VMIVME-7587
Pentium Processor-Based VMEbus Single-Board Computer

- Pentium® processor – 133 MHz version
- External (L2) cache – 512 Kbyte synchronous burst SRAM
- PMC (PCI mezzanine card expansion site: IEEE-P1386 common mezzanine card standard, 5 V signaling)
- VME64 modes supported: A32/A24/D64/D32/D16/D08 (EO)/MBLT64/BLT32
- Up to 64 Mbyte DRAM using 72-pin SIMMs
- 64-bit PCI SVGA controller with 2 Mbyte video DRAM
- On-board Ethernet controller with 10BaseT and 10Base2 interfaces
- PCI SCSI-2 controller with front panel interface
- On-board IDE hard drive and floppy drive controllers
- Two high-performance 16550-compatible serial ports
- Enhanced parallel port with ECP/EPP modes supported
- PS/2-style keyboard and mouse ports on front panel
- Real-time clock and miniature speaker included
- VMEbus data transfers up to 58 Mbyte/s with Tundra Universe option
- VMEbus interrupt handler, interrupter, and system controller
- Includes byte-swapping hardware for little-endian and big-endian data interfacing
- Powerful PC/AT functionality occupies only two VMEbus 6U slots
- VMISFT-9420 VMEbus Access™ and other IOWorks® family software
- Vibration test data available upon request

APPLICATIONS

- Simulation
- Instrumentation
- Industrial control
- Process control and monitoring
- Factory automation
- Intelligent networked PLC controllers
- Automated test
- Data acquisition

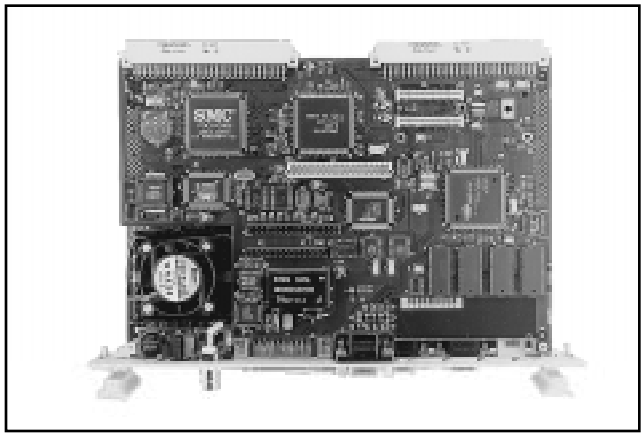
MICROPROCESSOR — The VMIVME-7587 brings Intel® Pentium processor power to VMEbus, offering 133 MHz processor speed. The Pentium processor has 32-bit addressing and a 64-bit data bus. Its superscalar architecture includes two pipelined integer units and a pipelined floating-point unit, allowing two instructions to be executed per clock cycle. A dynamic branch prediction unit and separate 8 Kbyte instruction and data caches also increase the Pentium's performance. The Intel Pentium processor is compatible with the large installed base of applications for the DOS, Windows®, and Windows NT® operating systems for the PC/AT architecture.

EXTERNAL (L2) CACHE MEMORY — The VMIVME-7587 complements the Pentium processor with 512 Kbyte of external cache memory. Near-zero wait state operation of the processor is ensured by the use of synchronous burst static RAM with the Intel Triton chipset.

DRAM MEMORY — The VMIVME-7587 accepts two 72-pin SIMM DRAM modules for a maximum memory capacity of 64 Mbyte. The on-board DRAM is dual ported to the VMEbus.

BIOS — The single-board computer (SBC) board has 128 Kbyte of system and video BIOS, supporting power management, plug-and-play, and on-board reprogrammability.

SUPER VGA CONTROLLER — High-resolution graphics and multimedia-quality video are supported on the VMIVME-7587 by the Cirrus Logic CL-GD5436 PCI graphics adapter. The CL-GD5436 is complemented by 2 Mbyte display memory with a high-bandwidth 64-bit data interface. Screen resolutions up to 1,280 x 1,024 x 256 colors and 800 x 600 x 16 M colors (noninterlaced) are supported by the CL-GD5436 graphics adapter.



ETHERNET CONTROLLER — The VMIVME-7587 supports both 10BaseT and 10Base2 interfaces on the SBC front panel with an on-board SMC 91C94 Ethernet controller.

PCI SCSI-2 CONTROLLER — Peripheral connections to SCSI-2 hard drives, tape backup, and CD-ROM drives are facilitated by the on-board Adaptec 7850 PCI SCSI-2 controller.

Ordering Options

May 10, 2000 800-007587-000 H	A	B	C	–	D	E	F
VMIVME-7587 –				–			

A = Processor
- 0 = Not Used
- 1 = Reserved
- 2 = Reserved
- 3 = Reserved
- 4 = Reserved
- 5 = 133 MHz Pentium Processor
- 6 = Reserved
- 7 = Reserved
- 8 = Reserved

B = DRAM Memory
- 0 = Not Used
- 1 = 8 Mbyte
- 2 = 16 Mbyte
- 3 = 32 Mbyte
- 4 = 64 Mbyte

C = VMEbus Interface
- 0 = Cypress VIC64-Based Interface
- 1 = Tundra Universe I-Based Interface - High Performance
- 2 = Reserved
- 9 = No VMEbus Interface

For Ordering Information, Call:
1-800-322-3616 or 1-256-880-0444 • FAX (256) 882-0859
E-mail: info@vmic.com Web Address: www.vmic.com

SERIAL PORTS — Two 16550-compatible serial ports are featured on the VMIVME-7587 front panel. Each serial channel has an independent 16-byte FIFO to support baud rates up to 56 kHz.

ENHANCED PARALLEL PORT — Also accessible on the VMIVME-7587 front panel is a Centronics-compatible, fully bidirectional parallel port meeting all IEEE-1284 standards (Compatibility, Nibble, EPP, and ECP). The parallel port contains a 16-byte FIFO to allow data rates up to 2 Mbyte/s in ECP mode.

KEYBOARD AND PS/2 MOUSE PORTS — The VMIVME-7587 has two 6-pin mini-DIN connectors for PS/2-style keyboard and mouse connections. A 5-pin DIN to 6-pin mini-DIN converter cable is supplied with the VMIVME-7587 for use with PC/AT-compatible keyboards.

RESET SWITCH AND ANNUNCIATORS — A small push-button switch on the front panel will reset the VMIVME-7587. If the system controller is enabled, a SYSRESET* will also be generated on the VMEbus. Three LEDs are visible on the front panel: +5 V power, status of VMEbus SYSFAIL, and IDE activity. A small speaker is also included on the VMIVME-7587 to provide PC/AT sound output.

PMC EXPANSION SITE — The VMIVME-7587 supports IEEE-P1386 common mezzanine card specification with a 5 V PCI Mezzanine Card expansion site. This expansion capability allows third-party devices to be used with the VMIVME-7587, as shown in Figure 1.

The following is a partial list of commercially available PMC modules:

- Analog and digital I/O
- High-speed serial and parallel I/O
- Networking adapters: FDDI, ATM, 100BaseTX Ethernet, Fast Ethernet
- Video graphics accelerators
- PMC-to-PC Card adapter
- MIL-STD-1553 bus interface
- SRAM
- Flash
- Solid-state disk
- Data acquisition cards
- SCSI-2 adapter
- Parallel links
- Octal DSP
- Quad SIO
- Second SVGA controller
- GPIB
- FAX/modem
- Second Ethernet
- PMC-to-PMC expanders

Contact VMIC for more information concerning third-party PMC modules and compatibility.

VMEbus INTERFACE — There are two optional VMEbus interfaces. One is based on the VIC64 from Cypress and the other is based on the high-performance Universe from Newbridge/Tundra.

SYSTEM CONTROLLER — The on-board VMEbus system controller allows the board to work as slot 1, or it may be disabled when another board is acting as the system controller. The system controller may be programmed to provide the following modes of arbitration:

Round Robin (RRS)
Single Level (SGL)
Priority (PRI)

The system controller provides a SYSCLK driver, IACK* daisy-chain driver, and a VMEbus access timeout timer. The system controller also provides an arbitration timeout if BBSY* is not seen within a specified period after a BGOUT* signal is issued. This period is 10 ms for the VIC64 and is programmable for the Universe for 16 or 256 µs.

VMEbus REQUESTER — The processor can request and gain control of the bus using any of the VMEbus request lines (BR3*-BR0*) under software control. The requester can be programmed to operate in any of the following modes:

Release-On-Request (ROR)
Release-When-Done (RWD)
VMEbus Capture and Hold (BCAP)

In addition, the VIC64 interface option can use:

Release-On-Clear (ROC)

MAILBOXES — The VMEbus interface provides four mailboxes, which are accessible from both the processor and the VMEbus providing interprocessor communication. The mailboxes, have the ability to interrupt the processor when accessed by VMEbus. Access to mailbox registers is provided using A16/D8(O) VMEbus accesses only. The four mailbox registers are 1 byte each for the VIC64 option and 1 bit each for the Universe option.

INTERRUPT HANDLER — The interrupt handler monitors, and can be programmed to respond to any or all VMEbus IRQ* lines. All normal-process VMEbus-related interrupts can be mapped to PCI INTA# or SERR# interrupts. These include:

Mailbox interrupts
VMEbus interrupts

VMEbus interrupter IACK cycle (acknowledgment of VMIVME-7587 VMEbus-issued interrupts)

All error processing VMEbus-related interrupts can be mapped to PCI INTA# or SERR#. Note: PCI SERR# initiates a SBC NMI. These include:

ACFAIL* interrupt
BERR* interrupt
SYSFAIL* interrupt

The VIC64 option also includes: Software NMI

The interrupt handler for the VIC64 option maps the VME interrupts to the PCI bus INTA# or SERR#. The interrupts are acknowledged by reading the ID register associated with the PCI interrupt source, that is, INTA# or SERR#. If the highest pending interrupt is from the VMEbus, the register read will initiate a VMEbus IACK cycle. The returned ID will be the ID read during the IACK cycle. Due to the shared nature of PCI interrupts, a register is provided to indicate interrupts pending.

The interrupt handler in the Universe option has a corresponding STATUS/ID register for each IRQ* interrupt. Once the handler receives an IRQ*, it requests the VMEbus and, once granted, it performs an IACK cycle for that level. Once the IACK cycle is complete and the STATUS/ID is stored in the corresponding ID register, an appropriate interrupt status bit is set in an internal status register, and a PCI interrupt is generated. The PCI interrupt can be mapped to PCI INTA# or SERR#.

INTERRUPTER — Interrupts can be issued under software control on any or all of the seven VMEbus interrupt lines (IRQ7* to IRQ1*).

For the VIC64 option, an ID register is associated with each interrupt line. During the interrupt acknowledge cycle, the interrupter issues the ID associated with the IRQ* being acknowledged.

For the Universe option, a common ID register is associated with the interrupt lines. During the interrupt acknowledge cycle, the interrupter issues the ID to the interrupt handler.

The interrupter can be programmed to generate a PCI INTA# or SERR# interrupt when a VMEbus interrupt handler acknowledges a software-generated VMEbus interrupt.

BYTE SWAPPING — The Intel 80x86 family of processors use little-endian format. To accommodate other VMEbus modules which transfer data in big-endian format such as the 680x0 processor family, the VMIVME-7587 incorporates byte-swapping hardware. This provides independent byte swapping for both the master and slave interfaces. Both master and slave interface byte swapping are under Pentium processor software control.

VIC64 OPTION, MASTER INTERFACE — MA32:MBLT32:MBLT64 (A32:A24:A16:D32:D16:D8 (EO):BLT32)

When the Pentium processor is in protected mode, the VMEbus is accessed using a 16 Mbyte window. VMEbus address A31 to A24 are driven from the extended address 8-bit page register. Processor address signals A31 to A24 are decoded to provide four unique 16 Mbyte regions. Each region generates a unique address modifier code for the desired address width (A32/A24/A16). Access type is programmed for each of the four regions (supervisory, nonprivileged, code, or data). The processor address decode also allows user-defined address modifier codes to be output when accessing a specific 16 Mbyte region.

When the Pentium processor is operating in real mode, the VMEbus is accessed using a 64 Kbyte window at D0000H. VMEbus A31 to A24 are driven from the extended address page register. VMEbus A23 to A16 are driven from the standard address page register which is only activated when in real mode.

VIC64 OPTION, SLAVE INTERFACE — SAD032:SD32:SBLT32:SBLT64 (A32:A24:A16:D32:D16:D8 (EO): BLT32)

This slave interface provides access to the on-board DRAM, as well as to mailbox registers which are used for communication between VMEbus and the Pentium processor.

The interface allows access to the on-board DRAM. The amount (window size) of DRAM accessible from the VMEbus is programmable in increments of 64 Kbyte up to 16 Mbyte.

UNIVERSE OPTION, MASTER INTERFACE — MA32:MBLT32:MBLT64 (A32:A24:A16:D32:D16:D8 (EO):BLT32)

The Universe option VMEbus master interface provides five separate memory *windows* into VMEbus resources. Each window has separate configuration registers for mapping PCI transfers to the VMEbus (that is, PCI base address, window size, VMEbus base address, VMEbus access type, VMEbus address/data size, etc.). The maximum/minimum window sizes for the five windows are as follows:

Window	Minimum Size	Maximum Size
0	4 Kbyte	4 Gbyte
1-3	64 Kbyte	4 Gbyte
4	64 Mbyte	64 Mbyte

UNIVERSE OPTION, SLAVE INTERFACE — Memory Access
SAD032:SD32:SBLT32:SBLT64
A32:A24:A16:D32:D16:D8 (EO): BLT32)

The Universe option VMEbus slave interface provides four separate memory *windows* into PCI resources. Each window has separate configuration registers for mapping VMEbus transfers to the PCI bus (that is, VMEbus base address, window size, PCI base address, VMEbus access type, VMEbus address/data size, etc.). The maximum/minimum window sizes for the four windows are as follows:

Window	Minimum Size	Maximum Size
0	4 Kbyte	4 Gbyte
1-3	64 Kbyte	4 Gbyte

In addition, each window can be programmed to operate in coupled or decoupled mode. In decoupled mode, the window utilizes a write-posting FIFO and/or a read prefetching FIFO for increased system performance. In coupled mode, the FIFOs are bypassed and VMEbus transactions are directly coupled to the PCI bus (that is, transfers on VMEbus are not completed until they are completed on the PCI bus).

GENERAL SOFTWARE — The VMIVME-7587 is 100 percent PC/AT compatible. VMIC supplies support software for the VIC64 option that runs on MS-DOS® and Microsoft® Windows 3.x operating systems. For Windows NT and VxWorks operating systems, VMIC provides software support for the Universe option.

OPERATING SYSTEM AND SOFTWARE SUPPORT — VMIC has a wide range of software products designed to run on Intel processor-based SBCs such as the VMIVME-7587. These products are aimed at developers who are incorporating VMIC SBCs, I/O boards, and workstations into systems. Windows NT OS, DOS, and VxWorks are the most common operating systems supported.

Windows NT

The IOWorks software family is a set of software components that can work together or separately to provide a total development environment for any application in a Windows NT OS.

VMISFT-9420, VMEbus Access - Libraries and debug utilities to facilitate VMEbus access by the SBC

VMISFT-9450, IOWorks Board Support Package - Libraries with drivers for a wide variety of VMIC analog and digital I/O boards

DOS

VMIVME/SW-7420, VMEbus Development - Libraries and debug utilities to facilitate VMEbus access by the SBC

VxWorks

VMISFT-7418, VxWorks board support package - software allowing VxWorks to operate VMIC SBC boards

SPECIFICATIONS

6U double Eurocard format, two slot

Height	9.2 in. (233.4 mm)
Depth	6.3 in. (160 mm)
Thickness	1.6 in. (40.6 mm)

VMEbus Performance – Block Transfers

All data rates expressed in Mbyte/s.

	VIC64	Universe
Master BLT 32-bit Write	4.4	25.0
Master BLT 32-bit Read	16.1	20.5
Master MBLT 64-bit Write	4.8	52.3
Master MBLT 64-bit Read	19.3	42.1
Slave BLT 32-bit Read	5.4	30.3
Slave BLT 32-bit Write	17.5	29.0
Slave BLT 64-bit Read	5.4	58.8
Slave BLT 64-bit Write	27.7	58.0

Power Requirements:

+5 VDC (±5 percent), 8.0 A (typical), 10 A maximum

+12 VDC (±5 percent), 105 mA (typical), 150 mA maximum

-12 VDC (±5 percent), 25 mA (typical), 50 mA maximum
Note: The currents at +12 and -12 VDC are specified with the serial connectors open.

Operating Temperature:

0 to 55 °C	Forced air cooling required
0 to 50 °C	For 200 MHz option

Relative Humidity: 10 to 90 percent, noncondensing

VMEbus Interface:

DTB Master:	BLT32/BLT64, A32/D32, A24/D32, A16/D32
DTB Slave:	BLT32/BLT64, A32/D32, A24/D32 DRAM access

DTB Slave: A16/D8(O)
Interprocessor communication
Requester: Programmable, BR(3-0), ROR, RWD, BCAP
ROC (VIC64 option only)
Interrupt Handler: IH(1 to 7) D8(O)
Interrupter: Programmable, IRQ7* to IRQ1*
Arbiter: SGL, PRI, RRS
BTO: Programmable (4 to1,024 µs)
Compliance: Rev. C.1

MTBF: 49,309 hours (217F)

COMPATIBLE PRODUCTS

The VMIVME-7587 can be used with a number of VMIC's PMC bus and VMEbus products.

Floppy/Hard Disk: VMIC produces three floppy/hard drive modules to support the built-in IDE and floppy controller ports. They all use an internal flexible cable configuration to reduce front panel clutter.

The VMIVME-7452 provides hard disk storage and a 3.5-inch 1.44 Mbyte floppy drive. The unit fits into a standard VMEbus 6U single-slot form factor.

CD-ROM Support: Since much of today's advanced software is delivered on CD-ROM, the SCSI-2 port can be used with an external CD-ROM drive such as the 4PleX from Plextor.

VMEbus: The VMIVME-7587 enables access to VMIC's wealth of VMEbus products. If you have real-world control, monitoring, and real-time networking requirements, VMIC has a solution for you. Today's system requirements demand state-of-the-art solutions. Our advanced I/O features such as Built-in-Test, self-test, isolation, digital autocalibration, and intelligent on-board DSP give our customers those solutions.

Analog Input:
— Up to 64 channels
— 12- and 16-bit ADC
— Isolation
— Differential and single-ended
— Low- and high-speed models
— Programmable gains and filters
— Simultaneous sample-and-hold
— Autocalibration
— Signal conditioning: RTD, strain gauge, and thermocouples

Analog Output:
— Up to 32 channels
— 12- and 16-bit DAC
— Isolation
— Voltage and current outputs
— Programmable function generator

Digital Input:
— Up to 128 channels per board
— Change-of-state and time tagging
— Isolated
— Contact and voltage sensing
— Pulse accumulators
— AC and DC inputs up to 240 V
— TTL, RS-422, or RS-485

Digital Output:
— Up to 128 channels
— TTL and high voltage
— Isolated
— Solid-state and mechanical relays, latching or momentary
— Programmable function generator
— Real-time and off-line fault detection and isolation

Chassis and Power Supplies: VMIC provides a number of chassis and table top enclosures to complete your installation. A variety of power supplies are available to suit your system needs.

TRADEMARKS

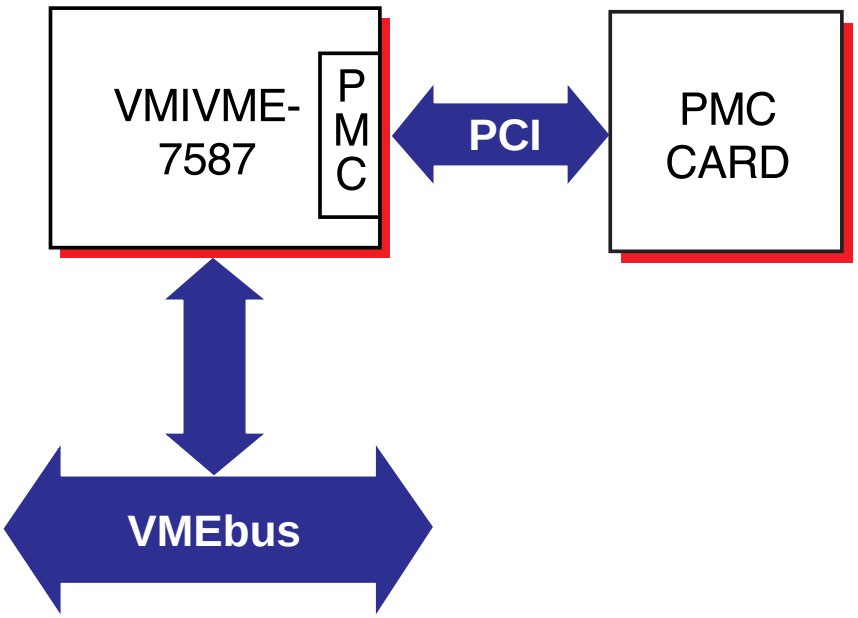


Figure 1. PMC Expansion Site