

# the altair™ system



LOAD "CONAR" & R  
MISSION CONTROL CALLING LUNAR MODULE  
MINIMAL CONTROL IS NECESSARY FOR LANDING  
YOU MUST SPECIFY A FUEL RATE EACH  
RATES MUST ZERO, OR BETWEEN 8 AND 200 LBS. PER  
YOU HAVE 16000 LBS OF FUEL.  
CAPSULE WEIGHT IS NOW 32500 LBS, INCLUDING FUEL  
COMMENCE LANDING PROCEDURE.

FIRST RNDMR CHECK COMING UP:  
TIME(SEC) ALT(MILES+FEET) VELOCITY(FPS) FUEL(LBS) FUEL RATE

0	120 0	3200	16000	FUEL RATE
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# Imagine a microcomputer

Imagine a microcomputer with all the design savvy, ruggedness, and sophistication of the best minicomputers.

Imagine a microcomputer supported by dozens of interface, memory, and processor option boards. One that can be interfaced to an indefinite number of peripheral devices including dual floppy discs, CRT's, line printers, cassette recorders, video displays, paper tape readers, teleprinters, plotters, and custom devices.

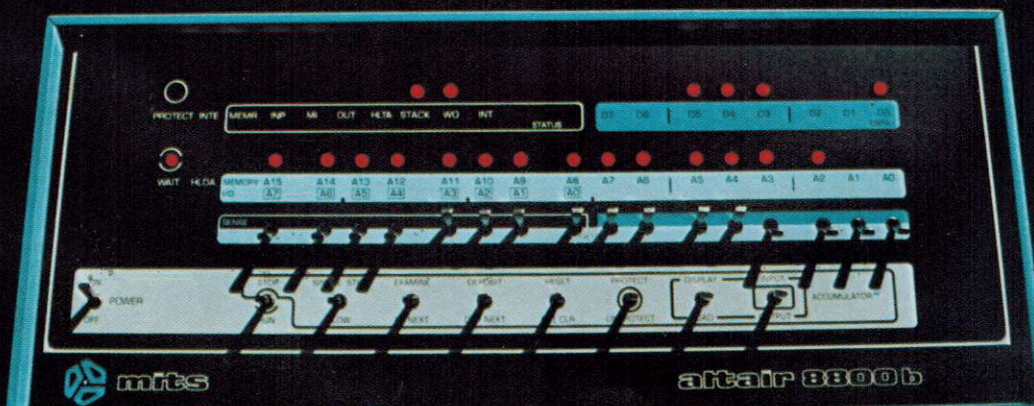
Imagine a microcomputer supported by extensive software including Extended BASIC, Disk BASIC, DOS and a complete library of business, developmental, and industrial programs.

Imagine a microcomputer that will do everything a mini will do, only at a fraction of the cost.

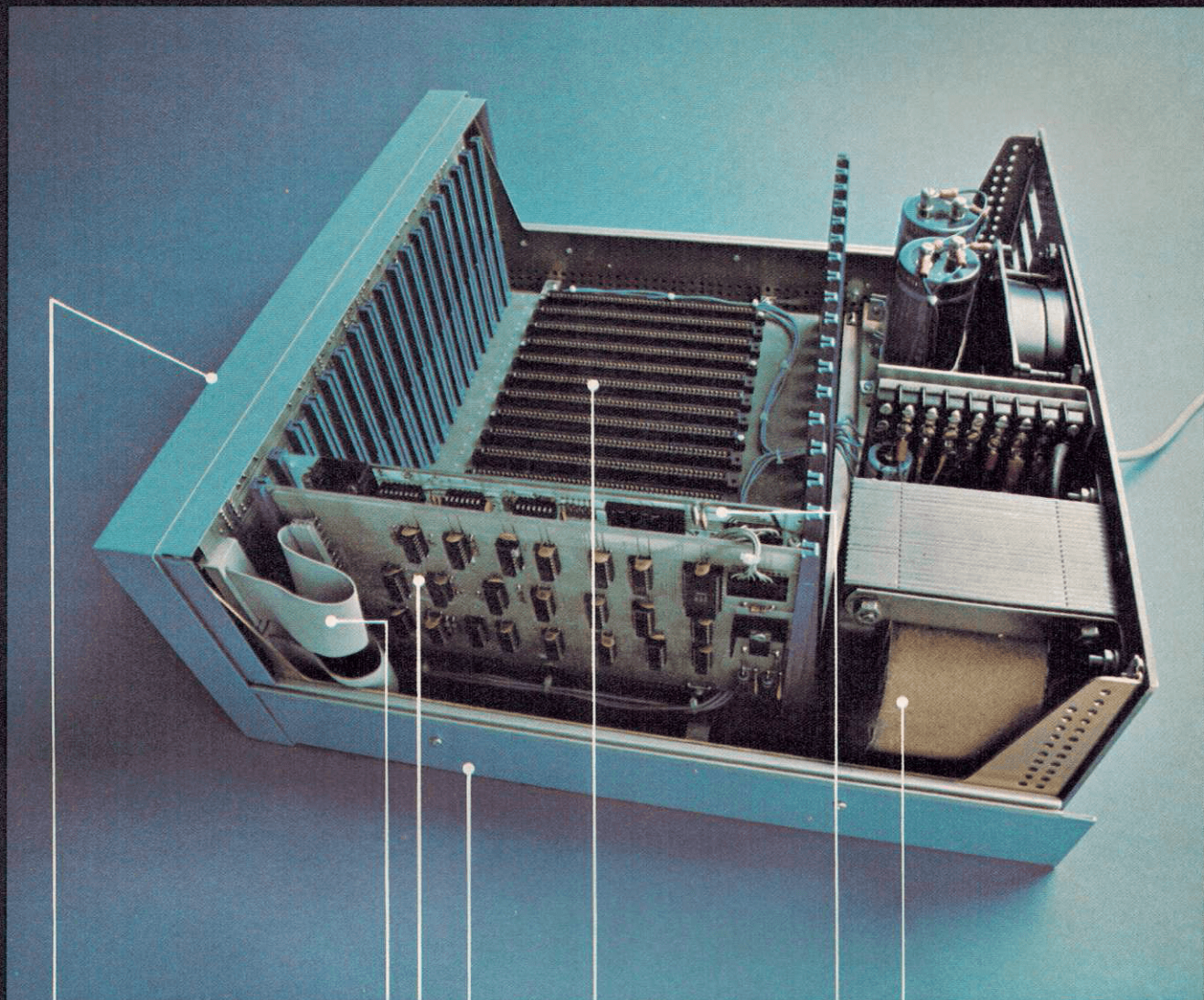
You are imagining the Altair™ 8800b. The Altair 8800b is here today, and it may very well be the mainframe of the 70's.

The Altair 8800b is a second generation design of the most popular microcomputer in the field, the Altair 8800. Built around the 8800A microprocessor, the Altair 8800b is an open ended machine that is compatible with all Altair 8800 hardware and software. It can be configured to match most any system need.

NOTE: Altair is a trademark of MITS, Inc.







Redesigned front panel. Totally synchronous logic design. Same switch and LED arrangement as original Altair 8800. New back-lit Duralith (laminated plastic and mylar, bonded to aluminum) dress panel with multi-color graphics. New longer, flat toggle switches. Five new functions stored on front panel PROM including: DISPLAY ACCUMULATOR (displays contents of accumulator), LOAD ACCUMULATOR (loads contents of the 8 data switches (A7-A0) into accumulator), OUTPUT ACCUMULATOR (outputs contents of accumulator to I/O device addressed by the upper 8 address switches), INPUT ACCUMULATOR (inputs to the accumulator from the I/O device), and SLOW (causes program execution at a rate of about 2 cycles per second—for program debugging).

Full 18 slot motherboard.

Rugged, commercial grade Optima cabinet.

New front panel interface board buffers all lines to and from 8800b bus.

Two, 34 conductor ribbon cable assemblies. Connects front panel board to front panel interface board. Eliminates need for complicated front panel/bus wiring.

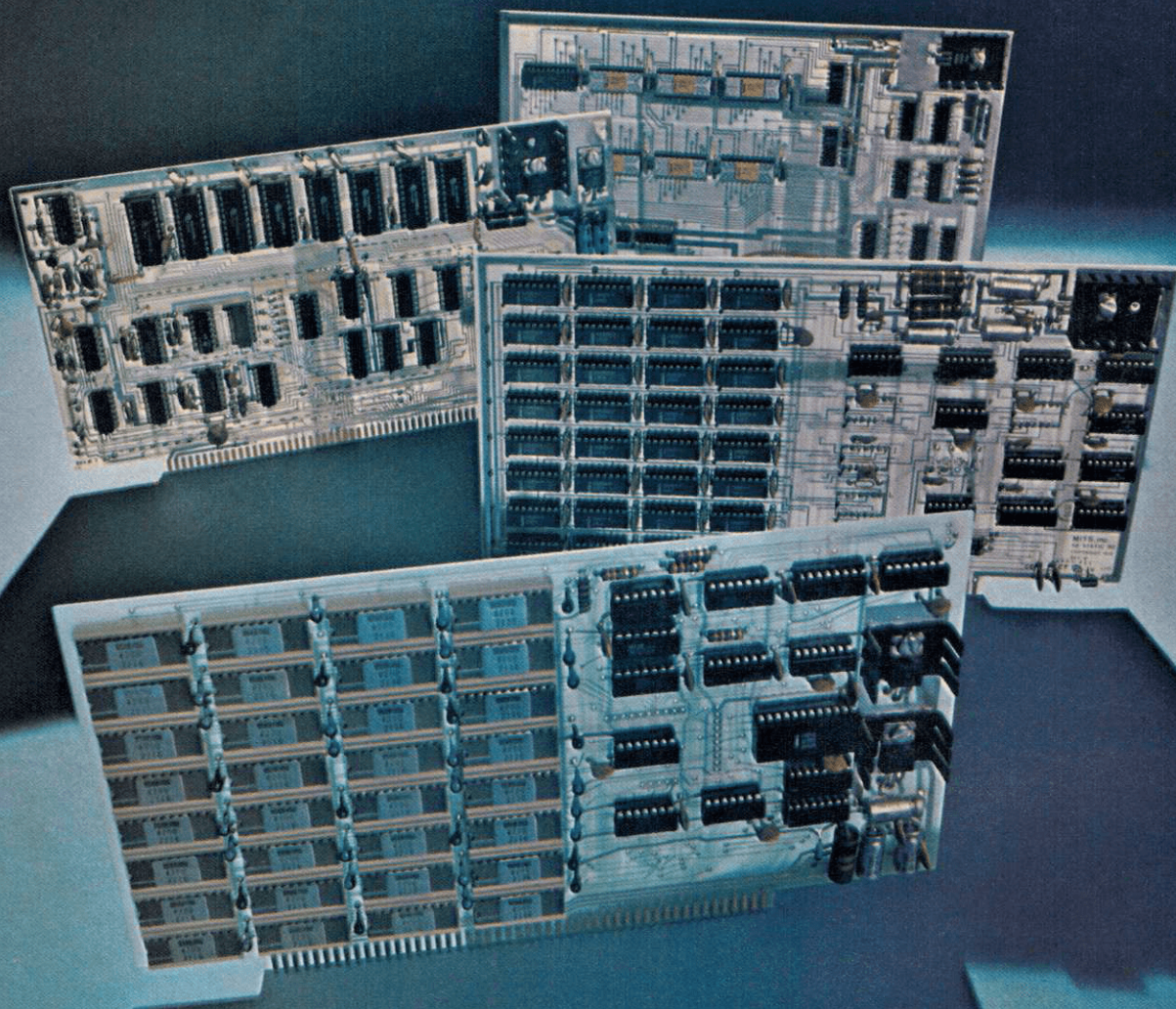
New, heavy duty power supply +8 volts at 18 amps, +18 volts at 2 amps, 18 volts at 2 amps, 110 volt or 220 volt operation (50/60 Hz). Primary tapped for either high or low line operation.

New CPU board with 8080A micro-processor and Intel 8224 clock generator and 8216 bus drivers. Clock pulse widths and phasing as well as frequency are crystal controlled. Compatible with all current Altair 8800 software and hardware.

# altair 8800-b



# Imagine a microcomputer





# with a complete selection of plug-in compatible boards

MITS' wide variety of plug-in compatible boards permits Altair 8800 series microcomputers to be configured for a limitless number of applications in business, industry, and home use. Included are the following:

**Synchronous 4K Memory Board.** Provides 4,096 bytes of RAM, and depends solely on the CPU for timing signals (no single shots). Contains memory protect circuitry, and address selection circuitry for any one of 16 starting locations in increments of 4K. Access time is 200-300 nanoseconds.

**4K Static RAM memory board.** Uses Intel 2102 A-4 memory chips with worst case access of 450 nanoseconds. Fully isolated from system bus, thus eliminating excessive capacitive loading.

**16K Static RAM memory board.** Two surprise features are minimal power requirements and fast access time. One 16K static draws less power than 4K static. Maximum access time is 215 nanoseconds. Four 16K static boards add up to the entire 64K of memory directly addressable by the Altair 8800 series microcomputers.

**PROM memory board.** Allows for 2K bytes of PROM. Uses either 1702 or 1702A PROMs, which are electrically programmable and erasable via ultraviolet light. Provides option of power down circuitry. PROM programmer also available.

**Serial Interface board.** User selectable for RS232, TTL, or TTY. Two ports allow interface to two I/O devices, each running at a different baud rate and each using different electrical interconnect. That is, the two ports operate entirely independent of each other. Baud rates from 110 to 9600.

**Parallel Interface board.** Up to four ports, each contains 16 data lines. Each line can be initialized as input or output to interface or terminal. Can handle two inputs (such as paper tape reader and keyboard) and two outputs (such as paper tape punch and printer) or any combination of custom applications. Fully TTL compatible. Four controllable interrupt lines.

**Audio-cassette Interface.** Allows for inexpensive mass storage via magnetic tape. Any type of tape recorder with wow and flutter less than 0.5% may be used.

**Vector Interrupt.** Provides the computer with eight priority levels of CPU interrupt.

**Real Time Clock.** Added onto the vector interrupt board, the RTC allows processor interrupts at one of four selectable rates. Offers two clock sources, the system clock which operates at 2 megahertz or the line frequency which operates at 60 hertz.

**Analog to Digital Converter.** Used to input analog signals to the Altair 8800 series microcomputers. Features include: unipolar or bipolar operation, 12-bit resolution, 50 microsecond conversion time, optional 8 multiplexed inputs, optional true instrumentation amplifier input, and vector interrupt capability.

**Multiplexer.** 24 analog input channels utilized in conjunction with the A/D Converter. Features include: 24 single-ended or differential input signals, input buffer operational amplifiers, gain of up to 1,000; and free of CMOS switch latchup.



# Imagine a microcomputer



## with a floppy disk

The Altair Floppy Disk System is a mass memory storage system designed by MITS engineers exclusively for the Altair 8800 series microcomputers.

The Altair Floppy Disk System consists of a disk controller unit, up to 16 disk drive units, DOS (Disk Operating System), and Disk Extended BASIC.

The disk controller unit is two Altair plug compatible circuit boards that fit inside the 8800 chassis. Data is transferred to and from the disk at 250,000 bits/second. The disk controller can control up to 16 Altair Disk Drives. It controls timing functions via hardware to allow for the most efficient use of software.

The Disk Drive consists of a Pertec™ FD400 mounted in a case similar to the Altair 8800b case, power supply, and a buffer/address/line driver board. The Altair Disk format allows storage of over 300,000 bytes of memory on each diskette.

Altair Disk Extended BASIC provides the Altair 8800 series microcomputers with complete facility for reading or writing data files and for saving and loading program files.



# with a wide selection of peripherals

Altair 8800 series microcomputers can be interfaced to a limitless number of peripheral devices. MITS peripherals include the Comter II (pictured here), Altair 80 column line printer, teletypewriter, and PROM programmer.

**COMTER II.** The Comter II is a low cost, versatile computer terminal. It is equipped with an ASCII keyboard and a 32 character display. Complete cursor control allows the Comter to move data in and out of the display from its own 256 byte memory. The Comter II has a built-in audio-cassette interface and a data rate of 110 or 300 baud.

**ALTAIR LINE PRINTER** The Altair 110 Line Printer (pictured on the cover) is a desktop line printer that produces 80 columns of 5 x 7 dot matrix characters at 110 characters per second (70 lines per minute). The impact dot matrix prints bidirectionally, using a conventional teletypewriter ribbon. The Altair 110 will print up to three copies of any item, plus the original.

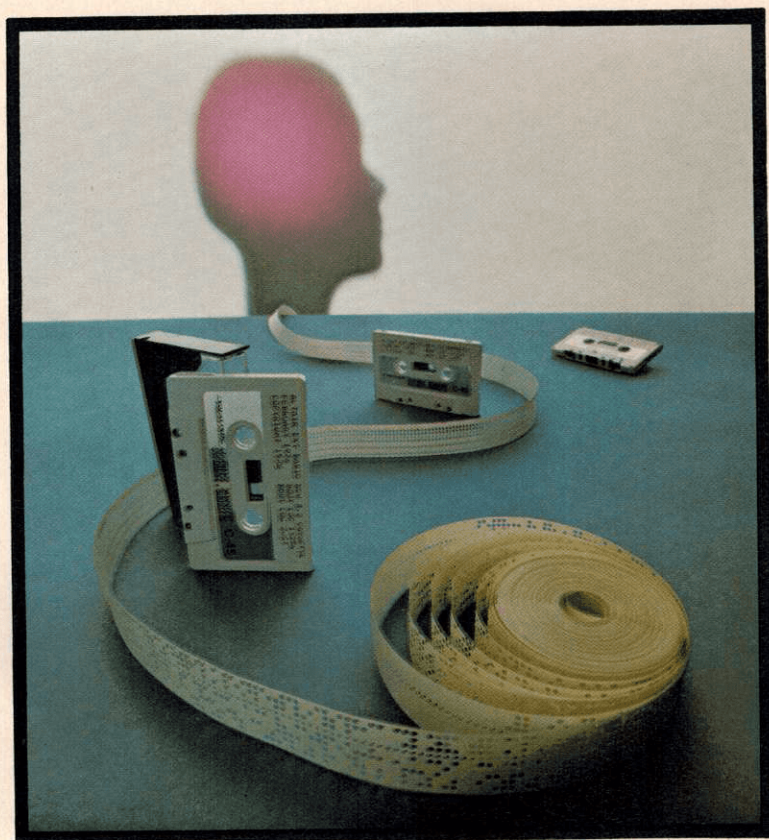
The Altair 110 Line Printer comes with complete control electronics including a printer control card that plugs directly into an Altair 8800 series microcomputer. It is fully compatible with Altair BASIC.

MITS offers a number of Teletype™ options including a standard ASR-33 Teletype. Contact the MITS factory for complete details. The CRT terminal on the front cover is a Lear Siegler terminal. Contact LSI for complete details.





# Imagine a microcomputer





# with extensive software

MITS software has received industry wide acclaim for its efficiency and revolutionary features. Software for the Altair 8800 series microcomputers includes the following:

**System monitor.** Contains I/O drivers for system console, audio cassette interface, and high speed paper tape reader. Programs can be loaded from paper tape or cassette, memory locations examined and changed, and absolute programs dumped onto paper tape or cassette. 2.5K bytes.

**Text editor.** Line oriented editor used for editing of source programs. 2K bytes.

**Assembler.** Assembles source program in one pass from paper tape, cassette, or from the current Editor buffer. Object code is stored directly into memory as assembly progresses. 3K bytes.

**Debug.** Assembly language debugging package which allows the user to find and correct errors in a simple and effective manner. 2K bytes.

**Altair BASIC.** Includes many features not normally found in BASIC. These include Boolean operators, the ability to read or write a byte from any I/O port or memory location, multiple statements per line, and the ability to interrupt program execution and then continue after the examination of variable values.

Other features of Altair BASIC include variable length strings (up to 255 characters), with LEFT\$, RIGHT\$ and MID\$ functions, a concatenation operator and VAL and STR\$ to convert between strings and numbers. Both string and numeric arrays of up to 30 dimensions can be used. Nesting of loops and subroutine calls is limited only by available memory. Intrinsic functions include: SIN, COS, TAN, LOG, EXP, SQR, SGN, ABS, INT, FRE, RND and POS, in addition to TAB and SPC in PRINT statements. 5.9K bytes.

**Altair Extended BASIC.** Features include INTEGER VARIABLES stored as double byte signed quantities ranging from -32768 to +32768, DOUBLE-PRECISION variables, and PRINT USING which provides complete control over output format.

Other features of Altair Extended BASIC include ELSE clause in IF statements, LIST and DELETE commands, TRACE ON/OFF commands to monitor program flow, EXCHANGE statement, and the capacity for user defined functions with string arguments and values allowed. 10.2K bytes.

**Altair Disk Extended BASIC.** Allows user to save and recall programs and data files from the Altair Floppy Disk. Random access as well as sequential files are provided. Also simultaneous use of multiple data files. Utilities will format new disks, and print directories. User can write his own file access method or other special disk routine. Includes all features of Extended BASIC. 16K bytes.

**Altair DOS.** Disk Operating System allows users to assemble and edit 8080 assembler language programs stored on floppy disk. 12K bytes.



# The small wonder



# of the micro-world

Measuring just 11" wide x 11" deep x 5" high, and weighing a mere 7 pounds, the Altair™ 680b is a complete, general-purpose computer.

*The secret to this revolutionary, small computer* is its CPU board. This double-sided board fits along the bottom of the Altair case and plugs directly into the front panel board. It contains the new 6800 microprocessor, 1,024 bytes of RAM memory, a 256 byte PROM monitor, provisions for 768 bytes of additional PROM or ROM, and a single Interface port with a Motorola ACIA serial interface adapter which can be configured either RS-232 or TTY. A five level Baudot interface option is also available.

The Altair 680b can be programmed from front panel switches, or it can be interfaced to a video display terminal, or teletypewriter. Three additional circuit boards can be plugged inside the Altair 680b

for further memory and interface expansion. The first of these boards is a 16K static RAM memory board.

Software already developed includes Altair 680 BASIC with all the features of the 8K BASIC previously developed for the Altair 8800. These include Boolean operators, the ability to read or write a byte from any I/O port or memory location, multiple statements per line, and the ability to interrupt program execution and then continue after the examination of variable values. This software takes only 6.8K bytes of memory space and a copy is included free with the purchase of the Altair 680 16K memory board.

Other software includes a resident two pass assembler. The Altair 680b is also compatible with Motorola 6800 software.



# Altair computer centers

Altair Computer Centers. Now, you can buy Altair computers and Altair computer products right off the shelf. A list of Altair Computer Centers is below.

RETAIL COMPUTER STORE, INC.  
410 NE 72nd St.  
SEATTLE, WA 98115  
Tim & Susanne Broom  
(206) 524-4101

COMPUTER KITS (S. F. area)  
1044 University Ave.  
BERKELEY, CA 94710  
Pete Roberts  
(415) 845-5300

THE COMPUTER STORE  
(Arrowhead Computer Co.)  
820 Broadway  
SANTA MONICA, CA 90401  
Dick Heiser  
(213) 451-0713

GATEWAY ELECTRONICS, INC. OF COLORADO  
2839 W. 44th Ave.  
DENVER, CO 80211  
George Mensik  
(303) 458-5444

COMPUTER SHACK  
3120 San Mateo NE  
ALBUQUERQUE, NM 87110  
Pete Conner  
(505) 883-8282, 883-8283

GLOBAL ENGINEERING CO.  
5416 South Yale  
TULSA, OKLA. 74145  
(918) 452-2567

COMPUTER PRODUCTS UNLIMITED  
4216 West 12th  
LITTLE ROCK, AR 72204  
Harry & Margaret Mohrmann  
(501) 666-2839

BYTE'TRONICS  
Suite 103  
1600 Hayes St.  
NASHVILLE, TN 37203  
John & Stan Morrow  
(615) 329-1979

CHICAGO COMPUTER STORE  
517 Talcott Rd.  
PARK RIDGE, IL 60068  
Lou Van Eperen  
(312) 823-2388

GATEWAY ELECTRONICS, INC.  
8123-25 Page Blvd.  
ST. LOUIS, MO 63130  
Harry & Margaret Mohrmann  
Lou Elkins, Stuart Bartfield  
(314) 427-6116

THE COMPUTER STORE, INC.  
120 Cambridge St.  
BURLINGTON, MA 01803  
Richard Brown, Sid Halligan  
(617) 272-8770  
Jeff Seldman, Service Dept.

THE COMPUTER ROOM  
3938 Beau D'Rue Drive  
EAGAN, MN 55122  
Dale Hagert, Bob Raemer  
(612) 452-2567

THE COMPUTER STORE OF ANN ARBOR  
310 East Washington Street  
ANN ARBOR, MI 48104  
Peter Blond  
(313) 995-7616

THE COMPUTER STORE OF NEW YORK  
55 West 39th St.  
NEW YORK, NEW YORK 10018  
Bob Arning  
(212) 221-1404

THE COMPUTER STORE, INC. (Hartford area)  
63 South Main Street  
WINDSOR LOCKS, CT 06096  
George & Susan Gilpatrick  
(203) 627-0188

MICROSYSTEMS (Washington, D.C.)  
6605A Backlick Rd.  
SPRINGFIELD, VA 22150  
Gloria & Russell Bank  
(703) 569-1110

EAGLE RESEARCH CORP.  
1114 Charleston Nat'l. Plaza  
CHARLESTON, VA 25301  
Stephen Payne  
(304) 343-4607 or 343-4608

THE COMPUTER STORE  
1114 Charleston National Plaza  
CHARLESTON, W. VA. 25301  
(304) 343-4607

THE COMPUTER SYSTEMCENTER  
3330 Piedmont Road  
ATLANTA, GA 30305  
Jim Dunion, Rich Stafford,  
Steven Mann, Ron Roberts  
(404) 231-1691

MARSH DATA SYSTEMS  
5405 B Southern Comfort Blvd.  
TAMPA, FL 33614  
Don Marsh  
(813) 886-9890



**mits**

**MIT, Inc. 2450 Alamo SE Albuquerque, New Mexico 87106 (505) 243-7821**

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**Ordering Instructions.** Altair computer products are marketed in both kit and assembled units. Contact factory for OEM pricing or for mail order sales.





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Albuquerque, NM 87106

PHOTOGRAPHY BY STEPHEN MARKS