

VECTOR GRAPHIC EXTENDED MONITOR

The VECTOR GRAPHIC EXTENDED MONITOR available on 2708 or 1702 type proms provides 25 useful commands. When used with VECTOR GRAPHIC Prom/Ram boards system start up is greatly simplified - just turn the power on! The EXTENDED MONITOR is programmed on one 2708 or four 1702A (five with video driver program) and is available for the most popular I/O configurations:

OPTION A	MITS SIO REV 1/3P+S W/INVERTED STATUS
OPTION B	MITS 2 SIO
OPTION C	VECTOR GRAPHIC BITSTREAMER SERIAL IN/OUT IMSAI SIO2
OPTION D	VERSION 1.0 POLY VTI (OBSOLETE)
OPTION E	3P+S WITHOUT INVERTED STATUS BIT
OPTION AV	VDM-1 OUTPUT, INPUT SAME AS OPTION A
OPTION EV	VECTOR GRAPHIC FLASHWRITER ; 3P+S INPUT VDM-1 OUT; VECTOR GRAPHIC BITSTREAMER PARALLEL INPUT, VDM-1 OUT
OPTION P	POLY VTI VERSION 1.2
OPTION EP	3P+S INPUT, POLY VTI 1.2 OUT; BITSTREAMER PARALLEL INPUT, VTI 1.2 OUT
OPTION CV	BITSTREAMER SERIAL IN, FLASHWRITER OR VDM-1 OUTPUT.

EXTENDED MONITOR COMMANDS

A	ASCII DUMP
B	JUMP TO BOOTSTRAP LOADER (I.E. E900H)
C	COMPARE BLOCKS OF MEMORY
D	JUMP MEMORY IN HEX
E	JUMP TO EXTENSION PROM (I.E. C400)
F	FIND TWO BYTES
G	GO TO AND EXECUTE
I	INPUT FROM PORT
J	JUMP TO LOADED DOS (I.E. 2028H)
L	LOAD TARBELL CASSETTE AND GO
M	MOVE MEMORY BLOCK
N	NON DESTRUCTIVE MEMORY TEST
O	OUTPUT TO PORT
P	PROGRAM MEMORY
Q	COMPUTE CHECKSUM
R	READ CASSETTE
S	SEARCH FOR SINGLE BYTE
T	TEST MEMORY
U	TARBELL SYNC
V	VERIFY TAPE
W	WRITE CASSETTE TAPE
X	EXCHANGE MEMORY BLOCKS
Y	RELOCATING LOADER (1702 PROMS)
Y	KEYBOARD ECHO (2708 PROMS)
Z	ZERO OR FILL MEMORY

BITSTREAMER I/O BOARD

The VECTOR GRAPHIC BITSTREAMER I/O BOARD provides two 8 bit parallel ports (2 input/2 output) and one serial port. Fully S-100 bus compatible, the BITSTREAMER allows interfacing to most peripherals including terminals, printers, readers and punches. The serial port operates at 110 to 9600 baud (switch selectable) asynchronous data and DC to 56K baud synchronous data (including IBM BI-SYNC). Using an 8251 programmable usart, the BITSTREAMER may be software configured for 5-8 data bits and 1, 1 1/2, 2 stop bits.

The parallel interface provides two full 8 bit ports with latched strobe inputs for easy connection to keyboards. Data transmission rates greater than 100K bytes/sec are possible depending on software.

Available assembled or in kit form, the BITSTREAMER includes solder mask on both sides of the board, operation at 4 MHz CPU clock rates and gold plated edge connectors.

SPECIFICATIONS

PORTS

1 SERIAL, 2 PARALLEL

SERIAL PORT

SIGNAL LEVELS	EIA RS-232, 20 MA CURRENT LOOP, TTL
DATA RATE	ASYNCHRONOUS 110-9600 BPS (SWITCH SEL) SYNCHRONOUS DC-56K BPS
CONTROLLER	8251 PROGRAMMABLE USART
DATA BITS	5-8 PROGRAMMABLE
STOP BITS	1, 1 1/2, 2 PROGRAMMABLE

PARALLEL PORT

SIGNAL LEVEL	TTL (INPUT - 1 TTL LOAD) (OUTPUT - DRIVE 5 STD TTL LOADS)
NO OF LINES	16 OUTPUT 16 INPUT 2 CONTROL
DATA TRANSFER RATE	>100K BYTES/SEC.

VECTOR 1, VECTOR 1+ and VECTOR 1++

The VECTOR 1, VECTOR 1+ and VECTOR 1++ are exceptionally versatile general purpose byte-oriented digital computers. They are based on the 8080A/Z-80A Microprocessor and the common S-100 bus structure. Each has room for up to 64K of directly addressable memory using a parallel 8 bit word/16 bit address and 256 separate input and output devices can be addressed.

The VECTOR 1, VECTOR 1+ and VECTOR 1++ incorporate improvements in mechanical, thermal, and electrical design compared to competitive computers. Mechanically rigid heavy .093" gauge cabinets retain their structural integrity even with their covers removed. A low noise level fan is standard with each box, and cross ventilation uniformly cools each circuit board you might include. The power supply components transfer their heat directly to the case bottom for cool operation. A line filter is provided to prevent transients on the power line from causing memory errors, a common problem.

The mechanical assembly of the case and card guides is simplified through the use of special fasteners and snap together components. No sheet metal screws are used.

Using the Prom/Ram board and Prom Monitor, the VECTOR 1 can load cassette tapes or diskettes and communicate with a terminal through an I/O board as soon as the power is turned on.

The VECTOR 1+ will accommodate one 5" diskette such as the Shugart SA-400 drive. The VECTOR 1++ will accommodate two drives.

POWER SUPPLY - The 22A 8V and 4A + 16V, 1A - 16V custom supply provides sufficient power for a full 18 boards. The transformer has a multiple tapped primary, all class B insulation and the 8V supply has a 150,000 mfd filter capacitor.

MOTHERBOARD - .093" material, full ground plane shield, soldermasked on both sides, plated through holes, 18 slots, bus termination, .125" x .25" 100 pin connectors.

SPECIFICATIONS

Number of boards	up to 18	
Microprocessor	8080A	Z-80A
Technology	NMOS	NMOS
Data Word Size, Bits	8	8
Instruction Word Size, Bits	8	8
Clock Frequency	2 Mhz	4 Mhz
Add Time, Register to Register Microsec. per data word	2	1
Number of Instructions	78	158
8 bit registers	7	14
I/O Word Size Bits	8	8
Number of I/O channels	256	256
Direct Memory access	Optional	Optional
Vectored interrupts (8 priority levels)	Std.	Std.
Non maskable interrupt	no	yes
Software		
Monitor or Executive	System Monitor	System Monitor
Resident Assembler	ESP-1	ESP-1
Disassembler	The Sourcerer	The Sourcerer
Higher-level language	Basic	Basic

ANALOG INTERFACE BOARD

The VECTOR GRAPHIC ANALOG INTERFACE BOARD is a multipurpose board designed to permit low cost interfacing with potentiometers, joysticks, or voltage sources. In addition, an eight bit digital port is provided with a latched strobe which can be used as a keyboard input port, to take the place of front panel sense switches, or for any other applications requiring digital inputs.

A pair of tone pulse generators can be used to produce sounds for games or for keyboard audio feedback. The board occupies two input and output port addresses which may be assigned anywhere from 00 to FF hex.

Analog conversion is accomplished by means of a program loop testing a voltage comparator output and incrementing a register as a result of the comparison. A conversion with the resolution required for cursor motion takes about 480 usec. The resolution of the A/D conversion is entirely under software control and can range from 16 or 64 counts for cursor motion to 1024 or more for graph plotting or feedback controls. Available factory assembled and tested or in easy to build kit form.

SPECIFICATIONS

INTERFACE	S-100 BUS COMPATIBLE
A/D CHANNELS	4
INPUT SIGNAL	0 TO +2.5 VDC
RESOLUTION	16-1024 COUNTS-SOFTWARE DETERMINED
CONVERSION TIME	480 USEC TYPICAL FOR 16 COUNT RESOLUTION
PARALLEL PORT	8 BITS INPUT 1 LATCHED STROBE INPUT
TONE GENERATOR	DUAL TONE, 450 HZ AND 800 HZ

S-100 MOTHERBOARD

VECTOR GRAPHIC realizes the need for many users to upgrade other computer mainframes and is pleased to offer a high quality, rugged 18 slot motherboard. Designed to be retrofitted into existing mainframes or used for homebrew systems, the board is constructed of .093" FR4 fiberglass with solder mask both sides and plated thru holes. The motherboard is fully shielded to reduce bus noise and has provision for terminator resistors and associated 5 VDC regulator (installed on assembled boards and supplied with kits). Each board undergoes careful inspection and is checked for shorts. Available factory assembled with 18 connectors or in kit form with terminator resistors, regulator and provision for 18 connectors.

SPECIFICATIONS

SLOTS	18
MATERIAL	.093" FR4 FIBERGLASS
CONNECTOR	100 PIN .125" X .25" PIN SPACING
DIMENSIONS	WIDTH 8.5 IN (21.59 CM) DEPTH 15.0 IN (38.10 CM)

PROM/RAM BOARD

The VECTOR GRAPHIC "RESET AND GO" PROM/RAM combines the technologies of fully static random access memory with ultra violet light erasable programmable read only memory to provide a versatile addition to any system. Using VECTOR GRAPHIC MONITOR PROMS any system can become Reset and Go eliminating tedious switch toggling of bootstrap routines. The PROM/RAM board has a capacity of up to 2K bytes of 1702A type prom and includes 1K of 2102 static ram. On board generation of MWRITE allows operation in machines without front panel consoles. The PROM/RAM board occupies a 4K block of memory and is jumper addressable on 4K boundaries. Jumper selectable wait states allow operation with 4 MHz CPU's even with the slowest of memory. As with all VECTOR GRAPHIC boards, both sides are solder masked and features gold over nickel edge contacts and plated thru holes. Available factory assembled and tested or in easy to build kit form.

SPECIFICATIONS

INTERFACE	S-100 BUS COMPATIBLE
CAPACITY	2K BYTES PROM (NOT INCLUDED) 1K BYTES STATIC RAM
MEMORY TYPE	PROM - 1702A RAM - 2102 STATIC RAM
ADDRESSING	4K BLOCKS - JUMPER SELECTABLE
POWER REQUIREMENTS	+8 VDC @ 450 MA (TYP) +16 VDC @ (DEPENDS ON QTY OF PROM) -16 VDC @ (DEPENDS ON QTY OF PROM)

Z-80 CPU BOARD

The VECTOR GRAPHIC Z-80 CPU BOARD is a fully S-100 bus compatible product designed to provide users the best performance at a reasonable price. Based on the Z-80A microprocessor, operation at 4 MHz clock rate is jumper selectable. Included is a jumper selectable automatic wait state which allows 4 MHz operation with slower memory boards while actually maintaining 80% or better throughput speed. All interface signals are fully buffered and the carefully engineered board layout assures reliable operation at 4 MHz. Another special feature of the Z80 CPU is jumper selectable MWRITE generation for use in systems without a front panel switch console or other source of MWRITE. Quality features include solder mask on both sides of the PC board, plated through holes, gold plated edge contacts, all IC's prime parts from reputable manufacturers, all IC's socketed, and card extractors for easy installation and removal. Available factory assembled and tested or in easy to build kit form.

SPECIFICATIONS

INTERFACE	S-100 BUS COMPATIBLE
PROCESSOR	MOSTEK Z-80A (MK-3880N)
NUMBER OF DATA BITS	8
NUMBER OF ADDRESS BITS	16
INSTRUCTIONS	158 (INCLUDING ALL 78 8080A INSTR)
CLOCK	2 OR 4 MHZ JUMPER SELECTABLE
POWER REQUIREMENTS	+8 VDC @ 750 MAMP (TYP)
INTERRUPTS	ALL THREE Z80 MODES
I/O DEVICES	256 INPUT/OUTPUT

12K PROM/RAM

The VECTOR GRAPHIC 12K PROM/RAM BOARD is designed to accommodate up to 12K bytes of 2708 or 2704 type programmable read only memory and includes 1K of static ram. The board is functionally divided into two 8K blocks; block A consisting of up to 8K bytes of PROM; block B consists of up to 4K bytes of PROM and the 1K bytes static RAM. Block A and B are independently addressable on 8K boundaries and in block B, the 1K RAM is addressable on 1K boundaries. The 12K PROM/RAM BOARD is S-100 bus compatible and has the necessary circuitry to perform the reset and go function as well as generate MWRITE (all jumper selectable).

All IC's are socketed and the board features soldermask both sides, gold over nickel edge contacts, and card extractors, all signal lines are buffered to reduce bus loading and improve immunity to noise and transients. The 12K PROM/RAM BOARD is available factory assembled and tested or in easy to build kit form.

SPECIFICATIONS

INTERFACE	S-100 BUS COMPATIBLE
CAPACITY	12K BYTES PROM/EPROM (NOT INCLUDED) 1K BYTES STATIC RAM (INCLUDED)
SPEED	STATIC RAM - 450 NSECS. PROM - USER SELECTED (TYP 450 NSECS)
MEMORY TYPE	PROM - 2704 OR 2708 RAM - 2102 STATIC RAM
ADDRESSING	8K BLOCKS ON 8K BOUNDARIES JUMPER SELECTABLE
POWER REQUIREMENTS	+8 VDC @ 450 MA (TYP) +16 VDC @ (DEPENDS ON QTY OF PROM) -16 VDC @ (DEPENDS ON QTY OF PROM)

8K STATIC RAM

The board that has become a favorite for thousands of satisfied customers continues to be a good value. Utilizing fully static RAM memories (2102) for top performance and unrestricted DMA operation, the VECTOR GRAPHIC 8K STATIC MEMORY BOARD is offered fully assembled, tested and burned in for 72 hours at 120 C. Available in 450 nanosecond and 250 nanosecond access time versions, each board uses four conservatively rated voltage regulators. Addressing is in 8K blocks on 8K boundaries switch selectable. Hardware write protect is also switch selectable. For user convenience, the dip switch is located at the top of the board to permit relocation without necessitating board removal. The 8K STATIC RAM is fully S-100 bus compatible and incorporates the phantom bootstrap output disable for use with reset and go mainframes. As with all VECTOR GRAPHIC boards, soldermask is on both sides and contact pins are gold plated for reliable connections.

SPECIFICATIONS

INTERFACE	S-100 BUS COMPATIBLE
CAPACITY	8K BYTES
SPEED	250 NANOSECONDS OR 450 NANOSECONDS
MEMORY TYPE	2102 FULLY STATIC RAM
POWER REQUIRED	(250 NS) +8 VDC @ 1.6A (TYP) (450 NS) +8 VDC @ 1.3A (TYP)
ADDRESSING	8K BLOCK - SWITCH SELECTABLE
MEMORY PROTECT	HARDWARE - 8K BLOCK - SWITCH SELECTABLE
BURN IN	72 HOURS @ 120 C
DMA OPERATION	NO RESTRICTIONS

16K STATIC RAM

The VECTOR GRAPHIC 16K STATIC RAM BOARD is a high quality, S-100 bus compatible memory system. Utilizing state of the art high speed static ram allows unrestricted DMA operation, no need to worry about refresh cycles as required by dynamic ram. 350 nsec access static ram also allows operation with Z-80 based CPU's at full 4 MHZ clock speed with no wait states. All signal lines are fully buffered and in addition, the address lines use Schmitt trigger buffers for extra immunity from bus noise and transients. Use of 4 conservatively rated voltage regulators assures reliable operation over the long term. All IC's are fully socketed for ease of maintenance. Addressing is in 8K blocks on 8K boundaries, switch selectable. Hardware write protect is also switch selectable. Each 16K MEMORY BOARD can be assigned to 1 or more of 8 memory banks thus permitting up to 512K bytes of memory in a chassis. User convenience features include card extractors, all switches located at top of board so boards can be reconfigured without removal, plated through holes, a solder mask on both sides of the board, and gold over nickel edge contacts.

SPECIFICATIONS

INTERFACE	S-100 BUS COMPATIBLE
CAPACITY	16K BYTES
SPEED	350 NANOSECONDS
MEMORY TYPE	2114 FULLY STATIC RAM
POWER REQUIRED	+8 VDC @ 1.8 AMPS (TYP)
ADDRESSING	SWITCH SELECTABLE BY 8K BLOCKS
MEMORY PROTECT	HARDWARE IN 8K BLOCKS, SWITCH ACCESSABLE
MEMORY BANKS	EIGHT - SWITCH SELECTABLE
BURN IN	72 HOURS AT 125 C
DMA OPERATION	NO RESTRICTIONS