

Special Altair®

MITTS-MAS



Christmas Catalog

Lowest Price in the World!

In January of 1975, MITS stunned the computer world with the announcement of the *Altair 8800* Computer that sells for \$439 in kit form.

Today MITS is announcing the *Altair 680*.

The *Altair 680*, built around the revolutionary new 6800 microprocessor chip, is the lowest priced complete computer on the market. Until December 31, 1975, this computer will be sold in kit form for the amazing introductory price of \$293! (A savings of \$52!)

The *Altair 680* comes with power supply, front panel control board, and CPU board included in an 11" wide x 11" deep x 4 11/16" case. In addition to the 6800 processor, the CPU board contains the following:

1. 1024 words of memory (RAM 2102 type 1024 x 1-bit chips).
2. Built-in Interface that can be configured for RS232 or 20 mA Teletype loop or 60 mA Teletype.
3. Provisions for 1024 words of ROM or PROM.

The *Altair 680* can be programmed from the front panel switches or it can be connected to a computer terminal (RS232) or a Teletype such as an ASR-33 or surplus five-level Baudot Teletype (under \$100).

The *Altair 680* can be utilized for many home, commercial or industrial applications or it can be used as a development system for *Altair 680* CPU boards. With a cycle time of 4 microseconds, 16-bit addressing, and the capability of directly addressing 65,000 words of memory and a virtually unlimited number of I/O devices, the *Altair 680* is a very versatile computer!

Altair 680 Software

Software for the *Altair 680* includes a monitor on PROM, assembler, debug, and editor. This software is available to *Altair 680* owners at a nominal cost.

Future software development will be influenced by customer demand and may include *BASIC* on ROM. MITS will sponsor lucrative software contests to encourage the rapid growth of the *Altair 680* software library. Programs in this library will be made available to all *Altair 680* owners at the cost of printing and mailing.

Contact factory for updated information and prices.

Altair Users Group

All *Altair 680* purchasers will receive a free one year membership to the Altair Users Group. This group is the largest of its kind in the world and includes thousands of *Altair 8800* and *680* users.

Members of the Altair Users Group are kept abreast of Altair developments through the monthly publication, **Computer Notes**.

Altair 680 Documentation

The *Altair 680* kit comes with complete documentation including assembly manual, assembly hints manual, operation manual, and theory manual. Assembled units come with operation and theory manuals. Turnkey model and CPU boards also include documentation.

NOTE: *Altair 680 manuals can be purchased separately. See back page of this catalog for prices.*

Delivery

Personal checks take 2-3 weeks to

process while money orders and credit card purchases can be processed in 1-3 days. Delivery should be 30-60 days but this can vary according to order backlog. All orders are handled on a first come, first served basis.



Altair 680 Prices

Altair 680 complete computer kit \$293
(\$345 after December 31, 1975)

<i>Altair 680</i> assembled and tested	\$420
<i>Altair 680T</i> turnkey model (complete <i>Altair 680</i> except front panel control board) Kit Only	\$240 (\$280 after December 31, 1975)
<i>Altair 680</i> CPU board (including pc board, 6800 microprocessor chip, 1024 word memory, 3 way interface and all remaining components except power supply)	\$180 (\$195 after December 31, 1975)
<i>Altair 680</i> CPU board assembled and tested	\$275
Option I/O socket kit (required when interfacing 680 to external devices)	\$ 29
Option cooling fan (required when expanding 680 internally)	\$ 16 (\$22 after December 31, 1975)
Option cooling fan installed	\$ 26
PROM kit (256 x 8-bit ultraviolet, erasable 1702 devices)	\$ 42

MITS
"Creative Electronics"

Prices, delivery and specifications subject to change.

"PROJECT BREAKTHROUGH!"

World's First Minicomputer Kit To Rival Commercial Models . . . 'Altair 8800' "

headline on cover of *Popular Electronics*,
January, 1975

The *Altair 8800* from MITS is now one of the most successful computers ever delivered. Thousands of *Altair 8800*'s have been sold and are in the field where they are being used for an infinite variety of industrial, business, science and home applications.

The *Altair 8800* is extensively supported by ongoing hardware and software development. *Altair 8800* interface and memory modules and *Altair peripherals* are inexpensively priced, yet among the highest quality in the business. Byte for byte, *Altair 8800* BASIC language software is the most powerful BASIC ever written.

Thanks to the success of the *Altair 8800*, building and programming computers has become one of the World's most exciting and fastest growing hobbies. Local *Altair 8800* Users Clubs have been formed across the United States and in such far away places as England and Japan.

Thanks to clean, efficient design and accurate, easy to understand assembly instructions, the *Altair 8800* is an easy kit to assemble. As an *Altair 8800* kit builder, you will have the satisfaction of successfully building your own computer and you will learn about the internal structure of digital computers.

As the owner of an *Altair 8800*, you will be backed by the technical expertise of the MITS Customer Service Department. You will receive the latest update information, programming hints, technical advice and general computer information on a monthly basis through a free subscription to *Computer Notes*. You will be in contact with other *Altair 8800* owners through the *Altair Users Group* and you will have access to the extensive *Altair 8800 Software Library*.

No other computer on today's market can offer you as much support as the *Altair 8800*.

Christmas Special

For a limited time only, you can be the owner of an *Altair 8800* with a 1,024 word memory module for just \$68 a month! See back page of this catalog for all the details.

Altair 8800 Features

Built around the most successful (and many say the most powerful) microprocessor chip ever [the Intel 8080], the *Altair 8800* is a variable word length computer with an 8-bit processor, 16-bit addressing and a maximum word size of 24-bits. It has 78 basic machine instructions with variances over 200 instructions. The *Altair 8800* can directly address 256 input and 256 output devices and up to 65,000 words of memory.

Up to 300 peripherals can be interfaced to the *Altair 8800* without any additional buffering.

The custom designer can interface almost any number of imaginable devices simultaneously. All *Altair* peripherals are supplied with software handlers to make interfacing easy.

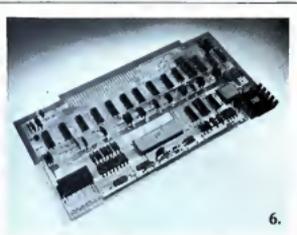
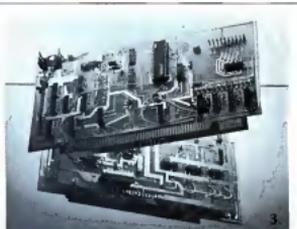
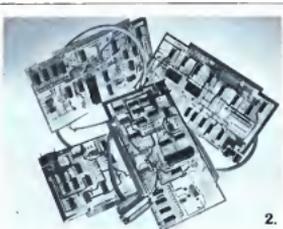
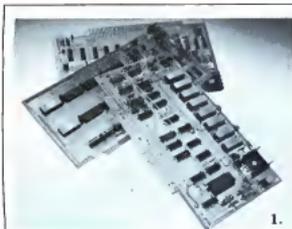


The *Altair 8800* includes the CPU board, front panel control board, power supply (enough to power any additional cards), and expander board (with room for 3 extra interface or memory modules) all included in a handsome, aluminum case complete with sub-panel and dress panel. Up to 16 cards can be added inside the main case.

Altair 8800 Prices

Altair 8800 Computer kit (includes assembly hints, assembly, operator's, and theory manuals)	\$439
Altair 8800 assembled	\$621
Expander board (adds 4 slots)	\$ 16 kit
..... assembled, \$ 31	
Cooling fan	\$ 16 kit
..... assembled, \$ 20	

Custom Design Your Computer System to Meet Your Application (and stay within your budget!)



1. Three 8800 memory modules. Three memory modules are now available for the Altair 8800 and more are in the works. These modules include a 1K (1,024) word static card, a 2K (2,048) word static card, and a 4K (4,096) word dynamic card. Each of these modules is constructed with the finest components available and each contains memory protect features (prevents the computer from accidentally writing over programs you want to save). The maximum access time of the static cards is 850 nanoseconds while access time for the dynamic card is 300 nanoseconds.

2. Four 8800 Interface Modules. Interface modules now available for the Altair 8800 include three serial and one parallel I/O cards. The SIOA serial card is used to connect the Altair 8800 to CRT's and other computer terminals that have industry standard RS232 asynchronous interconnect lines. It has divider logic to allow for presettable baud rates up to 19,200 baud (5-8 data bits).

The SIOB is the same as the SIOA except that all signals are TTL levels. This card is a general purpose serial interface that can be used to custom interface the Altair 8800 to a wide variety of devices.

The SIOB is also the same as the other serial cards except it is used to interface the Altair 8800 to conventional Teletypes and other asynchronous 20 mA current loop terminals. The SIOC is required to interface the Altair with ASR-33 Teletypes available from MITS.

The PIO parallel interface card is used for bidirectional transmission of bytes at speeds up to 25,000 bytes/second! It is a full TTL compatible input/output card with necessary hand-

shake flags for conventional parallel interface. Both input and output data have their own 8-bit latch for buffering. Includes necessary logic to allow an adjacent channel to be a control channel. Most commonly used to interface the Altair 8800 to SWTPC-TV's or equivalent, custom A/D-D/A interfacing, computer to computer interfacing, and control applications.

3. Audio-Cassette Interface. This best-selling Altair module allows you to connect your Altair 8800 to any tape recorder (medium quality cassette is adequate) for inexpensive mass storage. It works by modulating (changing) digital signals from the computer to audio signals for recording data and by demodulating the audio signal for playback. Consists of a special Altair modem board "piggy-backed" on an SIOB board. Requires one slot in the 8800.

4. 8800 PROM module. This PROM memory card is designed to hold up to 2K of PROM. Contact factory for price and other information. Altair 8800 PROM Programmer to be announced soon.

5. 680 CPU board. The Altair 680 CPU board is a complete computer on a board (less power supply). In addition to the 6800 CPU available from Motorola and AML, the Altair 680 CPU board comes with 1K of RAM memory (2102 type, 1,024 x 1-bit chips), built-in I/O that can be configured for RS232 or 20 mA current loop or 60 mA current loop, and provisions for 1K of ROM or PROM. It measures 8" x 10 1/4".

6. 8800 CPU board. The heart of the Altair 8800 is its CPU board. This double-sided board was designed around the powerful byte

oriented, variable word length 8080 processor—a complete central processing unit on a single LSI chip using n-channel, silicon gate MOS technology. The CPU board also contains the Altair system clock—a standard TTL oscillator with a 2,000 MHz crystal as the feedback element.

Altair Module Prices:

1K static memory	\$97 kit and \$139 assembled
2K static memory	\$145 kit and \$195 assembled
4K dynamic memory	\$264 kit and \$338 assembled
SIOA interface	\$119 kit and \$138 assembled
SIOB and SIOC interface	\$124 kit and \$146 assembled
PIO interface	\$92 kit and \$114 assembled
Audio-cassette interface	\$128 kit and \$174 assembled
680 CPU board kit	\$180 kit [\$195 after December 31, 1975]
680 CPU board, assembled	\$275
8800 CPU board	\$310 kit and \$360 assembled

NOTE: Watch our advertisements for announcement of new Altair 8800 modules and Altair 680 modules.

BASIC language was chosen for the Altair 8800 because it is the easiest language to learn and because it can be used for an infinite number of applications. Literally hundreds of thousands of BASIC programs have been written and are in the public domain. These programs include accounting programs, business programs, scientific programs, educational programs, game programs, engineering programs, and much more.

Altair BASIC is an interactive language. This means that you get immediate answers and you can use your Altair as a super programmable calculator as well as for writing complicated programs.

8K BASIC Features

Altair 8K BASIC leaves approximately 2K bytes in an 8K Altair for programming which can also be increased by deleting the math functions. This BASIC is the same as the 4K BASIC only with 4 additional statements [ON ... GOTO, ON ... GOSUB, OUT, DEF], 1 additional command [CONT] and 8 additional functions [COS, LOG, EXP, TAN, ATN, INP, FRE, POS]. Other additional features include multi-dimensional arrays for both strings and numbers, AND, OR, NOT

“I've seen and used other BASICs, but byte-for-byte, Altair is the most powerful BASIC I've seen. I'm particularly impressed with the n-dimensional arrays (and for strings too!), machine level I/O, and machine language 'function' features. The level of your documentation is, for me, though the high point. Sections for those who know nothing and sections for those who know a lot, plus sections that 'normal' people can read and understand.”

J. Scott Williams
Bellingham, Washington

Altair BASIC was written as efficiently as possible to allow for the maximum number of features in the minimum amount of memory. You can order one of three Altair BASICs: 4K BASIC—designed to run in an Altair 8800 with as little as 4K of memory, 8K BASIC, or EXTENDED BASIC (12K). Each of these BASICs allows you to have multiple statements per line (a memory saving feature), and each of them is capable of executing 700 floating point additions per second!

The 8K BASIC and EXTENDED BASIC have multi-dimensional arrays for both strings and numbers. This is particularly useful for applications requiring lists of names or numbers such as accounting programs, inventory programs, mailing lists, etc.

The 8K BASIC and EXTENDED BASIC also have an OUT and corresponding INP statement that allows you to use your Altair 8800 control low speed devices such as drill presses, lathes, stepping motors, model trains, model airplanes, alarms, heating systems, home entertainment systems, etc.

Altair BASIC comes with complete documentation including a copy of "My Computer Likes Me When I Speak In BASIC" by Bob Albrecht, a beginner's BASIC text.

Never before has such a powerful BASIC language been marketed at such low prices!

4K BASIC Features

Altair 4K BASIC leaves approximately 750 bytes in a 4K Altair for programming which can be increased by deleting the math functions. This powerful BASIC has 16 statements [IF ... THEN, GOTO, GOSUB, RETURN, FOR, NEXT, READ, INPUT, END, DATA, LET, DIM, REM, RESTORE, PRINT, and STOP] in addition to 4 commands [LIST, RUN, CLEAR, SCRATCH] and 6 functions [RND, SQR, SIN, ABS, INT and SGN]. Other features include: direct execution of any statement except INPUT; an "@" symbol that deletes a whole line and a "+" that deletes the last character; two-character error code and line number printed when error occurs; Control C which is used to interrupt a program; maximum line number of 65,535; and all results calculated to at least six decimal digits of precision.

operators that can be used in IF statements or formulas, strings with a maximum length of 255 characters, string concatenation (A\$ = B\$) and the following string functions: LEN, ASC, CHAR\$, RIGHTS\$, LEFT\$, MID\$, STR\$, and VAL.

EXTENDED BASIC

Altair EXTENDED BASIC is the same as 8K BASIC with the addition of double precision arithmetic, PRINT USING and disk file I/O. A minimum of 12K memory is required to support EXTENDED BASIC.

Other Altair 8800 software includes a Disk Operating System, assembler, text editor, and system monitor. Altair users also have access to the Altair Library, which contains a large number of useful programs.

SOFTWARE PRICES:

Altair 4K BASIC	\$150
Purchasers of an Altair 8800, 4K of Altair memory, and an Altair I/O board	\$ 60
Altair 8K BASIC	\$200
Purchasers of an Altair 8800, 8K of Altair memory, and an Altair I/O board	\$ 75
Altair Extended BASIC	\$350
Purchasers of an Altair 8800, 12K of Altair memory, and an Altair I/O Board	\$150
Altair PACKAGE ONE (assembler, text editor, system monitor)	\$175
Purchasers of an Altair 8800, 8K of Altair memory, and an Altair I/O board	\$ 30
Altair Disk Operating System	\$500
Purchasers of an Altair 8800, 12K of Altair memory, Altair I/O and Altair Floppy Disk	\$150

Note: When ordering software, specify paper tape or cassette tape.

Inexpensive, Sophisticated Mass Storage



The *Altair Disk* can store over 300,000 words of information on a floppy disk! It offers the advantage of nonvolatile memory (doesn't "forget" when power is turned off) and fast access to data ($\frac{3}{4}$ seconds—worst case). The data transfer rate of the *Altair Disk* to and from the computer is a whopping 250,000 bits per second.

The *Altair Disk* includes the disk controller, disk drive, one floppy disk and a software driver. The disk controller, which consists of two cards requiring two slots in the 8800, is capable of controlling up to 16 disk drives. It controls all mechanical functions of the disk, presents the disk status to the computer, and

converts serial data to 8-bit parallel words and vice versa for rapid transfer.

The disk drive consists of a Pertec FD400 drive mounted in an *Altair* case including power supply, a buff/multiplexer board, and cooling fan. Its rotational speed is 360 rpm, track to track access time is 10 msec., average time to read or write is 400 msec., and disk life is over 1 million passes per track.

The floppy disk is hard sectored for 32 sectors per track (128 words per sector). There are 77 tracks on each disk. Extra floppy disks are available for \$15 from MITS.

A Disk Operating System (software) with complete file structure and utilities for copying, deleting and sorting files is also available.

PRICES:

88-DCDD Altair Disk (includes disk controller, disk drive, one floppy disk and software driver)	\$1,480 kit
..... assembled,	\$1,980
88-DISK Altair Disk Drive only	\$1,180 kit
..... assembled,	\$1,600
Floppy disk	\$ 15
Disk Operating System (if purchased separately)	\$ 500
Purchasers of an Altair 8800, 12K of Altair memory, Altair I/O and Altair Disk (88-DCDD)	\$ 150

Build Your Own Advanced Terminal!



The *Comter II* is easily the most advanced computer terminal kit on the market. It has its own internal memory of 256 characters which combines with a highly-readable, soft orange 32 character display to provide ease of operation and information retrieval.

Complete cursor control allows you to move data in and out of the display and operate the *Comter II* with the versatility of a CRT terminal. *Built-in audio-cassette interface* allows you to store unlimited data from the computer and feed that information back into the computer.

Other features include auto transmit which allows line-by-line transmission of data or program information to the computer from the *Comter's* memory. The *Comter II* has a complete ASCII encoded keyboard with TTY-33 format plus the addition of special function keys. Its total weight is just 15 lbs.

Flexible power requirements allow you to operate the computer at either 95-125V or 190-250V. The *Comter II* can be interfaced to any computer with an RS232 serial interface. Requires an SIOA board to be connected to the Altair 8800. No interface required to connect to the Altair 680.

PRICES:

Comter II kit with built-in audio cassette I/O	\$780
Comter II assembled	\$920

High Speed Printing at Low Cost!

The Altair 110 Line Printer is a desktop line printer that produces 80 columns of 5 x 7 dot matrix characters at 100 characters per second x 70 lines per minute. The impact head prints bidirectionally on a 8½" roll paper* using a conventional teletype ribbon. The Altair Line Printer will print up to four copies of any item.

Maximum reliability is provided by a mechanism which contains no brakes, clutches, dampers or stepper motors. All control electronics including one-line buffer and self-test circuitry are contained on a single 5" x 15" printed circuit card. The Model 110 was expressly designed for the simplicity, reliability and extremely low cost required by current small-scale data handling systems and terminals.

Vibration and wear are minimized because the print head moves uniformly in both directions and pauses only at the end of each line. Opto-electronic sensing is used to accurately position each dot and permit characters to be printed on the fly.

The Altair 110 Line Printer comes with complete control electronics including a printer control card. Requires one slot in the Altair 8800.

*Pin-fed Optional.



PRICES:

Altair Line Printer with controller card	\$1,750 kit
..... assembled,	\$1,975

Very Low Cost Terminal



The Altair VLCT is ideal for machine language programming. It converts a three digit octal code directly into an 8 digit binary code for transmission to the computer and then displays the binary output from the computer in a 3 digital octal format. This allows you to program in octal which is much easier than programming in binary. In addition, the VLCT is much more convenient to work with than using the front panel switches of the Altair 8800.

PRICES:

VLCT	\$129 kit
..... assembled,	\$169

NOTE: PIO interface module is required to connect VLCT to Altair 8800.

Teletype - Most Versatile



With a built-in paper tape reader and punch and hard copy output, this ASR-33 Teletype is perhaps the most versatile of all low cost input/output devices.

The ASR-33 Teletype prints 10 characters per second. It is a completely checked-out machine with standard 120 day warranty.

PRICE:

ASR-33 Teletype	\$1,500
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NOTE: SIOC interface module is required to connect Teletype to Altair 8800.

Christmas Time Payment Plan

1K Altair for Just \$68 a Month!

You can be the owner of an Altair 8800 with a 1,024 word memory module for just \$68 a month. Each month (for 8 months) you send in your payment and we send you part of an Altair kit until you have the complete system. The advantages of the plan are *NO interest* or financing charge, *GUARANTEED price* based on today's price, and *free, immediate membership to the Altair Users Group* including subscription to Computer Notes.

Our terms are cash with order, BankAmericard, or Master Charge. If you send in an early payment, we will make an early shipment. By the same token, a late payment will result in a late shipment. (After 60 days past due, the balance of the deal is cancelled. All payments must be made within 10 months).

Total \$544.00 (Retail price: Altair 8800 \$439.00, Memory \$97.00, Postage and Handling \$8.00—
total \$544.00)

Altair Users Group Special

Each month the Altair Users Group sponsors a software contest and each month MITS gives away \$130 in credit to the winners of this contest. At the end of the year, the author of the overall best program will receive \$1000 in credit.

Membership to the Altair Users Group (the largest of its kind in the world) is free to Altair 8800 owners. However, even if you don't own an Altair, you can be an associate member for one year at the special low price of \$10 (regularly \$30).

As a member of the Altair Users Group, you will be kept informed of Altair developments, software contests, and general computer news through the monthly publication, Computer Notes. You will have access to the Altair Software Library and you can communicate to other Altair users throughout the world.

Note: These specials expire on January 30, 1976.

Altair Manuals

Altair 8800 Operators	\$ 7.50
Altair 8800 Assembly	\$ 9.00
Altair 8800 Theory, Schematics	\$10.00
Altair 680 Operators	\$ 7.50
Altair 680 Assembly	\$ 7.50
Altair 680 Theory, Schematics	\$10.00
BASIC Language Documentation	\$10.00
Assembler, Monitor, Editor	\$ 7.50
8800 4K Memory (includes Assembly, Theory & Schematics)	\$ 5.00
8800 2K Memory	\$ 5.00
8800 1K Memory	\$ 5.00
8800 SIOA	\$ 5.00
8800 SIOB	\$ 5.00
8800 SIOC	\$ 5.00
8800 PIO	\$ 5.00
8800 ACR	\$ 5.00
COMTER II Operators	\$ 6.50
COMTER II Assembly	\$10.00
COMTER II Theory, Schematics	\$10.00
VLCT (Assembly, Operators, Theory)	\$ 5.00
Altair Line Printer Interface	\$ 5.00

Documentation Special One

Altair 8800 Operators, Assembly and Theory manuals plus BASIC Language manual (regularly \$36.50). Now just \$15.00.

Documentation Special Two

Altair 680 Operators, Assembly and Theory manuals. Regularly \$25. Now just \$14.50.

Documentation Special Three

BASIC Language manual, Package I (Assembler, Monitor, Editor), and BASIC language beginners text (My Computer Likes Me When I Speak BASIC by Bob Albrecht). Regularly \$19.50. Now just \$12.50.

MITS/6328 Linn NE/Albuquerque, NM 87108
505-265-7553 or 262-1951

Mail this special Altair Coupon Today!

- Enclosed is check for \$ _____ BankAmericard # _____ or Master Charge # _____
- Altair 8800 Kit Assembled Fan Christmas Time Plan Expander Board
- Altair 680 Kit Assembled Fan I/O Sockets
- Teletype Line Printer Comter II VLCT Disk Disk Drive Only Disk Controller Only
- Memory Module I/O Module (list on separate sheet)

Postage & Handling: Add \$8 for Altair 8800 or Altair 680 and \$3 for any cards or peripherals if ordered separately. Teletype and Line Printer shipped by collect

- Documentation Special One Documentation Special Two Documentation Special Three
- Altair Users Group plus Computer Notes
- Please put me on your mailing list

BILL TO:

NAME _____

ADDRESS _____

CITY _____

STATE & ZIP _____

COMPANY (IF APPLICABLE) _____

freight. Warranty: 90 days on parts for kits and 90 days on parts and labor for assembled units. Prices, specifications, and delivery subject to change.

SHIP TO:

NAME _____

ADDRESS _____

CITY _____

STATE & ZIP _____

- Please send Christmas Card to above address announcing gift and anticipated delivery.

MITS/6328 Linn NE/Albuquerque, NM 87108 505-265-7553 or 262-1951