	CONN [41]	GND	D28	TRK#	CONN [40]
28	A03	IRQ3	A10	GND	GND	D29	RDATA#	CONN [42]
29	A02	IRQ2	A09	CONN [44]	DSKCHG #	D30	SIDE1#	CONN [43]
30	A01	IRQ1	A08	GND	GND	D31	DIR	CONN [45]
31	-12 V	+5 V STDBY	+12 V	CONN [46]	VCC	GND	WGATE	GND
32	+5 V	+5 V	+5 V	GND	VCC	+5 V	WPT	NC

Serial Connector Pinout

Each standard RS-232 serial port connector is a Microminiature D9 male as shown in Figure A-2. Adapters to connect standard D9 serial peripherals to the board are available. Please refer to the product specification sheet for ordering information.

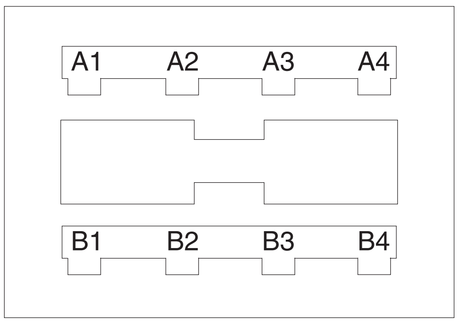


COM 1 and COM 2 SERIAL PORT CONNECTORS			
D9 PIN	**DIR**	**RS-232 SIGNAL**	**FUNCTION**
1	In	DCD	Data Carrier Detect
2	In	RX	Receive Data
3	Out	TX	Transmit Data
4	Out	DTR	Data Terminal Ready
5		GND	Signal Ground
6	In	DSR	Data Set Ready
7	Out	RTS	Request to Send
8	In	CTS	Clear to Send
9	In	RI	Ring Indicator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

Figure A-2 Serial Connector Pinouts

USB Connector

The dual USB port uses an industry standard dual 4 position shielded connector. Figure A-3 shows the pinout of the dual USB connector.

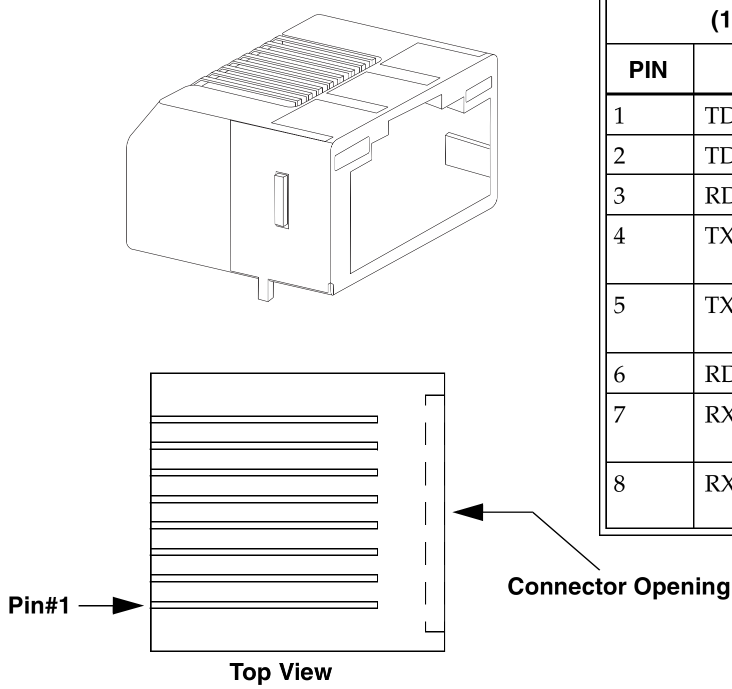


USB1 & 2 CONNECTOR		
PIN	**SIGNAL**	**FUNCTION**
1	USBV	USB Power
2	USB-	USB Data -
3	USB+	USB Data +
4	USBG	USB Ground

Figure A-3 USB Connector Pinout

Ethernet Connector Pinout (J4 and J5)

The pinout diagram for the Ethernet 10BaseT and 100BaseTx connector is shown in Figure A-4.

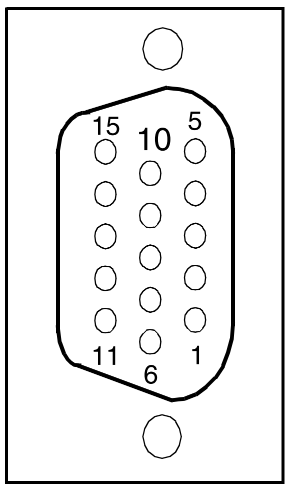


ETHERNET CONNECTOR (10BaseT, 100BaseTx)		
PIN	Signal Name	
1	TD+	Transmit Data
2	TD-	Transmit Data
3	RD+	Receive Data
4	TX_CT_OUT	Transmit Center Tap Out
5	TX_CT_OUT	Transmit Center Tap Out
6	RD-	Receive Data
7	RX_CT_OUT	Receive Center Tap Out
8	RX_CT_OUT	Receive Center Tap Out

Figure A-4 Ethernet Connector and Pinout

Video Connector Pinout

The video port uses a standard high-density DB15 SVGA connector. Figure A-5 illustrates the pinout.

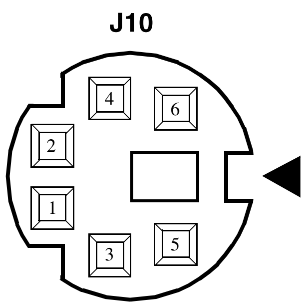


VIDEO CONNECTOR		
PIN	**DIRECTION**	**FUNCTION**
1	Out	Red
2	Out	Green
3	Out	Blue
4		Reserved
5		Ground
6		Ground
7		Ground
8		Ground
9		+5V
10		Ground
11		Reserved
12	I/O	DDC Data
13	Out	Horizontal Sync
14	Out	Vertical Sync
15	I/O	DDC Clock
Shield		Chassis Ground

Figure A-5 Video Connector Pinout

Keyboard and Mouse Connectors and Pinout (J7)

The keyboard and mouse connectors are standard 6-pin female mini-DIN PS/2 connectors as shown in Figure A-6 and Table A-2.



Keyboard/Mouse Connector*		
Pin	**Dir**	**Function**
1	In/Out	Mouse Data
2	In/Out	Keyboard Data
3		Ground
4		+5 V
5	Out	Mouse Clock
6	Out	Keyboard Clock
Shield		Chassis Ground
*An adapter cable is included with the VMIVME-7750 to separate the keyboard and mouse connector.		

Figure A-6 Keyboard/Mouse Connector and Pinout

Table A-2 Keyboard/Mouse Y Splitter Cable

Keyboard			Mouse		
Pin	**Dir**	**Function**	**Pin**	**Dir**	**Function**
1	In/Out	Keyboard Data	1	In/Out	Mouse Data
2		Unused	2		Unused
3		Ground	3		Ground
4		+5 V	4		+5 V
5	Out	Keyboard Clock	5	Out	Mouse Clock
6		Unused	6		Unused
Shield		Chassis Ground	Shield		Chassis Ground

PMC Connector Pinout

PMC #1 (J1) Connector and Pinout

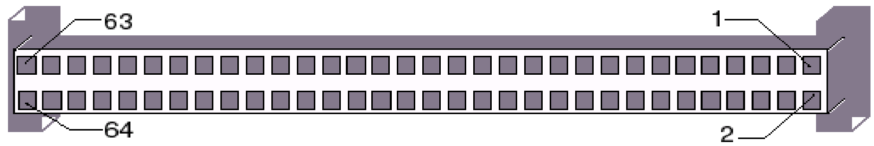


Table A-3 PMC #1 (J1) Connector Pinout

PMC Connector (J1)				PMC Connector (J1)			
Left Side		Right Side		Left Side		Right Side	
Pin	Name	Pin	Name	Pin	Name	Pin	Name
1	+12 V	2	+5 V	33	GND	34	NC
3	GND	4	NC	35	TRDY	36	+3.3 V
5	+5 V	6	GND	37	GND	38	STOP#
7	GND	8	NC	39	PERR#	40	GND
9	NC	10	NC	41	+3.3 V	42	SERR#
11	PRSNT2	12	+3.3 V	43	C/BE1#	44	GND
13	RST#	14	GND	45	AD[14]	46	AD[13]
15	+3.3 V	16	GND	47	GND	48	AD[10]
17	NC	18	GND	49	AD[8]	50	+3.3 V
19	AD[30]	20	AD[29]	51	AD[7]	52	NC
21	GND	22	AD[26]	53	+3.3 V	54	NC
23	AD[24]	24	+3.3 V	55	NC	56	GND
25	IDSEL	26	AD[23]	57	NC	58	NC
27	+3.3 V	28	AD[20]	59	GND	60	NC
29	AD[18]	30	GND	61	ACK64#	62	+3.3 V
31	AD[16]	32	C/BE2#	63	GND	64	NC

PMC #1 (J2) Connector and Pinout

The PCI Mezzanine Card (PMC) carries the same signals as the PCI standard; however, the PMC standard uses a completely different form factor. Tables A-4 through A-3 are the pinouts for the PMC connectors (J1 and J2).

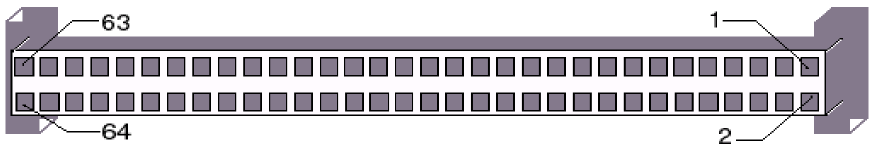


Table A-4 PMC #1 (J2) Connector Pinout

PMC Connector (J2)				PMC Connector (J2)			
Left Side		Right Side		Left Side		Right Side	
Pin	Name	Pin	Name	Pin	Name	Pin	Name
1	GND	2	-12	33	FRAME#	34	GND
3	GND	4	INTA#	35	GND	36	IRDY#
5	INTB#	6	INTC#	37	DEVSEL#	38	+5 V
7	BMODE1A	8	+5 V	39	GND	40	LOCK#
9	INTD#	10	NC	41	SDONE#	42	NC
11	GND	12	NC	43	PAR	44	GND
13	CLK	14	GND	45	+5 V	46	AD[15]
15	GND	16	GNT#	47	AD[12]	48	AD[11]
17	REQ#	18	+5 V	49	AD[9]	50	+5 V
19	+5 V	20	AD[31]	51	GND	52	C/BE0#
21	AD[28]	22	AD[27]	53	AD[6]	54	AD[5]
23	AD[25]	24	GND	55	AD[4]	56	GND
25	GND	26	C/BE3#	57	+5 V	58	AD[3]
27	AD[22]	28	AD[21]	59	AD[2]	60	AD[1]
29	AD[19]	30	+5 V	61	AD[0]	62	+5 V
31	+5 V	32	AD[17]	63	GND	64	REQ64#

PMC #1 (J3) Connector and Pinout

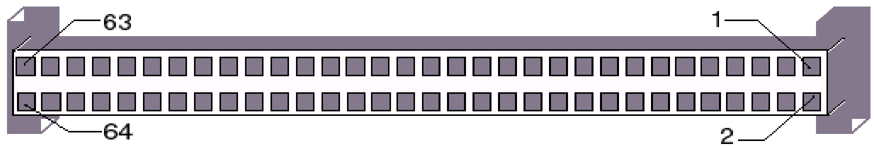


Table A-5 PMC #1 (J3) Connector Pinout

PMC Connector (J3)						PMC Connector (J3)					
Left Side			Right Side			Left Side			Right Side		
Pin	Name	Connected To	Pin	Name	Connected To	Pin	Name	Connected To	Pin	Name	Connected To
1	CONN[1]	P2 pin D1	2	CONN[2]	P2 pin Z1	33	CONN[33]	P2 pin D22	34	CONN[34]	P2 pin D23
3	CONN[3]	P2 pin D2	4	CONN[4]	P2 pin D3	35	CONN[35]	P2 pin Z23	36	CONN[36]	P2 pin D24
5	CONN[5]	P2 pin Z3	6	CONN[6]	P2 pin D4	37	CONN[37]	P2 pin D25	38	CONN[38]	P2 pin Z25
7	CONN[7]	P2 pin D5	8	CONN[8]	P2 pin Z5	39	CONN[39]	P2 pin D26	40	CONN[40]	P2 pin D27
9	CONN[9]	P2 pin D6	10	CONN[10]	P2 pin D7	41	CONN[41]	P2 pin Z27	42	CONN[42]	P2 pin D28
11	CONN[11]	P2 pin Z7	12	CONN[12]	P2 pin D8	43	CONN[43]	P2 pin D29	44	CONN[44]	P2 pin Z29
13	CONN[13]	P2 pin D9	14	CONN[14]	P2 pin Z9	45	CONN[45]	P2 pin D30	46	CONN[46]	P2 pin Z31
15	CONN[15]	P2 pin D10	16	CONN[16]	P2 pin D11	47	CONN[47]	NC	48	CONN[48]	NC
17	CONN[17]	P2 pin Z11	18	CONN[18]	P2 pin D12	49	CONN[49]	NC	50	CONN[50]	NC3
19	CONN[19]	P2 pin D13	20	CONN[20]	P2 pin Z13	51	CONN[51]	NC	52	CONN[52]	NC
21	CONN[21]	P2 pin D14	22	CONN[22]	P2 pin D15	53	CONN[53]	NC	54	CONN[54]	NC
23	CONN[23]	P2 pin Z15	24	CONN[24]	P2 pin D16	55	CONN[55]	NC	56	CONN[56]	NC
25	CONN[25]	P2 pin D17	26	CONN[26]	P2 pin Z17	57	CONN[57]	NC	58	CONN[58]	NC
27	CONN[27]	P2 pin D18	28	CONN[28]	P2 pin D19	59	CONN[59]	NC	60	CONN[60]	NC
29	CONN[29]	P2 pin Z19	30	CONN[30]	P2 pin D20	61	CONN[61]	NC	62	CONN[62]	NC
31	CONN[31]	P2 pin D21	32	CONN[32]	P2 pin Z21	63	CONN[63]	NC	64	CONN[64]	NC

Appendix

B

System Driver Software

Contents

Introduction

The VMIVME-7750 provides high-performance video, Ultra ATA storage device control and Local Area Network (LAN) access by means of on-board PCI-based adapters and associated software drivers. High-performance video and Ultra ATA storage device control are provided by the embedded Intel 815E chipset. Dual high-performance LAN operation is provided by an Intel GD82559ER Fast Ethernet adapter chip (LAN1) and the embedded Intel 815E chipset (LAN2). The two LAN adapters can be configured to allow the VMIVME-7750 to access two separate, physical networks. Each LAN adapter is capable of running 10BaseT and 100BaseTx.

To optimize performance of each of these PCI-based subsystems, the user must install the driver software located on the distribution CD-ROM provided with the unit. Detailed instructions for installation of the drivers during the installation of Microsoft Windows 98 Second Edition (SE), Windows NT Workstation (NTW) 4.0 and Windows 2000 Professional operating systems are provided in the following sections.

Using USB Keyboard/Mouse with Microsoft Windows Operating Systems

This section applies if either a USB keyboard or USB mouse is connected. It does not apply if a PS/2 keyboard and mouse are used.

Windows 98SE/Windows 2000

The use of a USB keyboard/mouse with an operating system that supports USB devices requires changing the default BIOS settings before and after the installation of Windows 98SE/2000.

'Legacy USB Support' must be enabled in the BIOS to allow a USB keyboard/mouse to operate as a PS/2 device during the installation of Windows 98SE/2000. After the installation is complete, the computer will restart and boot Windows 98SE/2000. As the computer is restarting to boot the operating system for the first time, 'Legacy USB Support' must be disabled, and 'Assign Interrupt to USB' must be enabled. If Legacy USB Support is not disabled, Windows 98SE/2000 will attempt to load a device driver for a device (USB) that is not present at that point. See "BIOS Setup" on page 87 for guidelines on changing BIOS settings.

A suggested workaround to this situation is to connect a PS/2 keyboard and mouse, disable 'Legacy USB Support' and enable 'Assign Interrupt to USB' in the BIOS, and install Windows 98SE/2000. At some point after the installation is complete, replace the PS/2 keyboard and mouse with a USB keyboard and mouse and enable 'Legacy USB Support' in the BIOS. This approach might be easier since you don't have to worry about making changes to the BIOS at exactly the right time.

Windows NT 4.0

The use of a USB keyboard/mouse with an operating system that does not support USB devices requires changing the default BIOS settings.

'Legacy USB Support' must be enabled in the BIOS to allow a USB keyboard/mouse to operate as a PS/2 device. This setting must be enabled prior to the installation and during the operation of Windows NTW 4.0. See "BIOS Setup" on page 87 for guidelines on changing BIOS settings.

BIOS Setup

To enable/disable Legacy USB Support and/or assign a interrupt to the USB controllers, perform the appropriate actions as outlined below:

1. Immediately after the CPU has been powered on or reset, press F2 to enter the ‘PhoenixBIOS Setup Utility’.
2. Using the arrow keys, select the ‘Advanced’ menu.
3. Using the arrow keys, select the ‘Installed O/S’ setting. Press + or – on the number keypad to toggle the setting between ‘Other’, ‘Win95’ and ‘Win98/Win2000’.
4. Using the arrow keys, select the ‘Assign Interrupt to USB’ setting. Press + or – on the number keypad to toggle the setting between ‘Enabled’ and ‘Disabled’.
5. Using the arrow keys, select the ‘Legacy USB Support’ setting. Press + or – on the number keypad to toggle the setting between ‘Enabled’ and ‘Disabled’.
6. Press F10, then ENTER to save settings and exit the BIOS.

NOTE: See “Using USB Keyboard/Mouse with Microsoft Windows Operating Systems” on page 86 for proper settings.

Microsoft Windows 98SE Software Driver Installation

1. Prior to installing Windows 98SE, ensure the BIOS is set to assign an interrupt to the USB controller. Also ensure 'Installed O/S' is set to 'Win98/Win2000'. See "BIOS Setup" on page 87 for guidelines on changing BIOS settings.
2. Begin installation of Windows 98SE, following the instructions provided by the Windows 98SE manual.
3. At the 'Setup Options' portion of the 'Windows 98SE Setup Wizard', ensure 'Typical' is selected and click 'Next'.
4. Enter the user's name and the company's name as appropriate and click 'Next'.
5. At the 'Windows Components' portion of the Setup Wizard, ensure 'Install the most common components' is selected and click 'Next'.
6. Continue with the installation until Windows 98SE is completely installed and has restarted for the last time. Please note that the computer will restart several times during the Windows 98SE installation process.

NOTE: Leave the Windows 98SE installation CD-ROM in the CD-ROM drive during the entire setup process as additional files may need to be copied.

Intel 815 Chipset Software Installation

1. If not already present, insert the Windows Drivers CD-ROM.
2. Click 'Start', 'Run', 'Browse'. In the 'Look in' pull-down selection menu, select the 'Windows Drivers' CD-ROM. Double-click on the 'Win98' folder. Double-click on the '815chpst' folder. Double-click on the 'Disk1' folder. Double-click on 'Setup'. Click 'OK'.
3. At the 'Welcome' window, click 'Next'.
4. Click 'Yes' to agree to the software license agreement.
5. Click 'Next' at 'Readme Information' window.
6. At the 'Setup Complete' window, ensure 'Yes, I want to restart my computer now' is selected and click 'Finish'. The computer will restart.
7. Windows 98SE will find new hardware and install the necessary software. At the 'System Settings Change' window, click 'Yes' to restart the computer. Upon restarting, Windows 98SE will find additional hardware and present the 'System Settings Change' window again. Click 'Yes' to restart the computer.

Ultra ATA Storage Driver Installation

1. If not already present, insert the Windows Driver CD-ROM.

2. Click ’Start’, ‘Run’, ‘Browse’. In the ‘Look in’ pull-down selection menu, select the ‘Windows Drivers’ CD-ROM. Double-click on the ‘Win98’ folder. Double-click on the ‘UltraATA’ folder. Double-click on ’UltraATA’. Click ‘OK’.
3. At the ‘Intel Ultra ATA Storage Driver 6.1 Setup’ window, click ‘Next’. Click ‘Yes’ to agree to the license agreement. Click ‘Next’ twice.
4. Ensure ‘Yes I want to restart my computer now’ is selected and click ‘Finish’. The computer will restart.

Video Driver Installation

1. If not already present, insert the Windows Drivers CD-ROM.
2. Click ‘Start’, ‘Run’, ‘Browse’. In the ‘Look in’ pull-down selection menu, select the ‘Win_drivers’ CD-ROM. Double-click on the ‘win98’ folder. Double-click on the ‘Video’ folder. Double-click on ‘Setup’. Click ‘OK’.
3. At the ‘Intel(R) 810/810E/815/815E/815EM Chipset Graphics Driver Software Setup’ window, click ‘Next’.
4. Click ‘Yes’ to agree to the software license agreement.
5. Ensure ‘Yes, I want to restart my computer now’ is selected and click ‘Finish’. The computer will restart.

Ethernet Adapter Driver Disks Preparation

1. Insert a blank floppy disk. The disk will be formatted and have files copied onto it.
2. If not already present, insert the Windows Drivers CD-ROM. Click ‘Start’, ‘Run’, ‘Browse’. In the ‘Look in’ pull-down selection menu, select the ‘Win_drivers’ CD-ROM. Double-click on the ‘Win98’ folder. Double-click on the ‘Lan1’ folder. Double-click on ‘Makedisk’. Click ‘OK’.
3. Follow the on-screen prompts. Remove the floppy disk and label it ‘LAN1: Intel(R) GD82559ER Fast Ethernet Adapter’.
4. When the MS-DOS window title changes to ‘Finished – Makedisk’, click ‘X’ to close the window.
5. Insert another blank floppy disk. Click ‘Start’, ‘Run’, ‘Browse’. In the ‘Look in’ pull-down selection menu, select the ‘Win_drivers’ CD-ROM. Double-click on the ‘Win98’ folder. Double-click on the ‘Lan2’ folder. Double-click on ‘Makedisk’. Click ‘OK’.
6. Follow the on-screen prompts. Remove the floppy disk and label it ‘LAN2: Intel(R) PRO Adapter Driver for Windows 9x’.
7. When the MS-DOS window title changes to ‘Finished – Makedisk’, click ‘X’ to close the window.
8. Remove the CD-ROM.

Ethernet Adapter Drivers Installation

1. Insert the Windows 98SE installation CD-ROM. Insert the ‘LAN1: Intel(R) GD82259ER Fast Ethernet Adapter’ floppy disk.
2. Right-click on ‘My Computer’ and select ‘Properties’. Click on the ‘Device Manager’ tab.
3. Select the first ‘PCI Ethernet Controller’ (found under ‘Other devices’) and click ‘Properties’.
4. In the ‘PCI Ethernet Controller Properties’ window, click on the ‘Driver’ tab. Click ‘Update Driver’. Click ‘Next’ twice. Ensure ‘Floppy disk drives’ is the only search location selected and click ‘Next’.
5. Confirm the ‘Update Device Driver Wizard’ displays ‘Windows driver file search for the device: Intel(R) GD82559ER PCI Adapter’. Click ‘Next’. If a ‘Copying Files’ window appears asking for the location of the Windows 98SE CD-ROM, specify the path to the CD-ROM (i.e. d:\) and click ‘OK’. After files have been copied, click ‘Finish’ and remove the floppy disk.
6. At the ‘System Settings Change’ window that says ‘Do you want to restart your computer now?’, click ‘No’. Click ‘Close’.
7. Insert the ‘LAN2: Intel(R) PRO Adapter Driver for Windows 9x’ floppy disk.
8. In the ‘System Properties’ window, select the remaining ‘PCI Ethernet Controller’ and click ‘Properties’.
9. In the ‘PCI Ethernet Controller Properties’ window, click on the ‘Driver’ tab. Click ‘Update Driver’. Click ‘Next’. Select ‘Display a list of all the drivers...’ and click ‘Next’.
10. In the ‘Update Device Driver Wizard’ window, select ‘Network adapters’ and click ‘Next’.
11. Click ‘Have Disk’. Ensure ‘A:\’ is entered in the ‘Copy manufacturer’s files from’ field, and click ‘OK’.
12. At the ‘Select Device’ window, select ‘Intel(R) PRO/100 VE Desktop Adapter’ and click ‘OK’.
13. Click ‘Next’. After files have been copied, click ‘Finish’ and remove the floppy disk.
14. At the ‘System Settings Change’ window that says ‘Do you want to restart your computer now?’, click ‘Yes’.
15. When the computer reboots, changes can be made to the display and network configurations as desired.

Microsoft Windows NTW 4.0 Software Driver Installation

1. Follow the normal Windows NTW 4.0 installation until the Windows NT Workstation Setup window that states 'Windows NT needs to know how this computer should participate on a network.'
2. Select 'Do not connect this computer to a network at this time' and click 'Next'.
3. Click 'Finish'.
4. Continue through this portion of Setup. Allow the computer to restart and boot NT.
5. Log on as 'Administrator', using the password provided during Setup.
6. Install Service Pack 6a from the CD-ROM provided. Allow the computer to restart and boot NT.
7. Log on as 'Administrator'.

Ultra ATA Storage Driver Installation

1. If not already present, insert the Windows Driver CD-ROM.
2. Click 'Start', 'Run', 'Browse'. In the 'Look in' pull-down selection menu, select the 'Windows Drivers' CD-ROM. Double-click on the 'WinNT' folder. Double-click on the 'UltraATA' folder. Double-click on 'UltraATA'. Click 'OK'.
3. At the 'Intel Ultra ATA Storage Driver 6.1 Setup' window, click 'Next'. Click 'Yes' to agree to the license agreement. Click 'Next' twice.
4. Ensure 'Yes I want to restart my computer now' is selected and click 'Fish'. The computer will restart.

Video Driver Installation

1. If not already present, insert the Windows Drivers CD-ROM.
2. Click 'Start', 'Run', 'Browse'. In the 'Look in' pull-down selection menu, select the 'Win_drivers' CD-ROM. Double-click on the 'WinNT' folder. Double-click on the 'Video' folder. Double-click on 'Setup' and click 'OK'.
3. In the 'Intel(R) 810/810E/815/815E/815EM Chipset Graphics Driver Software Setup' window, click 'Next'. Click 'Yes' to agree to the license agreement.
4. Ensure 'Yes, I want to restart my computer now' is selected and click 'Finish'. The computer will restart.

Ethernet Adapter Driver Disks Preparation

1. Insert a blank floppy disk. The disk will be formatted and have files copied onto it.

2. If not already present, insert the ‘Windows Drivers’ CD-ROM. Click ‘Start’, ‘Run’, ‘Browse’. In the ‘Look in’ pull-down selection menu, select the ‘Win_drivers’ CD-ROM. Double-click on the ‘WinNT’ folder. Double-click on the ‘Lan1’ folder. Double-click on ‘Makedisk’. Click ‘OK’.
3. Follow the on-screen prompts. Remove the floppy disk and label it ‘LAN: Intel(R) GD82559ER Fast Ethernet Adapter’.
4. Insert another blank floppy disk. Click ‘Start’, ‘Run’, ‘Browse’. In the ‘Look in’ pull-down selection menu, select the ‘Win_drivers’ CD-ROM. Double-click on the ‘WinNT’ folder. Double-click on the ‘Lan2’ folder. Double-click on ‘Makedisk’. Click ‘OK’.
5. Follow the on-screen prompts. Remove the floppy disk and label it ‘LAN2: Intel(R) PRO Adapter Driver for Windows NT’.
6. Remove the CD-ROM.

Ethernet Adapter Drivers Installation

1. Insert the ‘LAN1: Intel(R) GD82259ER Fast Ethernet Adapter’ driver disk. Insert the Windows NTW 4.0 installation CD-ROM. If ‘Windows NT CD-ROM’ window appears automatically, click ‘X’ to close it.
2. Click ‘Start’, ‘Settings’, ‘Control Panel’. Double-click on ‘Network’.
3. In the ‘Network Configuration’ window, click ‘Yes’ to install Windows NT Networking.
4. In the ‘Network Setup Wizard’ window, ensure ‘Wired to the network’ is selected and click ‘Next’.
5. Click ‘Select from list’. Click ‘Have Disk’, ‘OK’.
6. In the ‘Select OEM Option’ window, ensure ‘Intel(R) GD82259ER Fast Ethernet Adapter’ is selected and click ‘OK’.
7. Insert the ‘LAN2: Intel(R) PRO Adapter Driver for Windows NT’ disk.
8. Click ‘Select from list’. Click ‘Have Disk’, ‘OK’.
9. In the ‘Select OEM Option’ window, ensure ‘Intel(R) PRO Adapter’ is selected and click ‘OK’.
10. In the following window, ensure ‘Intel(R) PRO Adapter’ and ‘Intel(R) GD82259ER Fast Ethernet Adapter’ are selected and click ‘Next’.
11. Select desired protocol(s) and click ‘Next’.
12. Click ‘Next’ two more times.
13. In the ‘Windows NT Setup’ window, enter ‘D:’. (If a drive letter other than ‘D’ is assigned to the CD-ROM drive, provide that drive letter in place of ‘D’.) Click ‘Continue’.
14. Continue through remaining network setup screens, inserting the respective

driver disks as required by Windows NT Networking installation. Provide data relative to the network configurations.

15. At 'Network Settings Change' window, remove the floppy disk and CD-ROM and click 'Yes' to restart the computer.
16. When the computer reboots, log on as 'Administrator'. A 'Service Control Manager' window may appear indicating that a service or driver failed to start. This occurs because during the installation of Windows NT Networking, some updated files were overwritten by files that were copied from the Windows NTW 4.0 installation disc. To fix this issue, re-install Service Pack 6a and reboot the computer.

Microsoft Windows 2000 Software Driver Installation

1. Prior to installing Windows 2000, ensure the BIOS is set to assign an interrupt to the USB controller. Also ensure 'Installed O/S' is set to 'Win98/Win2000'. See "BIOS Setup" on page 87 for guidelines on changing BIOS settings.
2. Complete the installation of Windows 2000, following the instructions provided by the Windows 2000 manual. Please note that the computer will restart several times during the Windows 2000 installation process.

NOTE: Leave the Windows 2000 installation CD-ROM in the CD-ROM drive during the entire setup process as additional files may need to be copied.

Intel 815 Chipset Software Installation

1. If not already present, insert the Windows Drivers CD-ROM.
2. Click 'Start', 'Run', 'Browse'. In the 'Look in' pull-down selection menu, select the Windows Drivers CD-ROM. Double-click on the 'Win2000' folder. Double-click on the '815chpst' folder. Double-click on the 'DISK1' folder. Double-click on 'SETUP'. Click 'OK'.
3. At the 'Welcome' window, click 'Next'.
4. Click 'Yes' to agree to the software license agreement.
5. Click 'Next' at 'Readme Information' window.
6. At the 'Setup Complete' window, ensure 'Yes, I want to restart my computer now' is selected and click 'Finish'. Windows 2000 will restart, find new hardware, and install the necessary software.

Ultra ATA Storage Driver Installation

1. If not already present, insert the Windows Drivers CD-ROM.
2. Click 'Start', 'Run', 'Browse'. In the 'Look in' pull-down selection menu, select the Windows Drivers CD-ROM. Double-click on the 'Win2000' folder. Double-click on the 'UltraATA' folder. Double-click on 'UltraATA'. Click 'OK'.
3. At the 'Intel Ultra ATA storage Driver 6.1 Setup' window, click 'Next'. Click 'Yes' to agree to the license agreement. Click 'Next' twice.
4. Ensure 'Yes, I want to restart my computer now' is selected and click 'Finish'. The computer will restart.

Video Driver Installation

1. If not already present, insert the Windows Drivers CD-ROM.

2. Click ‘Start’, ‘Run’, ‘Browse’. In the ‘Look in’ pull-down selection menu, select the Windows Drivers CD-ROM. Double-click on the ‘Win2000’ folder. Double-click on the ‘Video’ folder. Double-click on ‘Setup’. Click ‘OK’.
3. At the ‘Intel(R) 810/810E/815/815E/815EM Chipset Graphics Drivers’ window, click ‘Next’.
4. In the ‘Save files in folder’ box, enter the drive letter and path to a temporary directory where the driver files can be stored. (For example, ‘c:\i815temp’.) Click ‘Next’.
5. At the ‘Intel(R) 810/810E/815/815E/815EM Chipset Graphics Driver Software Setup’ window, click ‘Next’.
6. Click ‘Yes’ to agree to the software license agreement.
7. Ensure ‘Yes, I want to restart my computer now’ is selected and click ‘Finish’. The computer will restart. The temporary directory created in step 4 above may be deleted.

Ethernet Adapter Drivers Installation

1. Insert the Windows Drivers CD-ROM.
2. Right-click on ‘My Computer’ and select ‘Properties’. Click on the ‘Hardware’ tab. Click ‘Device Manager’.
3. Double-click on the first ‘Ethernet Controller’ (found under ‘Other devices’).
4. In the ‘Ethernet Controller Properties’ window, click on the ‘Driver’ tab. Click ‘Update Driver’. Click ‘Next’ twice. Ensure ‘Specify a location’ is the only search location selected (checked) and click ‘Next’.
5. In the ‘Upgrade Device Driver Wizard’ window, click ‘Browse’.
6. In the ‘Look in’ pull-down selection menu, select the ‘Windows Drivers’ CD-ROM. Double-click on the ‘Win2000’ folder. Double-click on the ‘Lan1’ folder. Double-click on ‘OEMSETUP’. Click ‘OK’. Click ‘Next’.
7. At the ‘Digital Signature Not Found’ window, click ‘Yes’. After files have been copied, click ‘Finish’.
8. At the ‘Intel(R) GD82559ER PCI Adapter Properties’ window, click ‘Close’.
9. Double-click on the remaining ‘Ethernet Controller’.
10. In the ‘Ethernet Controller Properties’ window, click on the ‘Driver’ tab. Click ‘Update Driver’. Click ‘Next’. Select ‘Display a list of the known drivers for this device...’ and click ‘Next’.
11. In the ‘Hardware types’ list, select ‘Network adapters’ and click ‘Next’.
12. Click ‘Have Disk’, ‘Browse’. In the ‘Look in’ pull-down selection menu, select the ‘Windows Drivers’ CD-ROM. Double-click on the ‘Win2000’ folder. Double-click on the ‘Lan2’ folder. Double-click on ‘NET82557’. Click ‘OK’, ‘Next’.

13. At the ‘Update Driver Warning’ window, click ‘Yes’. Click ‘Next’. At the ‘Digital Signature Not Found’ window, click ‘Yes’. After files have been copied, click ‘Finish’ and remove the CD-ROM.
14. At the ‘82557-based Integrated Ethernet with Wake on LAN Properties’ window, click ‘Close’.
15. Click ‘X’ to close the ‘Device Manager’ window.

Changes may be made to the network configuration as desired.

Status of PCI Devices Listed in Windows Device Manager

After installing all of the drivers provided on the Windows Drivers CD-ROM, Device Manager will still indicate that several PCI devices do not have drivers loaded. In the sample screen shot shown in Figure B-1, the two devices listed under “Other devices” are the Tundra Universe IIB PCI-to-VMEbus bridge and the VMIC proprietary FPGA. The second USB controller is present but not utilized. Although these devices are listed as non-functioning by Windows, the hardware is functioning as designed.

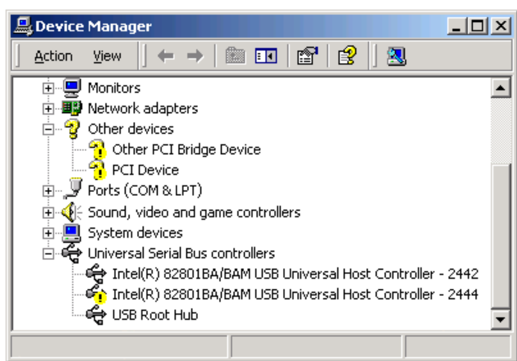


Figure B-1 Device Manager

Appendix

C

Phoenix BIOS

Contents

Introduction

The VMIVME-7750 utilizes the BIOS (Basic Input/Output System) in the same manner as other PC/AT compatible computers. This appendix describes the menus and options associated with the VMIVME-7750 BIOS.

System BIOS Setup Utility

During system bootup, press the F2 key to access the Phoenix BIOS Main screen. From this screen, the user can select any section of the Phoenix (system) BIOS for configuration, such as floppy drive configuration or system memory. The parameters shown throughout this section are the default values.

Help Window

The help window on the right side of each menu displays the help text for the currently selected field. It updates as you move the cursor to each field. Pressing F1 or ALT-H on any menu brings up the General Help window that describes the legend keys and their alternates. The scroll bar on the right of any window indicates that there is more than one page of information in the window. Use PGUP and PGDN to display each page. Pressing HOME and END displays the first and last page. Pressing ENTER displays each page. Press ESC to exit the current window.

First Boot

The VMIVME-7750 has a First Boot menu enabling the user to, on a one time basis, select a drive device to boot from. This feature is useful when installing from a bootable disk. For example, when installing Windows NT from a CD, enter the First Boot menu and use the arrows keys to highlight ATAPI CD-ROM Drive. Press ENTER to continue with system boot.

This feature is accessed by pressing the ESC at the very beginning of the boot cycle. The selection made from this screen applies to the current boot only, and will not be used during the next boot-up of the system. If you have trouble accessing this feature, disable the QuickBoot Mode in the Main BIOS setup screen. Exit, saving changes and retry accessing the First Boot menu.

```
                Boot Menu

   1. + Removable Devices:
   2. + Hard Drive
   3. ATAPI CD-ROM Drive
   4. MBA UNDI (Bus 1 Slot 6) LAN 1
   5. MBA UNDI (Bus 1 Slot 8) LAN 2

            <Enter Setup>
```

Main Menu

The Main menu allows the user to select QuickBoot, set the system clock and calendar, record disk drive parameters, and set selected functions for the keyboard.

```
                              Phoenix Setup Utility
 MAIN       Advanced     Security       Power        Boot     Exit
+-----------------------------------------------+--------------------------------+
|     QuickBoot Mode:       [Enabled]           |       Item Specific Help       |
|     System Time:          [11:07:46]          |--------------------------------|
|     System Date:          [06/04/2000]        |  Allows the system to          |
|                                               |  skip certain tests            |
|     Legacy Diskette A:    [1.44/1.25 MB 3½"]  |  while booting. This           |
|     Legacy diskette B:    [Disabled]          |  will decrease the             |
|                                               |  time needed to boot           |
|   ► Primary Master        [4312MB]            |  the system.                   |
|   ► Primary Slave         [CD-ROM]            |                                |
|   ► Secondary Master      [48MB]              |                                |
|     Secondary Slave       [None]              |                                |
|                                               |                                |
|   ► Keyboard Features                         |                                |
|                                               |                                |
|     System Memory:        640 kB              |                                |
|     Extended Memory:      64512 kB            |                                |
|     Extended Memory:      63 MB               |                                |
|   ► Console Redirection                       |                                |
+-----------------------------------------------+--------------------------------+
 F1Help↑↓      Select Item-/+Change ValuesF9Setup Defaults
 ESCExit←→     Select MenuEnterSelect ► Sub-MenuF10Save and Exit
```

QuickBoot

When enabled, certain checks normally performed during the POST are omitted, decreasing the time required to run the POST. The default is Enabled.

Setting The Time

The time format is based on the 24-hour military-time clock. For example, 1 PM is 13:00:00. Press the left or right arrow key to move the cursor to the desired field (hour, minute, seconds). Press the PGUP or PGDN key to step through the available choices, or type in the information.

Setting The Date

Press the left or right arrow key to move the cursor to the desired field (month, day, year). Press the PGUP or PGDN key to step through the available choices, or type in the information.

Legacy Diskette

Floppy Drive A

The VMIVME-7750 supports one floppy disk drive. The options are:

- Disabled — No diskette drive installed
- 360K, 5.25 in — 5-1/4 inch PC-type standard drive; 360 kilobyte capacity
- 1.2M, 5.25 in — 5-1/4 inch AT-type high-density drive; 1.2 megabyte capacity
- 720K, 3.5 in — 3-1/2 double-sided drive; 720 kilobyte capacity
- 1.44M, 3.5 in — 3-1/2 inch double-sided drive; 1.44 megabyte capacity
- 2.88M, 3.5 in — 3-1/2 inch double-sided drive; 2.88 megabyte capacity

Use PGUP or PGDN to select the floppy drive. The default is 1.44M, 3.5 inch.

Floppy Drive B

The VMIVME-7750 does not support a second floppy drive. The default is Disabled.

Primary Master/Slave

The VMIVME-7750 is capable of utilizing two IDE devices on the Primary Master bus. The default setting is Auto. The Primary Slave is assigned to the CD-ROM (if installed). If a setting other than Auto is selected, the user must match the settings to the hardware.

```
                         Phoenix Setup Utility
  MAIN

      Primary Master [1350]                     Item Specific Help

   Type:                      [Auto]          User = you enter
                                              parameters of hard-disk
   Multi-Sector Transfers     [16 Sectors]    drive installed at this
   LBA Mode Control           [Enabled]       connection.
   32 Bit I/O                 [Disabled]      Auto = autotypes
   Transfer Mode:             [Fast PIO 4]    hard-drive
   Ultra DMA Mode:            [Mode 2]        installed here.
                                              1-39 = you select
                                              pre-determined type of
                                              hard-drive
                                              installed here.
                                              CD-ROM = a CD-ROM drive
                                              is installed here.
                                              ATAPI Removable =
                                              Removable disk-drive is
                                              installed here.

F1Help↑↓     Select Item-/+Change ValuesF9Setup Defaults
ESCExit←→    Select MenuEnterSelect ► Sub-MenuF10Save and Exit
```

Secondary Master

The Secondary Master is the resident Compact Flash Disk (if installed). The default setting is Auto.

Keyboard Features

The Keyboard Features allows the user to set several keyboard functions.

```
                         Phoenix Setup Utility
MAIN
            Keyboard Features                        Item Specific Help

     NumLock:                    [Auto]             Selects Power-on state
     Key Click:                  [Disabled]         for NumLock.
     Keyboard Auto-Repeat Rate:  [30/sec]
     Keyboard Auto-Repeat Delay: [1/2 sec]
     Keyboard Test               [Disabled]

F1Help↑↓     Select Item-/+Change ValuesF9Setup Defaults
ESCExit←→    Select MenuEnterSelect ► Sub-MenuF10Save and Exit
```

NumLock

The NumLock can be set to Auto, On or Off to control the state of the NumLock key when the system boots. When set to Auto or On, the numeric keypad generates numbers instead of controlling the cursor operations. The default is Auto.

Key Click

This option enables or disables the Keyboard Auto-Repeat Rate and Delay settings. When disabled, the values in the Typematic Rate and Delay are ignored. The default is Disabled.

Keyboard Auto-Repeat Rate (Chars/Sec)

If the Key Click is enabled this determines the rate a character is repeated when a key is held down. The options are: 30, 26.7, 21.8, 18.5, 13.3, 10, 6 or 2 characters per second. The default is 30.

Keyboard Auto-Repeat Delay (sec)

If the Key Click is enabled, this determines the delay before a character starts repeating when a key is held down. The options are: 1/4, 1/2, 3/4 or 1 second. The default is 1/2.

Keyboard Test

When enabled, this feature will test the keyboard during boot-up.

System Memory

The System Memory field is for informational purposes only and cannot be modified by the user. This field displays the base memory installed in the system.

Extended Memory

The Extended Memory field is for informational purposes only and cannot be modified by the user. This field displays the total amount of memory installed in the system in Kbytes.

Extended Memory

The Extended Memory field is for informational purposes only and cannot be modified by the user. This field displays the total amount of memory installed in the system in Mbytes. The amount of extended memory shown will be approximately 3Mbytes less than the amount installed. This is due to the fact that the graphics function of the Intel GMCH chip uses a portion of this memory making it unavailable to other applications.

Console Redirection

Console Redirection allows for remote access and control of the PC functions to a remote terminal via the serial port. Selecting Console Redirection provides additional menus used to configure the console.

```
                         Phoenix Setup Utility
 MAIN
         Console Redirection                          Item Specific Help

     Com Port Address            [Disabled]          If enabled, it will
                                                     use a port on the
     Baud Rate                   [19.2]              motherboard.
     Console Type                [PC ANSI]
     Flow Control                [CTS/RTS]
     Console connection:         [Direct]
     Continue C.R. After POST:   [Off]

F1Help↑↓     Select Item-/+Change ValuesF9Setup Defaults
ESCExit←→    Select MenuEnterSelect ► Sub-MenuF10Save and Exit
```

Com Port Address

If enabled, it will allow remote access through the serial port. The options are: Disabled, Motherboard Com A and Motherboard Com B. The default is Disabled.

Baud Rate

Selects a baud rate for the serial port. The options are: 600, 1200, 2400, 4800, 9600, 19.2, 38.4 and 115.2. The default is 19.2.

Console Type

Selects the type of console to be used. The options are: PC ANSI or VT100. The default is PC ANSI.

Flow Control

Enables or disables Flow Control. The options are No Flow Control, XON/XOFF or CTS/RTS. The default is CTS/RTS.

Console Connection

Indicates whether the console is connected directly to the system, or if a modem is being used to connect. The options are: Direct or Via Modem. The default is Direct.

Continue C.R. After POST

This enables console redirection after the operating system has loaded. The options are OFF or ON. The default setting is OFF.

Advanced Menu

Selecting Advanced from the Main menu will display the screen shown below.

```
                              Phoenix Setup Utility
   Main      ADVANCED     Security      Power       Boot       Exit

       Installed O/S:             [Other]        Item Specific Help
       Reset Configuration Data   [No]
     ► Cache Memory                              Select the operating
     ► I/O Device Configuration                  system installed
       Large Disk Access Mode:    [DOS]          on your system which
       LBA Assisted Translation   [Disabled]     you will use most
       Local Bus IDE adapter:     [Both]         commonly.
     ► Advanced Chipset Control
       Assign Interrupt To USB    [Enabled]      Note: An incorrect
       Legacy USB Support         [Disabled]     setting can cause
       CARD Bus Memory Size       [Disabled]     some operating
                                                 systems to display
                                                 unexpected behavior.

 F1Help↑↓      Select Item-/+Change ValuesF9Setup Defaults
 ESCExit←→     Select MenuEnterSelect ► Sub-MenuF10Save and Exit
```

Installed O/S

Use this feature to select the operating system to use with your system.

Reset Configuration Data

Select Yes if you want to clear the extended system configuration data. The default is No.

Cache Memory

Enabling the cache memory enhances the speed of the processor. When the CPU requests data, the system transfers the requested data from the main DRAM into the cache memory where it is stored until processed by the CPU. The default is Enabled.

```
                         Phoenix Setup Utility
         ADVANCED
+-----------------------------------------------------+----------------------------+
|           Cache Memory                              |     Item Specific Help     |
+-----------------------------------------------------+----------------------------+
|     Memory Cache                   [Enabled]        |  Sets the state of the     |
|     Cache System BIOS area:        [Write Protect]  |  memory cache              |
|     Cache Video BIOS area:         [Write Protect]  |                            |
|     Cache Base 0-512k:             [Write Back]     |                            |
|     Cache Base 512k-640k:          [Write Back]     |                            |
|     Cache Extended Memory Area:    [Write Back]     |                            |
|     Cache A000-AFFF:               [Disabled]       |                            |
|     Cache B000-BFFF:               [Disabled]       |                            |
|     Cache C800-CBFF:               [Write Through]  |                            |
|     Cache CC00-CFFF:               [Write Through]  |                            |
|     Cache D000-D3FF:               [Write Through]  |                            |
|     Cache D400-D7FF:               [Write Through]  |                            |
|     Cache D800-DBFF:               [Write Through]  |                            |
|     Cache DC00-DFFF                [Write Through]  |                            |
+-----------------------------------------------------+----------------------------+
 F1Help↑↓      Select Item-/+Change ValuesF9Setup Defaults
 ESCExit←→     Select MenuEnterSelect ► Sub-MenuF10Save and Exit
```

I/O Device Configuration

Select this menu to configure your I/O devices, if required.

```
                         Phoenix Setup Utility
         ADVANCED
+-----------------------------------------------------+----------------------------+
|       I/O Device Configuration                      |     Item Specific Help     |
+-----------------------------------------------------+----------------------------+
|     Serial port A:                 [Auto]           |  Configure serial port A   |
|                                                     |  using options:            |
|     Serial port B:                 [Auto]           |                            |
|                                                     |  [Disabled]                |
|                                                     |    No Configuration        |
|     Floppy disk controller:        [Auto Detect]    |                            |
|     Legacy Diskette A:             1.44/1.25 MB 3½" |  [Enabled]                 |
|     PS/2 Mouse                                      |    User Configuration      |
|                                                     |                            |
|                                                     |  [Auto]                    |
|                                                     |    BIOS or OS chooses      |
|                                                     |    (OS Controlled)         |
|                                                     |    Displayed when          |
|                                                     |    controlled by OS        |
+-----------------------------------------------------+----------------------------+
 F1Help↑↓      Select Item-/+Change ValuesF9Setup Defaults
 ESCExit←→     Select MenuEnterSelect ► Sub-MenuF10Save and Exit
```

Large Disk Access Mode

The options for the Large Disk Access Mode are UNIX Novell Netware or Other.

If you are installing new software and the drive fails, change this selection and try again. Different operating systems require different representations of drive geometries. The default is DOS.

Local Bus IDE Adapter

This enables or disables the intergrated local bus IDE adapter. The options are: Disabled, Primary, Secondary or Both. The default is Both.

Advanced Chipset Control

Selecting Advanced Chipset Control opens the menu below. Use this menu to change the values in the chipset register for optimizing your system's performance.

```
                          Phoenix Setup Utility
          ADVANCED
-------------------------------------------------------------------------
     Advanced Chipset Control                    |    Item Specific Help
-------------------------------------------------------------------------
   Video boot type              [Onboard Video]  |  Select 'Onboard Video'
   Video Format                 [CRT]            |  to enable the onboard
                                                 |  video controller as
   Default Primary Video Adapter [AGP]           |  the boot display
   Graphics Aperture            [64 Mb]          |  device. Select either
                                                 |  512k or 1 MB of System
   Enable memory gap:           [Disabled]       |  Memory to be allocated
                                                 |  to the onboard video
                                                 |  controller.
                                                 |
                                                 |  Select
                                                 |  'Disable Onboard Video'
                                                 |  to disable the onboard
                                                 |  video controller. No
                                                 |  System Memory will be
                                                 |  allocated for video.
-------------------------------------------------------------------------
 F1Help↑↓     Select Item-/+Change ValuesF9Setup Defaults
 ESCExit←→    Select MenuEnterSelect ► Sub-MenuF10Save and Exit
```

Video Boot Type

Select "Onboard Video' to enable the onboard video controller as the boot display device. Select "Disable Onboard Video' to disable the onboard video controller.

Video Format

Selections are CRT, LCD or CRT_LCD. The default is CRT.

Default Primary Video Adapter

Select ‘PCI’ to have a PCI video card, if installed, used for the boot display device.

Do not select ‘AGP’ as the VMIVME-7750 does not support AGP.

Graphics Aperture

Select the size of the graphics aperture for the AGP video device. The options are: 4MB, 8MB, 16MB, 32MB, 64MB, 128MB or 256MB. The default is 64MB.

Enable Memory Gap

If enabled, turn system RAM off to free address space for use with an option card. Either a 128KB conventional memory gap, starting at 512KB, or a 1MB extended memory gap, starting at 15MB, will be created in the system RAM. The options are Disabled, Conventional or Extended. The default is Disabled.

Assign Interrupt To USB

Enabled assigns an interrupt to the USB. The default is Enabled.

Legacy USB Support

Enabled supports a legacy keyboard and mouse on the USB. The default is Disabled.

Card Bus Memory Size

When enabled, allows resources to be configured from a Card Bus Bridge located behind a PCI-to-PCI Bridge. The default is Disabled.

Security

Utilize this screen to set a user password.

```
                    Phoenix Setup Utility
                 Security
                                                                Item Specific Help
                       Security
                                                                Supervisor Password
          Set User Password          [ Enter ]                  controls Access to the
       1. Set Supervisor Password   [Enter]                     setup utility.

       2. Password on boot:         [Disabled]
       3. Fixed disk boot sector    [Normal]
       4. Diskette access:          [User]

       5. Virus check reminder:     [Disabled]
       6. System backup reminder:   [Disabled]

F1Help↑↓      Select Item-/+Change ValuesF9Setup Defaults
ESCExit←→     Select MenuEnterSelect ► Sub-MenuF10Save and Exit
```

Password On Boot

Enables password entry on boot. The default is Disabled.

Fixed Disk Boot Sector

Write protects boot sector on the hard disk to protect against viruses. The default is Normal.

Diskette Access

Controls access to the diskette drives. The default is User.

Virus Check Reminder

Displays reminder message at bootup. The choices are disabled, daily, weekly or monthly. The default is Disabled.

System Backup Reminder

Displays reminder message at bootup. The choices are disabled, daily, weekly or monthly. The default is Disabled.

Power

This screen, selected from the Main screen, allows the user to configure power saving options on the VMIVME-7750.

```
                              Phoenix Setup Utility
   Main       Advanced     Security       POWER        Boot      Exit

      CPU Throttling Down Threshold   [Disabled]        Item Specific Help
      CPU Throttling back hysteresis  [10C]
      Throttling %                    [50%]          Maximum Power savings
                                                     conserves the greatest
      Power Savings:                  [Disabled]     amount of system power.
                                                     Maximum Performance
      Standby Timeout:                [Off]          conserves power but
         Auto Suspend Timeout:        [Off]          allows greatest system
                                                     performance. To alter
      IDE Drive 0 Monitoring:         [Disabled]     these settings, choose
      IDE Drive 1 Monitoring:         [Disabled]     Customized. To turn off
      IDE Drive 2 Monitoring:         [Disabled]     power management,
      IDE Drive 3 Monitoring:         [Disabled]     choose Disabled.

      PCI Bus Monitoring:             [Disabled]

 F1Help↑↓      Select Item-/+Change ValuesF9Setup Defaults
 ESCExit←→     Select MenuEnterSelect ► Sub-MenuF10Save and Exit
```

The Throttling and CPU Throttling back hysteresis selections will only be shown if “CPU Throttling Down Threshold” is enabled. The default is Disabled. The default for CPU Throttling back hysteresis is 10C. The default for Throttling is 50%.

Boot Menu

The Boot priority is determined by the stack order, with the top having the highest priority and the bottom the least. The order can be modified by highlighting a device and, using the <+> or <-> keys, moving it to the desired order in the stack. A device can be boot disabled by highlighting the particular device and pressing <Shift 1>. <Enter> expands or collapses devices with a + or - next to them.

```
                              Phoenix Setup Utility
   MAIN       Advanced     Security      Power        Boot      Exit

          Removable Devices:                        Item Specific Help
        + Hard Drive
          ATAPI CD-ROM Drive                   Keys used to view or
          MBA UNDI (Bus1 Slot6) LAN 1          configure devices:
          MBA UNDI (Bus Slot 8) LAN 2          <Enter> expands or
                                               collapses devices with
                                               a + or -
                                               <Ctrl + Enter> expands
                                               all
                                               <Shift + 1> enables or
                                               disables a device.
                                               <+> and <-> moves the
                                               device up or down.
                                               <n> may move removable
                                               device between Hard
                                               Disk or Removable Disk
                                               <d> remove a device
                                               that is not installed.

 F1Help↑↓     Select Item-/+Change ValuesF9Setup Defaults
 ESCExit←→    Select MenuEnterSelect ► Sub-MenuF10Save and Exit
```

Exit Menu

The Exit menu allows the user to exit the BIOS program, while either saving or discarding any changes. This menu also allows the user to restore the BIOS defaults if desired.

```
                          Phoenix Setup Utility
   Main       Advanced      Power        Boot        Exit

       Exit Saving Changes                          Item Specific Help
       Exit Discarding Changes
       Load setup Defaults         [Disabled]     Exit System Setup and
       Discard Changes             [Disabled]     save your changes to
       Save Changes                               CMOS.

 F1Help↑↓     Select Item-/+Change ValuesF9Setup Defaults
 ESCExit←→    Select MenuEnterSelect ► Sub-MenuF10Save and Exit
```

Exit Saving Changes

Exit System Setup and save your changes to CMOS.

Exit Discarding Changes

Exit System Setup, discarding any changes to CMOS.

Load Setup Defaults

Load System defaults as defined at the factory.

Discard Changes

Discard any changes without exiting the Setup program.

Save Changes

Save any changes made without exiting the Setup program.

Appendix

D

LANWorks BIOS

Contents

Introduction

The VMIVME-7750 includes a LANWorks option which allows the VMIVME-7750 to be booted from a network. This appendix describes the procedures to enable this option and the LANWorks BIOS Setup screens.

Boot Menus

There are two methods of enabling the LANWorks BIOS option. The first method is the *First Boot* menu. The second is the *Boot* menu from the BIOS Setup Utility.

First Boot Menu

Press ESC at the very beginning of the boot cycle, which will access the *First Boot* menu. Selecting “Managed PC Boot Agent (MBA)” to boot from the LAN in this screen applies to the current boot only, at the next reboot the VMIVME-7750 will revert back to the setting in the Boot menu.

```
Boot Menu

+ Removable Devices:
+ Hard Drive
ATAPI CD-ROM Drive
MBA UNDI (Bus Slot 6) LAN 1
MBA UNDI (Bus Slot 8) LAN 2

<Enter Setup>
```

Using the arrow keys, highlight *Managed PC Boot Agent (MBA)*, and press the ENTER key to continue with the system boot.

Boot Menu

The second method of enabling the LANWorks BIOS option is to press the F2 key during system boot. This will access the BIOS Setup Utility. Advance to the Boot menu and, using the arrow keys, highlight the Managed PC Boot Agent (MBA) option. Repeat entering <+> until the desired MBA is at the top of the list.

Advance to the Exit menu, select “Exit Saving Changes” and press ENTER. When the system prompts for confirmation, press “Yes”. The computer will then restart the system boot-up.

Phoenix Setup Utility

MAIN Advanced Security Power **Boot** Exit

	Item Specific Help
MBA UNDI (Bus Slot 6) LAN 1 + Removable Devices: + Hard Drive ATAPI CD-ROM Drive + Removable Devices: MBA UNDI (Bus Slot 8) LAN 2	Keys used to view or configure devices: <Enter> expands or collapses devices with a + or - <Ctrl + Enter> expands all <Shift + 1> enables or disables a device. <+> and <-> moves the device up or down. <n> may move removable device between Hard Disk or Removable Disk <d> remove a device that is not installed.

F1Help↑↓ Select Item-/+Change ValuesF9Setup Defaults
ESCExit←→ Select MenuEnterSelect ► Sub-MenuF10Save and Exit

BIOS Features Setup

After the Managed PC Boot Agent has been enabled, there are several boot options available to the user. These options are RPL (default), TCP/IP, Netware and PXE. The screens below show the defaults for each boot method.

RPL

```
Managed PC Boot Agent (MBA) v3.20 (BIOS Integrated)
(c) Copyright 1998 LANWorks Technologies Co. a subsidiary of 3Com Corporation
All rights reserved
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
                                  Configuration

    Boot Method:                  RPL

    Config Message:               Enabled
    Message Timeout:              6 Seconds
    Boot failure Prompt:          Wait for key
    Boot Failure:                 Next BBS device

--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
Use cursor keys to edit: Up/Down change field, Left/Right change value
ESC to quit, F9 restore previous settings, F10 to save
```

TCP/IP

```
Managed PC Boot Agent (MBA) v3.20 (BIOS Integrated)
(c) Copyright 1998 LANWorks Technologies Co. a subsidiary of 3Com Corporation
All rights reserved
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
                                  Configuration

    Boot Method:                  TCP/IP

    Protocol                      BootP
    Config Message:               Enabled
    Message Timeout:              6 Seconds
    Boot failure Prompt:          Wait for key
    Boot Failure:                 Next BBS device

--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
Use cursor keys to edit: Up/Down change field, Left/Right change value
ESC to quit, F9 restore previous settings, F10 to save
```

Netware

```
  Managed PC Boot Agent (MBA) v3.20 (BIOS Integrated)
  (c) Copyright 1998 LANWorks Technologies Co. a subsidiary of 3Com Corporation
  All rights reserved
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
                              Configuration

      Boot Method:             Netware

      Protocol                 802.2
      Config Message:          Enabled
      Message Timeout:         6 Seconds
      Boot failure Prompt:     Wait for key
      Boot Failure:            Next BBS device

-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
 Use cursor keys to edit: Up/Down change field, Left/Right change value
 ESC to quit, F9 restore previous settings, F10 to save
```

PXE

```
  Managed PC Boot Agent (MBA) v3.20 (BIOS Integrated)
  (c) Copyright 1998 LANWorks Technologies Co. a subsidiary of 3Com Corporation
  All rights reserved
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
                              Configuration

      Boot Method:             PXE

-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
 Use cursor keys to edit: Up/Down change field, Left/Right change value
 ESC to quit, F9 restore previous settings, F10 to save
```

Appendix

E

Sample C Software

Contents

Introduction

This appendix provides listings of a library of sample code that the programmer may utilize to build applications. These files are provided in the directory “\sample code” on CD 320-500077-000, labeled “Windows Drivers”, included with the VMIVME-7750.

These files are provided without warranty. All source code is ©2001, VMIC Corporation.

Directory \VME

This directory contains code used to setup the Universe IIB chip with one PCI-to-VME window and enable Universe IIB registers to be accessed from the VMEbus to allow mailbox access.

Directory \fpga

This directory contains code used to test the functions of the VMIC-designed FPGA such as timers, SRAM controller and Watchdog Timer.

Directory \i2c

This directory contains code that demonstrates how to send data using the I^2C controller in the super I/O component, and also how to manipulate the I^2C mux which is used to direct the super I/O's I^2C back to the VME backplane.

Directory \include

This directory contains common files required to compile several of the sample code applications.

Directory \max1617

This directory contains code that demonstrates how to read the temperatures from the max1617 device on the VMIVME-7750.

Directory \support

This directory contains memory and PCI access routines used by many of the sample code applications.

Directory \vlm

This directory contains code that demonstrates how to read the voltages from the analog inputs of the super I/O component on the VMIVME-7750.

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