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DATA SHEET

MODEL 406

Adapter connects an IBM PC/AT computer to an A32 VMEbus system

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Bit 3's Model 406 Adaptor connects an IBM PC/AT computer to an A32 VMEbus system for fast, cost-effective sharing of memory and special purpose boards. The Model 406 Adaptor provides high-speed data transfers between the PC/AT bus and VMEbus, and requires minimal software support.

Model 406 interconnects the PC/AT and VMEbus at the physical layer. Working at the lowest level, the bus, the Adaptor allows the two systems to share memory; memory appears to and is treated by each system as if it were its own. In addition, a card only available on one bus may be accessed and directly controlled by a device on the other bus. For example, an Array Processor board in the VMEbus chassis can be directly controlled by the PC/AT processor.

The Model 406 Adaptor uses Memory Mapping for inter-system communications. Memory Mapping controls random access (PIO transfers) to VMEbus address space and dual-port memory. It provides an easy-to-use interface with low overhead that permits two processors to communicate via 8-bit and 16-bit random access memory reads and writes. The PC/AT system can access all 4G bytes of VMEbus system memory through a window in the PC/AT's address space.

With the Bit 3 Adaptor, each bus operates asynchronously and independently. The buses are linked only when a memory or I/O reference is made to an address on the PC/AT system that translates to a reference on the VMEbus system. The integrity of the interface between the Adaptor cards is maintained by parity checks on address, control, and data lines.

The Adaptor functions as a slave PC/AT device allowing memory references to it to pass to the VMEbus chassis. Although the VMEbus cannot directly address the PC/AT, data can be passed by VMEbus masters to and from the PC/AT via an optional shared Dual Port RAM card.

Other Bit 3 Adaptors, supporting a wide variety of buses, can be used with Model 406 Adaptors to connect multiple computers and systems in star, daisy-chain or modified star/daisy-chain configurations.

COMMUNICATION BETWEEN SYSTEMS

The Model 406 Adaptor supports Memory Mapped inter-system communication. Memory Mapping controls random access to VMEbus RAM, dual-port memory, and VMEbus I/O.

Memory Mapping provides an easy-to-use, flexible interface with low overhead that permits two processors to communicate via 8-bit and 16-bit random-access memory reads and writes. The PC/AT computer can access up to 4G bytes of memory in the VMEbus system through a window in the PC/AT bus address space.

Memory Mapping permits high-speed random access 8-bit and 16-bit writes from the PC/AT to the VMEbus at speeds comparable to reads and writes to local memory. Programmable I/O registers, loaded at system

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boot, establish the resulting host and destination address ranges in address space.

Two Memory Mapping techniques are supported: Direct Mode (with address biasing) and Page Mode. Either technique may be used to control access to VMEbus memory and dual-port memory. Access to VMEbus I/O is not affected by mapping mode.

Direct Mode has a one-to-one relationship between address windows. Data are transferred through one window directly into an equal size window on the other bus. Window size is configured via jumper settings. The addressing range can be as large as 14.8M bytes (15M bytes extended minus 128K bytes system space).

In Page Mode, a 32K - 1M byte window in PC/AT bus address space is coupled with programmable registers that provide the upper bits for the VMEbus address. The lower bits of the VMEbus address come directly from the PC/AT. Thus, the PC/AT can access 4G bytes of memory in the VMEbus system by paging through the VMEbus system's address space.

Data transfers are either 8-bit bytes or 16-bit words for both memory and I/O cycles. Round trip cycle time from the PC/AT to the VMEbus and back is 2 usec. If 16-bit words are transferred, the data rate is 1M Byte/sec.

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

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

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

INTERRUPT AND ERROR HANDLING

Model 406 supports interrupts from three sources:

- Up to four of the seven VMEbus interrupts (IRQ1 - IRQ7) can be passed by the Adaptor to the PC/AT chassis.
- Programmed interrupts can be passed in either direction.
- A programmable register holds the interrupt vector transmitted to a VMEbus processor when an interrupt is acknowledged.
- The Interface Error Interrupt can be activated when a timeout, parity error or bus error condition is detected on an Adaptor card.

An Adaptor card control register provides PC/AT acknowledgment of VMEbus interrupts and vector passing.

VMEbus SYSTEM CONTROLLER CAPABILITY

In addition to VMEbus control and bus master capabilities, the Model 406 Adaptor can function as the VMEbus system controller. If the VMEbus system is to be used primarily as an expansion chassis for slave VMEbus cards, this feature saves the expense of an additional VMEbus system controller.

If configured as the system controller, the VMEbus Adaptor card provides level 3 bus arbitration, the VMEbus system clock and system reset, and the BERR global timeout.

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32K BYTE WINDOWS

- The Model 406 Adaptor now supports window sizes as small as 32K bytes for easy mapping below 1M byte. The windows can also be individually enabled or disabled.

OTHER FEATURES

- Handshake Mode allows the PC/AT processor to communicate with very slow VMEbus devices. When the Handshake Mode bit is set, software polls to complete the transfer.
- Byte and word swapping control the order of data passing through the Model 406 Adaptor.

TECHNICAL HIGHLIGHTS

- Works with virtually all PC/AT-compatibles that have expansion slots with 8 MHz I/O bus timing.
- Random access reads and writes from the PC/AT computer to VMEbus devices.
- Flexible mapping of PC/AT address space to and from VMEbus memory and I/O address space.
- Addressing from the PC/AT to the VMEbus is A32, A24, or A16; data accesses are 16- or 8-bit.
- Addressing from the VMEbus to optional Dual Port RAM is A32 or A24; data accesses are 32-, 16-, or 8-bit.
- Page Mode allows access to 4G bytes of VMEbus memory through 32K - 1M byte page size.
- Add up to 8M bytes of shared memory via optional Dual Port RAM cards.
- Interrupts can be exchanged between a VMEbus and PC/AT bus.
- Parity checking on address, control and data lines on the PC/AT Adaptor card and on the interface between Adaptor cards.
- PC/AT memory and I/O operations with the VMEbus may be either byte or word transfers.
- Power requirements -

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The VMEbus Adaptor card draws 3.5A at 5V.

The PC/AT Adaptor card draws 3.0A at 5V.
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- Environment -

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Temperature:          0 to 60 degrees C operating.

-40 to 85 degrees C storage.

Humidity:             0% to 90% non-condensing.
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- Round EMI-shielded copper-conductor cable to 25 feet. Cable is available in standard 8-foot and 25-foot lengths.
- Fiber-Optic Interfaces are available as an option.
- VMEbus Adaptor cards meet IEEE 1014C specifications.
- Recognized under the component program of Underwriter Laboratories, Inc.

REQUIRED COMPONENTS

- One PC/AT Adaptor card (included in Model 406 package).
- One 6U A32 VMEbus Adaptor card (included in Model 406 package).A round EMI-shielded cable to connect the Adaptor cards (purchased separately from Bit 3).

Each Model 406 package contains: one PC/AT Adaptor card, one 6U A32 VMEbus Adaptor card, a Utilities Diskette and a manual. A cable is required but is ordered separately so that you can specify the appropriate length for your installation.

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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 400-105
25' Round EMI-Shielded	Model 400-106

Bulkhead connector configurations (contact Bit 3 for configurations)

- Fiber-Optic Interfaces

Two Fiber Card	Model 400-5
Two Fiber Module	Model 400-50

(Fiber-Optic Cards are for the VMEbus system only; Modules may be used with either the PC/AT or VMEbus system. Two Fiber-Optic Interfaces are required. For more information, request the Model 400 Fiber-Optic Interface data sheet.)

- Fiber-Optic Cable

High-quality, OFNP-grade, 62.3/125 micron glass duplex cable with tight buffer construction and ST-style connectors; standard cables are 5 meters (approximately 16') in length; custom lengths up to 2 km are available.

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