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BIT 3 COMPUTER CORPORATION

**DATA SHEET**

**MODEL 617**

**Adapter with DMA Connects a PCI System to a VMEbus System**

Bit 3's Model 617 is an easy-to-use, cost effective way to share memory and special purpose boards between a I Bus computer and a VMEbus system. The Model 617 Adaptor provides high-speed data transfers between syst requires minimal software support.

Linked by the Model 617 Adaptor, these two powerful computing environments become even more powerful a From the VMEbus side of the Adaptor, you can take full advantage of PCI system resources for VMEbus appli because the Adaptor card is treated as any other processor on the VMEbus, the PCI system acting through the A function as either a coprocessor or as the only bus master processor on the VMEbus. Consequently, the PCI sys directly control and monitor a wide variety of VMEbus cards and high-performance processors, as well as exch interrupts with the VMEbus.

The Model 617 Adaptor allows each bus to operate independently. The timing of the PCI bus and VMEbus is li when a memory or I/O reference is made to an address on one system that translates to a reference on the other. of the interface between Adaptor cards is maintained by parity checks on address, control and data lines.

Model 617 supports bi-directional random access bus mastering from either system and also supports 16- and 3 transfers using a built-in DMA Controller. The DMA Controller is a high-speed data mover engine that moves PCI system memory and the VMEbus at sustained data transfer rates up to 26 Megabytes per second (M Bytes/ allows a VMEbus DMA device (such as a disk controller) to DMA through the Adaptor directly into PCI mem transfer rates in excess of 10M Bytes/sec.

Other Bit 3 Adaptors, supporting a wide variety of buses, can be used with Model 617 Adaptors to connect mul computers and systems in star, daisy-chain or modified star/daisy-chain configurations.

COMMUNICATIONS BETWEEN PCI BUS & VMEbus

Model 617 supports two methods of intersystem communications: Memory Mapping and Direct Memory Acce

Memory Mapping controls random access (PIO transfers) to remote bus RAM, dual-port memory, and remote b provides an easy-to-use, flexible interface with low overhead. A PCI bus master can access memory in the VM through a window in PCI address space. Conversely, a VMEbus bus master can access PCI memory from a wi VMEbus address space.

Memory mapping registers (Mapping RAM Registers) are used to steer accesses in 4K byte segments from PC space to VMEbus address space. The contents of the 8,192 PCI to VMEbus Mapping RAM Registers identify t address, the address modifier code, and the option of byte or word swapping.


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Likewise, 4,096 32-bit Mapping RAM Registers are available to map accesses from VMEbus bus masters onto
In addition, there are 4,096 32-bit DMA to PCI bus Mapping RAM Registers.

Memory Mapping also controls access to dual-port memory. Dual Port RAM, an optional card installed on the
Adaptor card, provides a memory buffer; saves the cost of additional memory cards; and requires no additional
card slots.

Optional Dual Port RAM provides shared memory space accessible by random access reads and writes from eit
Dual Port RAM access uses only the bandwidth of the accessing bus. Consequently, data can be exchanged wit
impact on the performance of the other system's bus. Both systems can access Dual Port RAM simultaneously;
arbitrates accesses.

Dual Port RAM cards now available from Bit 3 include: 32K, 128K, 1M, 2M, 4M, and 8M byte cards.

DMA, the other method of communication, is the automatic transfer of data from one memory address to anoth
Model 617 Adaptor supports two DMA techniques: DMA Controller Mode and Slave Mode DMA.

DMA Controller Mode uses the Adaptor's DMA Controller to enable high-speed data transfers from one systen
directly into the other system's memory. Data transfer in either direction can be initiated by the PCI or VMEbus
Each DMA cycle supports transfer lengths up to 16M bytes. The DMA Controller also allows data transfers bet
memory and Dual Port RAM on the VMEbus Adaptor card.

In Slave Mode DMA, the Adaptor card appears as a slave memory card. This type of DMA transfer is performe
VMEbus DMA device (such as a disk controller) transfers data through the Adaptor directly into the PCI syster

INTERRUPT AND ERROR HANDLING

The Adaptor supports interrupts from four sources:

- Pending VMEbus interrupts IRQ1 - IRQ7.
- Programmed interrupts to the PCI system (PT interrupts).
- Interface error interrupts activated when a timeout, parity error, or bus error condition is detected on an A
- The DMA Done Interrupt that is activated when the Done Interrupt enable bit is set and a DMA operatio
  interrupt remains active until cleared by clearing the DMA Done bit or by starting another DMA operatic

Up to seven interrupts can also be sent from the VMEbus system to the PCI bus. These interrupts are selected f
possible sources: IRQ1 - IRQ7 and the PT interrupt.

Although there are several potential VMEbus interrupt sources, only one PCI interrupt signal is used. Therefore
status register and an interrupt control register are available for the PCI interrupt handling routine to use to dete
VMEbus interrupt source.

Two interrupt sources, PT and PR interrupts, can be generated from the PCI Adaptor card and sent to the VMEl

SYSTEM CONTROLLER MODE CAPABILITY

In addition to VMEbus control and bus master capabilities, the Model 617 Adaptor can provide the system cont
functions. If the VMEbus system is used primarily as an expansion chassis for the PCI system, System Controll
eliminates the need to purchase an additional VMEbus system controller.

When configured as the system controller the Model 617 Adaptor provides the VMEbus system clock and syste


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the Bus Error (BERR) global timeout. The VMEbus Adaptor card may be configured to be a Single-Level (SGL or a four-level bus arbiter in Priority (PRI) or Round-Robin (RRS) Mode.

MAPPING REGISTERS

All accesses from PCI to VMEbus, except Adaptor I/O registers, are through Mapping RAM. Each of the 8,192 RAM Registers controls access to 4K bytes of VMEbus address space. If all 8,192 Mapping RAM Registers po different 4K byte VMEbus addresses, a total of 32M bytes of PCI address space can be mapped to the VMEbus

Likewise, 4,096 Mapping RAM Registers are available for mapping random accesses and Slave Mode DMA ac originating on the VMEbus into PCI address space. The remaining upper 4,096 Mapping RAM Registers provi Controller Mode address control for either PCI or VMEbus initiated DMA transfers.

Because the PCI environment provides demand-paged virtual memory, a contiguous buffer is not guaranteed to contiguous pages when it is present in physical memory. Mapping RAM Registers on the PCI Adaptor card pro mechanism that allows discontiguous PCI physical pages to be accessed from a contiguous VMEbus address w appear contiguous for DMA operations. A third set of Mapping RAM Registers controls the remote address and attributes of part of the PCI's window into the VMEbus system. The 32M byte PCI window into VMEbus addre divided into 4K byte segments, each controlled by its own Mapping RAM Register; therefore, the address gaps devices do not need to be mapped.

TECHNICAL HIGHLIGHTS

- Random access reads and writes from the PCI system to the VMEbus.
- Random access reads and writes from the PCI bus to Dual Port RAM.
- Random access reads and writes from the VMEbus to the PCI bus.
- Flexible mapping of PCI bus address space to VMEbus memory and I/O address space.
- Accesses from the PCI bus to the VMEbus are A32, A24, or A16; data accesses are 32-, 16-, or 8-bit.
- Accesses from the VMEbus to PCI bus are A32; data accesses are 32-, 16-, or 8-bit.
- 32-bit and 16-bit Block Mode transfers are supported.
- Accesses from the VMEbus to Dual Port RAM are A32 or A24; data accesses are 32-, 16-, or 8-bit; Bloc transfers are supported.
- DMA Controller Mode and Slave Mode DMA.
- DMA modes support Dual Port RAM.
- DMA data transfers from chassis to chassis at sustained rates up to 26M Bytes/sec.
- Provides Byte Swapping and Word Swapping functions.
- VMEbus Adaptor card can function in System Controller Mode.
- Add up to 8M bytes of shared memory via optional Dual Port RAM cards.
- Interrupts can be passed from the VMEbus system to the PCI system.
- Parity checking on address, control and data lines on the PCI Adaptor card and on the interface between cards.
- Power requirements -

The VMEbus Adaptor card draws 3.5A at 5V.

The PCI Adaptor card draws 1.5A at 5V.

- Environment -

  Temperature: 0 to 60 degrees C operating;


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-40 to 85 degrees C storage.
Humidity: 0% to 90% non-condensing.

- Round EMI-shielded copper-conductor cable to 25 feet. Cable is available in standard 8- and 25-foot leng
- Fiber-Optic Interfaces are available as an option.
- 6U to 9U Holders are available as an option.
- VMEbus Adaptor card meets IEEE 1014C specifications.

REQUIRED COMPONENTS

- One short form factor PCI Adaptor card.
- One 6U VMEbus Adaptor card.
- A round EMI-shielded copper-conductor cable to connect the Adaptor cards (purchased separately from I

*Each Model 617 package contains: one PCI Adaptor card, one VMEbus Adaptor card, and a manual. A cable i but is ordered separately so that you can specify the appropriate length and type for your installation.*

OPTIONS

- Dual Port RAM

| | |
|---|---|
| 32K byte | Model 400-201 |
| 128K byte | Model 400-202 |
| 1M byte | Model 400-203 |
| 2M byte | Model 400-204 |
| 4M byte | Model 400-205 |
| 8M byte | Model 400-206 |

- Cable (one required)

| | |
|---|---|
| 8' Round EMI-Shielded | Model 400-107 |
| 25' Round EMI-Shielded | Model 400-108 |

Bulkhead connector configurations (contact Bit 3 for configurations)

- Fiber-Optic Interfaces

| | |
|---|---|
| Two Fiber Card | Model 400-5 |
| Four Fiber Card | Model 400-6 |
| Two Fiber Module | Model 400-50 |
| Four Fiber Module | Model 400-60 |

(Fiber-Optic Cards are for the VMEbus system only; Modules may be used with either the PCI or VMEbus sys Fiber-Optic Interfaces are required. For more information, request the Model 400 Fiber-Optic Interface data she

- Support Software


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Support Software for the PCI Local Bus will be available soon.

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