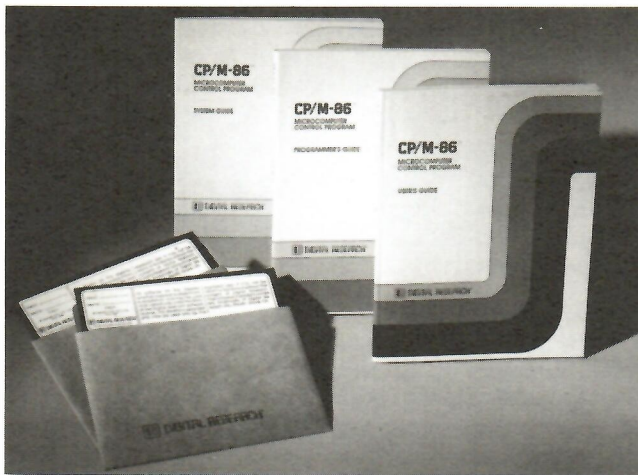


CP/M-86™**CP/M-86 FEATURES**

- Memory Space Efficient — Resides in 12K Bytes
- Manages up to 1MByte RAM
- Allows up to 128MByte of on-line magnetic storage
- Allows multiple programs in memory
- Cross Development Tools for customization on CP/M® based 8-bit systems
- Compatible with CP/M
- File Structure compatible with CP/M for 8-bit systems
- Allows non-contiguous physical memory areas
- Manages non-contiguous memory areas for application programs

CP/M-86 OVERVIEW

CP/M-86 is a proprietary, general purpose control program designed especially for microcomputers that use the Intel 8086 or 8088 microprocessor.

CP/M-86 is efficient and powerful. CP/M-86 systems can support application programs that range from small to complex. It has a time-tested, modular design. The system modules include:

- The Command Console Processor (CCP) — the human interface of the operating system that parses and executes user's commands.
- The Basic Disk Operating System (BDOS) — the logical, invariant portion of the operating system that performs system services such as managing disk directories and files.
- The Basic Input/Output System (BIOS) — the physical, variant portion of the operating system that contains the system-dependent input/output device handlers.

CP/M-86 is small, residing in about 12K bytes of memory. Its size is dependent on the BIOS. The actual size of a customized BIOS is determined by the number of peripheral devices in the system. Although it is compact, CP/M-86 can give application programs the full advantage of the 8086 address space, because it manages up to a full megabyte (1,048,576 bytes) of main memory.

CP/M COMPATIBILITY

CP/M-86 files are completely compatible with the versions of CP/M for the 8080, 8085 and Z-80® based microcomputer systems. This simplifies conversions of software developed to run under CP/M to the new 16-bit 8086-based systems.

The end-user will notice no significant difference between CP/M-86 and CP/M; commands such as DIR, TYPE, PIP, and STAT respond the same way in both systems. The program interface is also unchanged — CP/M calls for system services have the same function numbers in CP/M-86.

It is easy to upgrade existing CP/M application software to run under CP/M-86 because CP/M-86 is so similar to its predecessors. Although assembly language programs will require recoding, higher-level language programs will recompile with little modification.

To make software transport even easier, CP/M-86 uses the 8086 registers corresponding to 8080 registers for system call and return parameters, and allows the user to load application programs into a memory environment similar to the configuration of CP/M. In this execution environment, CP/M-86 loads programs starting at location 100H and stores the default buffers and file control blocks in the base page of memory. This execution environment allows code and data segments to overlap, making the mixture of code and data that often appears in 8-bit applications acceptable to the 8086.

FILE MANAGEMENT

CP/M-86 can support up to 16 logical drives, each containing up to eight megabytes, for a maximum of 128 megabytes of on-line storage. Any one file can reach the full drive size, with space dynamically allocated and released. Each device has a directory of file control blocks that map each file's physical locations on the disk. Disk definition tables in the BIOS translate this logical drive, directory and file structure to the physical characteristics of the disk. This file system is identical to the file system of CP/M 2.

MEMORY MANAGEMENT

CP/M-86 is extremely flexible because it can reside anywhere in memory. Plus, it is very simple to relocate. Simple changes in the command file header and BIOS memory table place CP/M-86 at a new location for subsequent system loads.

Through a user-defined memory configuration table, CP/M-86 manages non-contiguous memory locations. CP/M-86 allows multiple programs to reside in memory simultaneously. This provides facilities for background tasks. Also, a transient program may load additional programs for execution under its own control. These multiple programs may use non-contiguous memory areas. CP/M-86 keeps track of the order in which programs are loaded and, if an abort command is entered, discontinues execution of the program most recently activated.

CP/M-86 is also sophisticated in its handling of user memory. Language processors may specify up to eight independent program units. When the GENCMD utility prepares a memory image file, it builds a file header that specifies the application's memory requirements for each independent unit, including segment information, and a minimum and maximum buffer size. CP/M-86 uses this header information to allocate memory for the program to be loaded. An executing program may request additional buffer space from CP/M-86 during execution. Memory space allocated to the operating system, to background tasks, or to buffer space for the executing program need not be contiguous with the memory occupied by the executing program.

Because 8086 programs are so easy to relocate, dependence on absolute addresses has been minimized. For example, CP/M-86 uses a reserved software interrupt for system entry. To make a call for system services, an application program need only place the required call parameters in the appropriate registers and execute the 8086 instruction, INT 224. Control passes to the operating system, which performs the requested service and then returns control to the calling program. Intel Corporation has reserved the instruction INT 224 specifically for CP/M-86 and its applications programs.

CROSS DEVELOPMENT TOOLS

To assist OEM's wishing to bring up CP/M-86 on a specific hardware device, Digital Research provides a set of development tools which reside on a CP/M based 8-bit Z-80, 8080 or 8085 system and may be used to develop a version of CP/M-86 to be loaded on a target system. Thus, users taking advantage of these development tools are spared the expense of obtaining a 16-bit microcomputer development vehicle.

The primary software cross development tools consist of an assembler, ASM-86 and a utility, GENCMD; both will run on an 8-bit CP/M system. Using these tools on an 8-bit system, the programmer can assemble the custom BIOS program and generate a loadable object file that will run on the target system. This process can save time and money.

CUSTOMIZATION

For ease in transporting CP/M-86 to a specific hardware environment, all hardware dependent code is located in one module, the BIOS (Basic Input/Output System). The BIOS module manages the hardware peripheral devices.

Digital Research ships CP/M-86 configured for the Intel 8612 Single Board Computer with SBC 204 Disk Controller. To bring up CP/M-86 on a different system, a custom BIOS module must be tailored to the specific hardware environment, which usually includes a console, disk drives, a RAM memory configuration and a hard-copy listing device. The custom BIOS must support a standard set of I/O primitives on which the BDOS depends. Some of the standard primitives are:

- Console Status
- Console In
- Console Out
- List Out
- Select Drive
- Set Track
- Set Sector
- Read Sector
- Write Sector
- Return Memory Descriptor Table Address

Custom code for these and other required primitives can handle most application hardware, but must accept and return the appropriate values to the BDOS through a standard subroutine call and return.

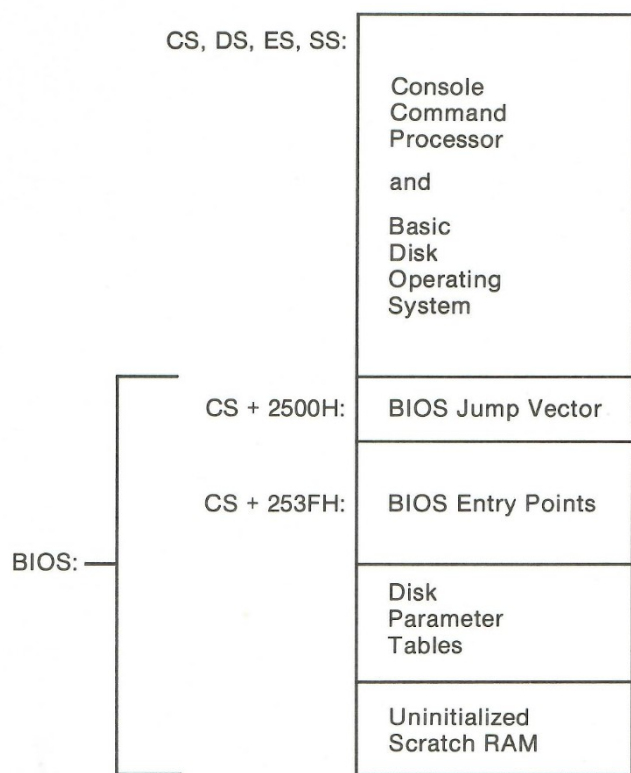
To simplify the preparation of a custom BIOS, Digital Research supplies a source listing of a working BIOS, a skeleton for a custom BIOS module, and powerful utility programs that allow users to develop a module on either an 8-bit or 16-bit machine. The CP/M-86 assembler, ASM-86™, and two other utility programs, GENCMD and GENDEF, are supplied in two forms on the distribution disk: one to operate under CP/M-86 and the other to operate under CP/M for use on Z-80® and 8080 systems. Users can develop CP/M-86 on an existing 8-bit CP/M system, reducing development time and cost.

Once a custom module has been prepared, it is easy to add to the invariant modules of CP/M-86. To do this, the user must concatenate the module with the invariant files, then build a memory image file with the GENCMD utility. The .CMD file that results may then be loaded and executed.

BASIC I/O SYSTEM (BIOS) ORGANIZATION

The distribution version of CP/M-86 is set up for operation with the Intel SBC 86/12 microprocessor and an Intel 204 diskette controller. All hardware dependencies are, however, concentrated in subroutines which are collectively referred to as the Basic I/O System, or BIOS. A CP/M-86 system implementor can modify these subroutines to tailor CP/M-86 to fit nearly any 8086 or 8088 operating environment.

The BIOS portion of CP/M-86 resides in the topmost portion of the operating system (highest addresses), and takes the following general form:



PROM LOADER

For users who have the ISBC 8612 hardware configuration, Digital Research can optionally provide a PROM Loader. This firmware brings the CP/M-86 loader into the system and sets up the hardware to initialize CP/M-86.

UTILITIES

CP/M-86 is supplied with 8 powerful utilities:

PIP

The Peripheral Interchange Program provides file transfer between devices and disk files and performs various reformatting and concatenation functions. Formatting options include parity-bit removal, case conversion, Intel "hex" file validation, subfile extraction, tab expansion, line number generation and pagination.

ED

The CP/M-86 Text Editor allows creation and modification of ASCII files using extensive commands: string substitution, string search, insert, delete and block move. ED allows text to be located by context, line number or relative position with a macro command for making extensive text changes with a single command line.

ASM-86

The CP/M-86 Assembler is a fast 8086 assembler using standard Intel mnemonics. ASM-86 also allows users to define unique instructions with its code-macro facility. ASM-86 is supplied in two forms: an 8086 cross assembler designed to run under CP/M on an 8-bit system and an 8086 assembler designed to run under CP/M-86.

DDT-86

The CP/M-86 Dynamic Debugging Tool allows the user to test and debug programs interactively in a CP/M-86 environment. The command set allows users to trace program execution with full register and status display. DDT-86 contains an integral assembler/disassembler module that lets users patch and display memory in assembler mnemonic form.

SUBMIT

The Submit utility allows the user to batch together a parameterized group of prototype CP/M-86 commands in a file and then "submit" them to the operating system with a single command.

STAT

The STAT utility alters and displays I/O device and file status including free-space computations, status of on-line diskettes and physical-to-logical device assignment.

GENCMD and LMCMD

The GENCMD utility processes Intel "H86" format files, which may be produced either by Digital Research's ASM-86 or by Intel's OH86 utility. LMCMD processes Intel L-module files resulting from the standard Intel LOC86 Object Code Relocator Utility.

THE CP/M-86 PACKAGE

CP/M-86 is shipped on two single-sided, single-density, 8-inch floppy disks in IBM compatible format. These disks contain the following machine-readable files:

Distribution Disk 1

CPM.SYS
LOADER.COM
DDT86.COM
STAT.COM
SUBMIT.COM
PIP.COM
GENCMD.COM
LDCOPY.COM
ED.COM
GENDEF.COM
ASM86.COM
CPM.H86
LDBDOS.H86
LDBIOS.H86
LDCPM.H86
GENDEF.COM
GENCMD.COM
ASM86.COM

Distribution Disk 2

ROM.A86
BIOS.A86
CBIOS.A86
RANDOM.A86
LDCPM.A86
DEBLOCK.LIB
SINGLES.LIB
SINGLES.DEF

The CP/M-86 package includes full documentation for the product. Documentation is also available separately. A CP/M-86 PROM loader is available for the Intel 8612 Single Board Computer.

HARDWARE REQUIREMENTS

The version of CP/M-86 that Digital Research ships and supports requires an Intel 8612 Single Board Computer and an Intel 204 Disk Controller. CP/M-86 may be reconfigured for a custom hardware environment with a CP/M development system. Custom hardware environments must include:

- An Intel 8086 or 8088 CPU
- At least 56K of RAM
- One to sixteen disk drives of up to 8 megabytes each
- An ASCII console device such as a CRT

DIGITAL RESEARCH

Digital Research, Pacific Grove, CA is the leading producer of microcomputer operating system software and utilities. For 10 years, Digital Research has been involved with the design, development, and support of microcomputer software. The single user operating system, CP/M, multiuser MP/M™ and software network, CP/NET™, form the basis of a family of operating system software products spanning 8 to 16 bit microcomputers. Digital Research users include over 200,000 systems, 250 OEMs and 300 independent software houses.

ORDERING INFORMATION

Product	Order Description
CP/M-86 System	Two Single Density, single sided diskettes and CP/M-86 Documentation.
CP/M-86 Documentation	CP/M-86 System Guide, CP/M-86 Programmer's Guide and CP/M users Guide.
CP/M-86 Development PROM	PROM for use on an 8612 Single Board Computer.

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