

Chapter 1: Introduction

1.0 Overview

The Bit 3 Model 617 Adaptor is an easy-to-use, cost-effective way to share memory and special purpose cards between a PCI bus system and a VMEbus system. The Model 617 Adaptor provides high-speed data transfers between the two systems, and requires minimal software support.

Model 617 interconnects the PCI and VMEbus systems 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. Therefore, a card only available on one bus may be accessed and directly controlled by a system using another bus. For example, an Array Processor board in a VMEbus chassis can be directly controlled by the processor on the PCI bus.

Model 617 supports two methods of inter-system communications: Memory Mapping and Direct Memory Access (DMA). Memory Mapping supports bi-directional random access bus mastering from either system. This allows Programmed Input/Output (PIO) access to VMEbus RAM, dual-port memory, and VMEbus I/O, and provides an easy-to-use, flexible interface with low overhead. A PCI bus master can access memory in the VMEbus system through a window in PCI memory address space. Conversely, a VMEbus bus master can access PCI memory from a window in VMEbus address space.

Memory mapping is accomplished through 16,384 Mapping Registers that are used to steer memory accesses on one bus to the appropriate address on the other bus. The Mapping Registers allow PCI devices to access up to 32M bytes of VMEbus address space and VMEbus devices to access up to 16M bytes of PCI space. In addition, the Mapping Registers allow up to 16M byte DMA transfers.

The Model 617 Adaptor supports two DMA techniques: DMA Controller Mode and Slave Mode DMA.

DMA Controller Mode uses the Adaptor's DMA Controller to provide high-speed data transfers from one system's memory directly into the other system's memory. Data transfer can be initiated in both directions by either the PCI or VMEbus processor. Each DMA cycle supports transfer lengths up to 16M bytes. The DMA Controller also allows memory-to-memory transfers between PCI memory and Dual Port RAM on the VMEbus Adaptor card. DMA Controller Mode can sustain data rates up to 26 Megabytes per second (M Bytes/sec).

VMEbus devices that have their own DMA controllers can use Slave Mode DMA instead of DMA Controller Mode. Slave Mode DMA allows a VMEbus DMA device to transfer data through the Adaptor directly into PCI memory at data rates in excess of 12M Bytes/sec.

Model 617 does not link the timing of the two buses (so that activity on one bus slows down the other). Instead, the Adaptor permits each bus to operate *independently*. The buses are linked only when a memory or I/O reference is made to an address on one system that translates to a reference on the other system's bus.

The Model 617 Adaptor consists of two cards: a short form factor PCI card and a 6U size VMEbus card. The two cards are connected by a round EMI-shielded copper-conductor cable purchased separately from Bit 3.

Cable is available in standard 8-foot or 25-foot lengths. Custom lengths may be ordered. Fiber-Optic Interface Cards and Modules are also available from Bit 3.

An optional Dual Port RAM card that installs on the VMEbus Adaptor card is available from Bit 3. The Dual Port RAM can be accessed by both systems and provides an inexpensive method of expanding PCI and VMEbus memory as well as a convenient way to share memory between the two systems. The following Dual Port RAM sizes are available: 32K, 128K, 1M, 2M, 4M, and 8M bytes.