# Altos 8086-based systems
## The 16-bit systems from Altos

*1981*



ALTOS
Built-In Dependability
BRAND
PROVEN VALUE
RELIABILITY
QUALITY
DELIVERY
COMPUTER · SYSTEMS
PRODUCED IN THE HEART OF SILICON VALLEY, CALIFORNIA U.S.A.

# Altos 8086-based systems

## Multi-user, 16-bit systems that deliver more performance at a lower cost per user.

ALTOS® 8086-based, 16-bit systems offer you a complete systems solution. A powerful 8086 processor. Up to one full megabyte of memory. The widest selection of industry-standard operating systems and languages. Networking. Communications. Support. And ready-to-run Altos Business Solutions applications software.

Choose from two system families—the 586 and ACS8600. The low-cost 586 family is based on 5¼" floppy and Winchester fixed disk storage, while the ACS8600 features 8" floppy and Winchester drives. The one to five user Altos 586 is expandable to eight users with 10 MHz speed. The ACS8600 will support eight users with 5 MHz processor speed. Both feature an intelligent disk controller, networking, communications, and a full complement of operating systems and languages.

### The ACS8600 and 586 families. 8086-based. Multi-purpose. Multi-user. Multi-tasking.

The Altos ACS8600 and 586 families are a line of "multi" machines. **Multi-purpose**—with the ALTOS BUSINESS SOLUTIONS (ABS/86) software. Financial planning, word processing, and accounting applications are ready to run, plus many other popular 8086 applications are also supported. **Multi-user**—up to eight simultaneous users can be served. **Multi-tasking**—many different applications can be run simultaneously. And Altos makes it easy to move 8-bit applications up from your Z80™-based system and down from your mini.

### Special ACS8600 features

- 16-bit 8086 CPU operating at 5 MHz.
- Eight RS-232 ports.
- Parallel interface for high speed peripherals.
- 8" floppy and Winchester storage with 20, 40, or 80 megabytes (expandable to 160 megabytes). Plus a magnetic tape back-up option.
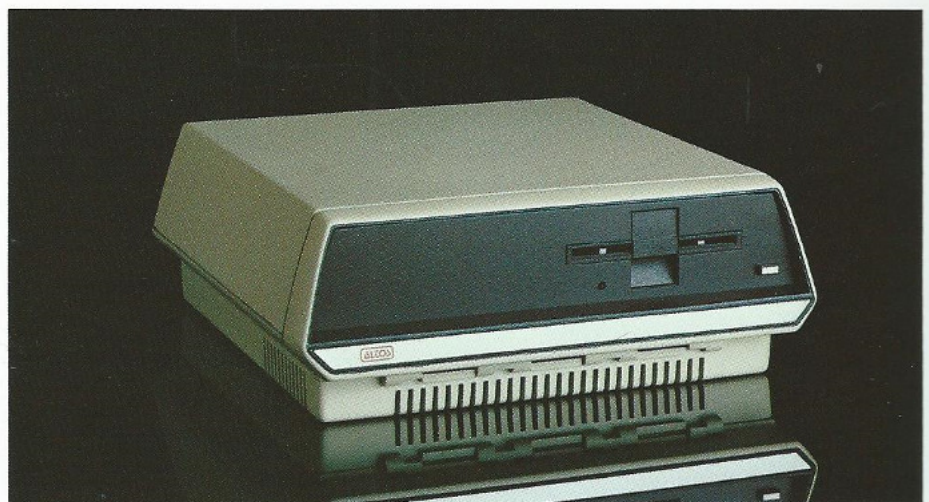
### Special 586 features

- Prices start under $4,500.
- 10 MHz CPU delivers faster execution and response time.
- Six RS-232 ports, expandable to ten.
- 5¼" minifloppy and Winchester storage with 10 or 20 megabytes (40 or 80 megabytes expandable to 80 or 160 megabytes with 8" Winchester disk drives).
- Magnetic tape back-up option.

### Built-in Altos 586/ACS8600 features

| FEATURES | BENEFITS |
|---|---|
| 256-512KB RAM | Run large applications programs |
| Intelligent disk and serial I/O controllers | Faster multi-user performance |
| A wide range of data storage options (from two to 80 MB) | Lets you tailor the system to your application |
| Proprietary memory management | Enhances operating system and multi-user performance |
| Real time clock (586 only) | Keeps track of time, aids in operator and applications control |
| Power fail detection | Maintains disk information integrity |
| Multibus™ expansion port (ACS8600 only) | Allows use of additional peripherals |
| 800KBaud communications port | Supports ALTOS-NET™ |
| **586—Communications option:** Includes an auto-dial, auto-answer modem, Ethernet interface and four additional RS-232 ports | Ethernet and electronic mail also supported. Gives you complete local network support for a true 8-user office automation system |
| **ACS8600—Ethernet and expansion options:** Ethernet interface | Ethernet and electronic mail also supported. Gives you complete local network support for a true 8-user office automation system |
| Remote communications support provided for 2780/3780, 3270, SNA/SDLC protocols | Enables communications via modem to mainframe computers |
| Integral diagnostics | Simplify trouble-shooting |
| A wide range of operating systems (XENIX™/UNIX,™ CP/M-86,™ MP/M-86,™ OASIS-16, MS™-DOS, PICK) | Match a broader range of application needs |

These 16-bit multi-user systems feature multiple processors, up to one megabyte of memory, and a proprietary memory management design. The 586 offers parity checking on RAM memory, the ACS8600 provides Error Checking and Correction (ECC). Both are available with full communications support, intelligent disk/tape controller, intelligent Z-80™-based serial I/O controller, and integrated Winchester/floppy data storage, all at the price of an 8-bit system.

Both systems use higher level languages compatible with the 8080/8085/Z80, so you can transport 8-bit programs. They perform 8 and 16-bit signed and unsigned arithmetic in binary or decimal, including multiply and divide.

**Multiple processors.** While the 8086 serves as the master CPU, the Z80-based intelligent I/O handles serial I/O functions and the 8089-based intelligent disk controller manages mass data storage. Although each processor is optimized for specific tasks, they work together to share the workload for faster execution and response time.

**Unique memory management.** Altos 8086-based systems carry a proprietary memory management system. It can sub-divide up to one megabyte of

**More Power.** The Altos 586 and 8600 families are designed to perform larger, more comprehensive tasks for more users than 8-bit systems. Larger word size allows the use of more powerful instructions and addressing of more memory. This means the system requires fewer instructions and fewer computer cycles to accomplish the same job. It also means that it can handle complex mathematical problems, large data base searches and other demanding applications in far less time.

**Serving more users.** Altos has pioneered the development of microcomputer-based, multi-user systems.

Our 8-bit system can perform a wide range of tasks for up to four users. As more users are added to the system and the tasks become more complex, a 16-bit computer is necessary to reduce contention problems and improve throughput.
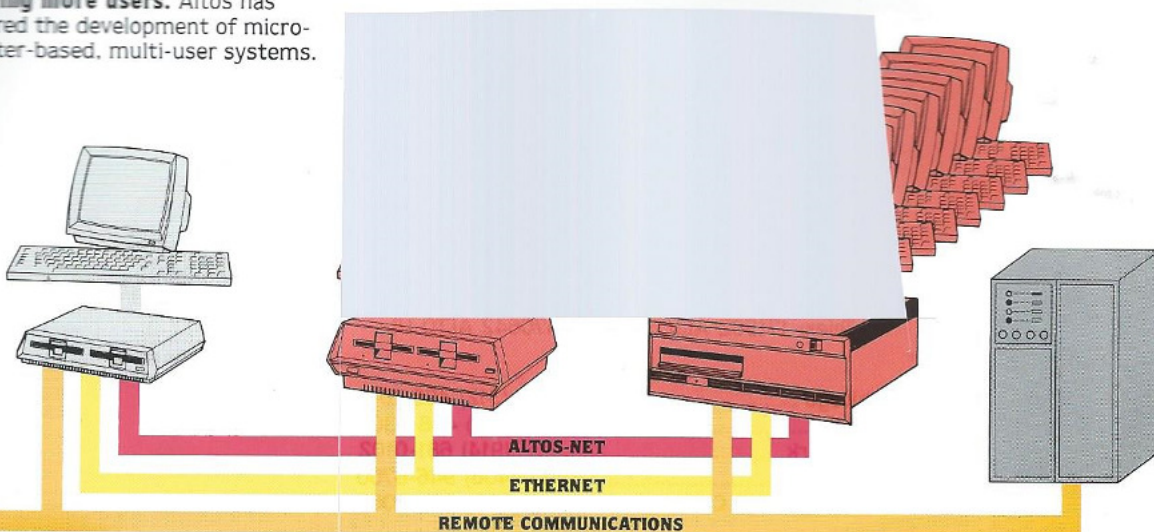
More powerful processing capability, bigger memory, and proprietary memory management greatly enhances multi-user capabilities. The 586 and ACS8600 can serve up to eight users.



**ALTOS-NET**

**ETHERNET**

**REMOTE COMMUNICATIONS**

memory into 4KByte blocks. It assigns a logical to physical address translation and various access attributes to each block so that non-contiguous physical memory can be assigned to any given task. This capability reduces the need to swap users or tasks out to disk. While providing access to more memory, the system also provides write protection and access protection to increase reliability and performance.

The memory management system contributes significantly to enhanced performance for the XENIX/UNIX operating system. While many microcomputers have difficulty handling the size and scope of this operating system, the Altos 586 and ACS8600 manage XENIX/UNIX with ease.

**Error correction.** While even many mid-sized minicomputer memories lack Error Checking and Correction (ECC), the Altos ACS8600 family improves operational reliability with true ECC. The memory has full error detection for single and double bit errors, and automatic correction of single bit errors. This reduces memory errors that can lock up a system.

**Memory expansion.** The basic Altos 586 family configuration includes 256KB of RAM, but all hard disk systems include 512KB, standard. The ACS8600 family includes 512KB of RAM. All systems are expandable to one megabyte.

**Real time clock (586 only).** The clock, with battery back-up, maintains time of day even during power failures or when the computer isn't running. This gives you fail-safe protection for automatic dial-up communications, process control, alarm control, etc.

**Power fail detection.** All Altos 16-bit, multi-user systems include power fail detection. In the event of power failure, data written to disk won't be lost. When power resumes, the system comes up with minimal operator intervention.

**Full communications support.** Altos 8086-based systems support asynchronous and synchronous protocols, and provide networking facilities and a high speed (800 KBaud) communications port for ALTOS-NET.

In the 586 computers, one port is configurable for 800 KBaud, two may be configured for BISYNC communications— 2780/3780, 3720 or SNA/SDLC. The system is expandable to 10 serial ports. A low-cost Ethernet interface may be added.

In ACS8600 computers, eight serial ports and one parallel port are standard, plus one port for Altos-Net 800 KBaud (RS-422).

**Integral data storage.** All 586 systems are available with at least one megabyte of floppy storage. All ACS8600 systems come with half a megabyte of floppy storage. Hard disk models are available with 10 (586 only), 20, 40, or 80 megabytes, upgradable to 160 megabytes.

Hard disk systems integrate an intelligent disk controller that takes full advantage of higher CPU speed and fast hard disk access. The controller supplies full track buffering, consecutive sector transfers, offloading of the central processor, and enhanced throughput. Auxiliary tape systems provide back-up insurance.

**Magnetic tape back-up.** Many users prefer mag tape to provide back-up copies from the hard disk. It's low-cost insurance for important files. The Altos MTU series of high capacity, high performance tape drives provides this optional back-up at a low cost.

**Multibus expansion interface.** The ACS8600 Multibus compatible expansion port also allows expansion beyond standard peripherals to tailor the system to special requirements. For example, the user can add an SMD interface, array processor, A to D or D to A converters, IEEE 488 bus interface, digitizer or digital relay boards.

**Software.** Altos 8086-based systems can run most of the high level languages executed on the Z80. Most 8-bit application packages can be easily re-compiled to run on the 16-bit configuration. The popularity of the 8086 processor has encouraged the development of advanced operating systems, languages, and application programs that make full use of faster speed and longer word length.

## Systems Software available for 586 and ACS8600

| Operating Systems | Languages | Communications and Networking |
|---|---|---|
| XENIX/UNIX | BASIC | ALTOS-NET |
| MS-DOS | COBOL | Ethernet |
| PICK | FORTRAN | 2780/3780 (BISYNC) |
| CP/M-86 | PASCAL | 3270 (BISYNC) |
| MP/M-86 | C | Asynchronous |
| OASIS-16 | | SNA/SDLC |
| | | X.25 |

# A broad selection of multi-user operating systems

## XENIX/UNIX

XENIX/UNIX is Microsoft's 16-bit microcomputer adaptation of Bell Laboratories Version 7 UNIX system. While other UNIX-like operating systems are available from other sources, this system, under license from Western Electric, offers the same proven UNIX code that has been field-tested for almost 10 years. Microsoft is adapting all of their standard system software products to run under XENIX. XENIX combines operating system, languages, text processor, information handling, graphics, and utilities in one package. This includes support for COBOL, BASIC, FORTRAN, PASCAL and C languages.

The memory resident operating system carries the code that supports all system calls to maintain the file system. Mountable file systems are tree-structured directory hierarchies. The file system supports universal accessing methods for data files, directories and devices. The system allows device-independent I/O.

Tree structured process hierarchies enable simple system calls for a process to create off-spring processes that may run in parallel. Asynchronous software interrupts and interprocess message buffers provide supports interprocess communications.

A powerful, user-space command language allows foreground and background program execution, batch control files, and easy redirection and chaining of program input/output. This command language interpreter offers many user-programmable features that improve overall throughput and simplifies operation.

The Altos "business command menu interface" makes XENIX/UNIX easier to use. This interface enables a system supervisor to customize separate menus for users, system administrators, and system designers. It provides extensive "help" facilities that guide usage. It simplifies user authorization procedures, helping users control access to sensitive information. It even helps configure terminals, so that many terminals with RS-232 ports can be used.

## MS-DOS

Microsoft MS-DOS is a single-user operating system that permits easy conversion from 8-bit to 8086 machines. This is the system selected by IBM for their personal computer.

Running Z80 or 8080 assembly language source code through the TRANS translation program will implement most 8-bit programs without modification. A READCPM utility converts CP/M-80 and CP/M-86 files into MS-DOS file format.

MS-DOS supports device independent I/O by assigning a reserved file name to each device. It provides advanced error recovery procedures with error messages when a disk I/O operation is not performed successfully.

MS-DOS provides a special executable object module format that overcomes the 8086 requirement for intersegment references to be fixed for a given load address. During program development, the linker can combine object modules via BASIC, COBOL, FORTRAN, PASCAL and C compilers and the macro assembler into an executable module of any number of segments.

There is no practical limit to file or disk size. The 4-byte XENIX/UNIX operating system compatible logical pointers support file and disk capacity to one gigabyte. Within one diskette, files can have different logical record lengths. The system can block and deblock its own physical sectors.

## PICK

The PICK operating system, developed by Pick & Associates and Pick Computer Works, is considered by many to be the easiest operating system to use. Little traditional coding is required. It has excellent data management capabilities, including a file-creating utility, procedure languages, a retrieval language that uses English sentence structure, and an extended Dartmouth BASIC, designed specifically for data base management.

Variable length records allow compact storage. Memory management provides flexible program development and use.

## MP/M-86

MP/M-86 is a multi-user, multi-tasking operating system for 8086-based systems (Altos 586 and ACS8600). Like CP/M-86, MP/M-86 supports up to 16 logical drives, manages up to one megabyte of RAM memory, offers real time capability, and extensive error-handling and reporting. It also provides record and file locking, and supplies date/time stamps and password file protection. It is file compatible with 8-bit CP/M and MP/M.

MP/M-86, however, extends capability by enabling multi-programming for multiple users. It also supports up to 254 logical character devices, such as consoles and printers. A key advantage is its small memory requirement. The system resides in less than 36 KBytes of memory.

## OASIS-16

OASIS-16 is a data base management operating system for microcomputers. It offers concurrent processing, editors for programs and text, key-index files (ISAM), a relocating macro assembler, an interactive executive language, and a complete library of utilities. An excellent assortment of development tools help the user create very sophisticated software.

## Languages

Operating systems integrated for Altos 16-bit machines support popular languages, but of course, all operating systems do not support all languages.

| | BASIC | COBOL | FORTRAN | PASCAL | C |
|---|---|---|---|---|---|
| XENIX/ UNIX for 8086-based systems | X | X | X | X | X |
| MS-DOS | X | X | X | X | |
| PICK | X | | | | |
| MP/M-86 | X | X | X | X | |
| OASIS-16 | X | X | | | |

## Applications

Although most OEMs will wish to develop their own applications, Altos does offer accounting, financial planning, and word processing applications with our self-teaching Altos Computer Tutor. The XENIX/UNIX operating system offers a user-friendly, business command menu inteface.

We can also provide a listing of over 10 applications packages from independent software vendors who have indicated that their packages will run on our Altos 586 and ACS8600 computers.

## Moving software from 8-bit to 16-bit systems

Altos eases translation of software from 8-bit Z80 systems to 16-bit 8086-based systems.
A. To move applications software from Z80-based ACS8000 or Series 5 computers to an 8086 system when source code is available:

For CP/M-86 or MP/M-86, insert 8-bit applications software floppies into Altos ACS8600, and simply load program and data files as required. Compile under the appropriate 8086/586 language compiler or interpreter. Use standard dump utilities for CP/M-86 or MP/M-86.

For XENIX, move CP/M or MP/M 8-bit source programs to the Altos ACS8600 or 586 via the XENIX file transfer program over RS-232 from 8-bit to 16-bit computer. (XENIX file transfer programs are available from Altos customer service or Altos distributors). For XENIX, use the "TAR" utility. This utility moves data between hard disk and floppy.

B. Back-up new 16-bit software.
C. Test and use the products.

A special note to DEC® DIBOL™ users. DIBOL-11 applications can be transported to Altos 8-bit and 16-bit machines operating under CP/M with up to 300% savings in hardware costs. For more information, call your nearest Altos sales office.

## The 586 Family

| MODEL | CPU | SPEED (MHz) | RAM (KB) | FLOPPY (KB) | HARD DISK (MB) | RS-232 |
|-------|-----|-------------|----------|-------------|----------------|--------|
| 586-2 | 8086 | 10 | 256[1] | 2 | — | 6[2] |
| 586-10 | 8086 | 10 | 512[1] | 1 | 10 | 6[2] |
| 586-12 | 8086 | 10 | 512[1] | 2 | 20 | 6[2] |
| 586-14 | 8086 | 10 | 512[1] | 2 | 40 | 6[2] |
| 586-18 | 8086 | 10 | 512[1] | 2 | 80[3] | 10 |

1. Socketed for 512KB and expandable to one megabyte.
2. One port is configurable for 800 KBaud, two are configurable for synchronous protocols. Expansion capability for ten serial ports, a modem and Ethernet interface is included.
3. The 586-18 will support two 80 MB Winchester hard disks.

## The ACS8600 Family

| MODEL | CPU | SPEED (MHz) | RAM (KB) | FLOPPY (MB) | HARD DISK (MB) | NUMBER OF RS-232 | PORTS PARALLEL |
|-------|-----|-------------|----------|-------------|----------------|------------------|----------------|
| ACS8600-12 | 8086 | 5 | 512 | 0.5 | 20 | 8[2] | 1 |
| ACS8600-14 | 8086 | 5 | 512 | 0.5 | 40 | 8[2] | 1 |
| ACS8600-18 | 8086 | 5 | 512 | 0.5 | 80[3] | 8[2] | 1 |

1. Socketed for 512KB and expandable to one megabyte.
2. An RS-422 port for 800 KBaud is standard. One port is configurable for BISYNC communications.
3. The 8600-18 will support two 80 MB Winchester hard disks.

optional back-up at a low cost.

**Multibus expansion interface.** The ACS8600 Multibus compatible expansion port also allows expansion beyond standard peripherals to tailor the system to special requirements. For example, the user can add an SMD interface, array processor, A to D or D to A converters, IEEE 488 bus interface, digitizer or digital relay boards.

**Software.** Altos 8086-based systems can run most of the high level languages

Telex: 171562 ALTOS SNJ or 470642 ALTO UI

### Sales Offices

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