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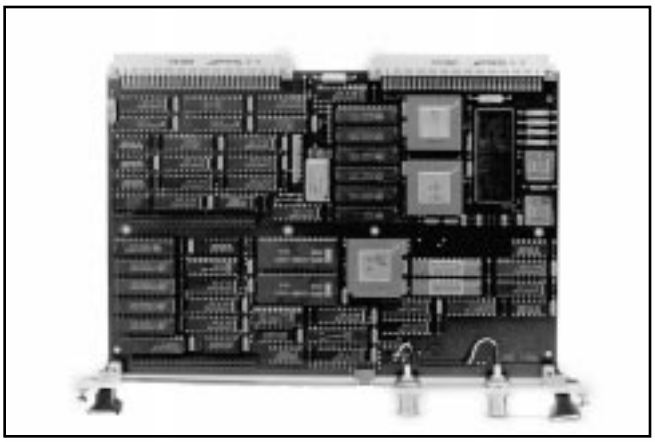
VMIVME-6000
MIL-STD-1553 Communications Controller Interface Board

- Software-selectable protocol
  - — MIL-STD-1553A
  - — MIL-STD-1553B
  - — McAir A3818, A5232, A5690
  - — General Dynamics 16PP303/690
- Programmable configurations
  - — Bus controller
  - — Bus simulator
  - — Multiple remote terminal/monitor
  - — Bus analyzer
  - — Diagnostic (self-test)
- Powerful custom ASIC-based design
- 256 Kbyte of dual-port memory
- Error generation capabilities
  - — Parity
  - — Bit count (17 to 28 bit times)
  - — Manchester errors including both bi-phase and transition errors
  - — Sync errors in both command words and data words
  - — No response and late responses (programmable in ms increments)
  - — Incorrect terminal address error (status word)
  - — Word count (plus and minus)
  - — Gaps between data words
- Error detection and detailed error reporting
- Double height (6U) board
- Flexible programmable interrupts
- Complete C software library of interface routines for all modes of operation available

PRODUCT OVERVIEW — The VMIVME-6000 is a microprogrammed MIL-STD-1553 interface designed specifically for VMEbus computers. The unit provides 128 Kbyte x 16 bits of dual-port RAM for constructing Control Block information and storing transmitted and received 1553 bus data. The VMIVME-6000 is compatible with the protocol of 1553B, 1553A, as well as, F16 and F18 derivatives of these specifications. The VMIVME-6000 can function as a Bus Controller/ Simulator, Multiple Remote Terminal and/or Monitor. The VMIVME-6000 is based on a microprogram-driven CMOS ASIC chip set that allows the unit to provide the versatility needed by tester and simulator environments, while meeting the needs of today's system power, space, and reliability requirements. Figure 1 shows a high-level block diagram of the VMIVME-6000.

The unit is programmed through command registers to the VMIVME-6000 slave interface, and Control Blocks constructed in the on-board 128 Kbyte x 16-bit memory. Once initialized by the host, the VMIVME-6000 Bit Slice ASIC chip set will retrieve and store all Control Block data and commands needed for 1553 operation. The VMIVME-6000 also provides two levels of maskable interrupts to allow flexible data and exception processing.



The VMIVME-6000 is a single 6U VMEbus printed circuit board that requires only one backplane slot for operation. The 1553 bus may be customer selected (by jumpers) to be accessible through the VMEbus P2 connector or through the front panel of the unit.

The VMIVME-6000 VMEbus slave interface has 16 VMEbus I/O register locations that are accessible by the host. These registers may be mapped on the VMEbus starting at address C000H of the short I/O space, in 64-byte increments.

The VMEbus base address of the on-board 128 Kbyte x 16-bit memory is programmed through the base address register in the short I/O space. This allows configuration of the memory space through software. As a slave device, the VMIVME-6000 supports standard (A24),(A16) addressing and will respond to address modifiers 3DH, 39H, 2DH, 29H.

The VMIVME-6000 slave interface supports standard byte/word transfers to the on-board memory. The I/O registers should be accessed as words ONLY. The VMIVME-6000 will not respond to longword (32-bit) transfers.

OPERATIONAL MODES — There are three basic active modes for the VMIVME-6000: Self-Test/Diagmode, Bus Controller/Simulator, and Multiple Remote Terminal/Monitor.

Ordering Options

Oct. 28, 1994 800-006000-000 C		A	B	C	–	D	E	F
VMIVME-6000	–	0	0	0	–			

ABC = 000 (Options reserved for future use)

For Ordering Information, Call:
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Self-Test Modes: Self-test features a power up self-test which requires no host interaction and verifies the health of the custom microengine and SRAM, a host-controlled diagmode self-test which checks the microengine, SRAM, and performs 1553 wraparounds within the board or out to the 1553 bus itself, and a self-test loopback with full validation and error checking on all words that it transmits onto the 1553 bus. The VMIVME-6000 may also be programmed to inject errors in a diagmode, so the error detection logic can be exercised.

Bus Controller/Simulator Mode: Bus Controller/Simulator is based on a flexible Control Block (CB) structure that, along with internal host programmable registers, allows the VMIVME-6000 to initiate all ten defined MIL-STD-1553B message formats. The unit will execute the Control Blocks independent of the host until an interrupt occurs or the END OF CHAIN bit is detected. Some of the options and features of this mode include: programmable intermessage gaps, response time-outs, message-level interrupts, RT response simulation, error generation, Major/Minor time frames, conditional branching, and automatic retries. In cases where the options are not needed, the unit will default to a predefined protocol. Once the Control Blocks have been constructed and the proper registers initialized, the unit operates independently without host intervention.

In addition to being the bus controller, the Status Response to any of the message formats may be simulated by the VMIVME-6000, allowing the unit to simulate an entire 1553 system. Enabling of Status Response simulation is programmable in Control Word 1 of the Bus Controller Control Block. The Status Word to be transmitted in response to a Receive Command should be written into the SW1 location of the Bus Controller Control Block. The Status Word transmitted in response to a Transmit Command should be written into the SW2 location of the Control Block. Any data to be transmitted as a response to a transmit command should be loaded into the data buffer pointed to by the BC Control Block data pointer and map.

Multiple Remote Terminal (MRT)/ Monitor Mode: The Multiple Remote Terminal/Monitor mode will simulate and/or monitor up to 32 remote terminals. The VMIVME-6000 will simulate selected RTs while monitoring messages addressed to other RTs. The VMIVME-6000 is capable of handling the 1553B, 1553A, F-16, and F-18 protocols. The selection of the protocol simulation is done at the RT level so the unit can be programmed to be compliant with any of the four protocols with any combination of the RTs. The VMIVME-6000 will simulate intermixed protocols with some RTs simulating 1553B and other RTs simulating 1553A, F18 (A3818), and F16 (16PP967).

The VMIVME-6000 is capable of generating errors in individual words at the RT level. It will also detect and report errors in the Interrupt and Transmission Status Registers for each message. A maskable interrupt is available for each RT (whether it is simulated or monitored). Two levels of Interrupt (A and B) are available for each RT whether it is being simulated or monitored. Also, the unit provides a host programmable 32-bit time tag in both MRT and Monitor modes. The time tag increments are programmed by the host for either 1 or 64 msec resolution. The time tags may be stopped, started, and loaded by the host at any time.

Multiple Remote Terminal (MRT) mode is the mode in which the VMIVME-6000 actually simulates an RT(s). It will transmit or receive data and provides the status response. It is capable of handling all 10 defined 1553B message formats including execution of Broadcast Mode Codes for simulated RTs.

The VMIVME-6000 will simulate both or either RT in an RT-to-RT transfer. It will simulate one RT and monitor the other, and the VMIVME-6000 can do all combinations involving an RT-to-RT broadcast.

Monitor mode is a pure record mode. It records all selected 1553 bus traffic and stores it in a ring buffer structure. Monitor mode *monitors* the 1553 bus traffic and stores the information in the same data buffer format as the MRT mode. The MRT/MON mode is capable of handling all ten defined message formats including broadcast and mode codes.

Error Detection/Generation: The VMIVME-6000 features the ability to generate and detect numerous 1553 bus errors in all modes. Error detection is done automatically in all operational modes while error generation is done on a Control Block basis in the BC Mode and at the RT level in MRT/MON Mode. Error generation is also possible in diagmode. The types of errors supported include Manchester, Parity, Sync, Bit Count, Terminal Address, ± Word Count, Respond on Wrong Bus, Data Word Gap, High/Low Bi-Phase Error, Zero Crossing, and others.

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Software: A complete set of sample software interface routines for the VMIVME-6000 is available on request. The source code, written in ANSI standard "C", may be used or modified by the user as needed. These routines range from low-level I/O sequences to routines that build entire Control Blocks with a minimum number of input parameters.

FUNCTIONAL CHARACTERISTICS

VMEbus Slave Interface: A24, A16, D16, D8 (EO)

MIL-STD-1553: Dual-Channel, Direct or Transformer-coupled on front panel or P2

Slave Access Time (Memory): 800 ns maximum (DS* to DTACK*)

Slave Access Time (Short I/O): 1,500 ns maximum (DS* to DTACK*)

Interrupter: ROAK, D16 (Vector)

PHYSICAL/ENVIRONMENTAL

Temperature Range: 0 to 55 °C, operating
-40 to +65 °C, storage

Operating Humidity: 0 to 90 percent, noncondensing

Power Requirements:
2.5 A (typical) at +5 VDC
100 mA (typical) at +12 VDC
100 mA (typical) at -12 VDC

COMPATIBILITY

Physical: Double height VME (6U) single slot

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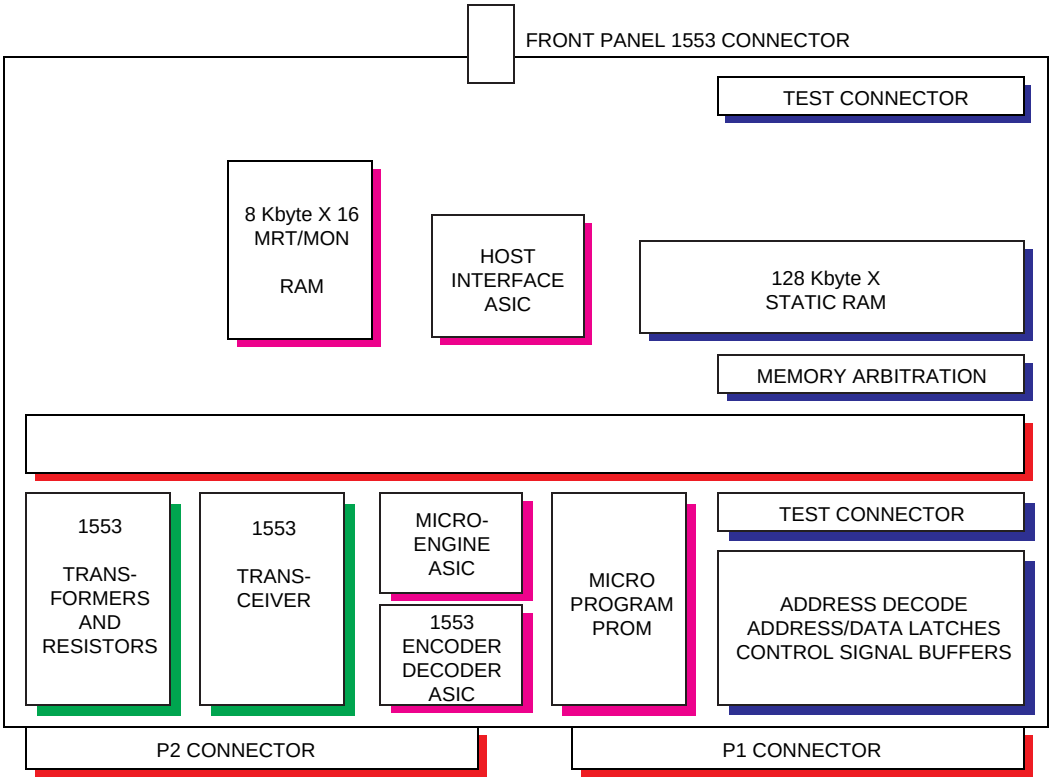

Figure 1. VMIVME-6000 Block Diagram

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