

## MP/M II™



## MP/M II OVERVIEW

MP/M II is a multi-user, multi-tasking operating system designed for microcomputers that use the Intel 8080/8085 or Zilog Z-80® microprocessors.

MP/M II is compact and powerful. It has a time-tested, modular design, which includes:

- TMP-(Terminal Message Processor) the human interface of the system, reads the user's command line.
- CLI-(Command Line Interpreter) the part of the system responsible for loading programs that execute user's commands.
- BDOS-(Basic Disk Operating System) the portion of the system that manages files and directories, consoles and printers.
- XDOS-(EXtended Disk Operating System) the real-time nucleus of MP/M II, which provides dispatching, queue, flag and time-base management.
- XIOS-(EXtended Input/Output System) the variant portion of the operating system that contains all physical hardware-dependent code, such as Input/Output device handlers.

MP/M II is small, residing in less than 26K bytes of memory, 13K of which must be common to all users. Total size is dependent on the XIOS and the number of Resident System Processes (RSP) included when the system is generated (GENSYS). The size of the XIOS is determined by the number and type of peripherals supported.

## MP/M II FEATURES

- A Multi-User, Multi-Tasking Operating System
- Upward Compatible with CP/M®
- Record and File Locking
- Date and Time Stamps and Password Protection on Files
- 16 Logical Drives managing up to 512 Megabytes each for total on-line storage of 8 Gigabytes
- Extensive Error-handling and Reporting
- Multiple Printer Support
- Includes RMAC™, LINK-80™ and LIB-80
- CP/NET™ Compatibility

## CP/M COMPATIBILITY

The MP/M II file system is upward compatible with CP/M 1.4 and 2.2 files. All files generated by CP/M systems may be read under MP/M II. In addition, the MP/M II file system allows larger files and supports file password protection.

Executable CP/M (.COM) files, will run under MP/M II when the following criteria are met: (1) the MP/M II system has "bank-select" memory; (2) the program will run in the memory available in the bank; and (3) the program communicates with the operating system only through BDOS calls.

To the end user, MP/M II commands are a superset of CP/M commands. Familiar CP/M commands such as DIR, ERA, TYPE, PIP and STAT respond similarly in MP/M II.

## RECORD AND FILE LOCKING

File integrity is enhanced with the MP/M II extended file system. MP/M II allows files to be opened in one of three modes: locked-, unlocked-, and read-only. These three modes are set by the Open File commands through a BDOS call.

Locked mode may be used when it is necessary to assure that only one user may open a specific file at a given time. Once a file is opened in the locked mode, other user requests for that file are denied.

In the unlocked mode multiple open file requests may be serviced. If a file is opened in the unlocked mode, individual records or groups of records within that file may be temporarily locked by a user. Alternately a record may be updated with a Test and Write Record command. In this case, before an update is performed an unaltered copy of the record in memory is compared with the record on the disk. If the disk copy has been altered, an error message is returned to the application program.

Finally, the read-only mode allows more than one process to open a file. Attempts to write to a file opened in this mode are denied.

## **PASSWORD PROTECTION ON DIRECTORIES AND FILES**

Protection for user files and directories is enhanced through the optional use of passwords. MP/M II allows a user to assign passwords to files and directory labels. Application programs may employ a password checking procedure to determine access authorization before opening files. Passwords are encrypted to provide additional security.

## **DATE AND TIME STAMPING**

MP/M II's extended directory entries provide a facility for date and time stamping files. Each file may have up to two date and time stamps. This feature is controlled by an attribute in the directory label, which may be set by the system manager, and provides the ability to automatically add date and time of last update and either last access or file creation. The SDIR utility displays date and time stamp information.

## **DISK MANAGEMENT**

MP/M II can support up to 16 logical drives, each containing up to 512 Megabytes, for a maximum of 8 Gigabytes of on-line storage. Any one file can be up to 32 Megabytes in size, with space dynamically allocated and released. Each drive has a directory which maps each file's physical locations on the disk. Disk definition tables in the XIOS translate the logical drive, directory and file structure to the physical characteristics of the disk. One physical disk can be treated as one or more logical drives by MP/M II.

## **ERROR HANDLING AND REPORTING**

MP/M II can handle errors in three modes: (1) it can display an error message and terminate the user's program; (2) it can display an error message and return to the user's program; or (3) it can return to the user's program without displaying an error message. In modes (2) and (3) the BDOS returns an error code which may be trapped by the application program. The application program can then provide more specific error handling and information.

## **MULTIPLE PRINTER SUPPORT**

MP/M II supports up to 16 list devices, typically printers and teletypes. At the application program level, a call to the BDOS allows the selection of a particular list device. Additionally, list devices may be assigned dynamically by using the Printer utility.

## **NETWORK INTERFACE**

MP/M II supports the Digital Research network operating system, CP/NET, which allows users to interconnect multiple microcomputers. Users may run standard CP/M programs which transparently share disks, printers and other network devices. Additionally, the elec-

tronic mail feature of CP/NET provides for message communications among users.

## **RMAC, LINK-80, and LIB-80**

The MP/M II package includes Digital Research's RMAC, relocating macro assembler, LINK-80, our linkage-editor with overlay capability, XREF, which uses the output of RMAC to produce a cross-reference file of symbols used in the program and LI B-80, a library manager. These utilities will help OEMs maintain software in the field. Users of compiled languages, which generate relocatable modules, can utilize the overlay capability of LINK-80.

## **MEMORY MANAGEMENT**

MP/M II can manage up to 400K bytes of RAM. The nucleus of the operating system requires a 16K of common memory. The remainder may be switched in up to 48K banks among seven users. The eighth bank contains the banked portion of the operating system, including resident system processes. Memory allocation is done on a best-fit basis.

## **MP/M II DISPATCHER**

The MP/M II Dispatcher, that portion of the XDOS which changes the currently executing task, requires from 600-900 microseconds to switch tasks (4MHZ Z-80). This low overhead leads to greater system throughput. For real-time applications, the interrupt mechanism is disabled for less than 150 microseconds during a dispatch. Thus, high priority interrupts may be serviced in a timely fashion.

## **CUSTOMIZATION**

MP/M II may be transported to a specific 8080/8085 or Z-80 hardware environment by tailoring its loader and hardware-dependent module (XIOS). Either MP/M™ 1.1 or CP/M 2.2 must first be implemented on the target machine.

The MP/M Loader (MPMLDR) may be executed under CP/M, or following reconfiguration it may be loaded from the system tracks of the disk by the cold start loader. The MPMLDR is specially configured for a particular environment by inserting the BIOS code from CP/M into the MPMLDR BIOS.

The hardware-dependent module of MP/M II (XIOS) must also be reconfigured. Much of the device handling code, as well as Disk Drive Definition tables, may be copied from the CP/M BIOS. Once a simple system is running, support for additional consoles, the system clock, bank-select memory and interrupt-driven devices may be introduced. MP/M II can be loaded and executed under the CP/M debugger (DDT).

Two samples of an XIOS are included in the MP/M II Documentation.

## MP/M II UTILITIES

### ABORT

The Abort utility allows a user to terminate a running program.

### ATTACH

The Attach utility attaches a program to a console.

### ASM

The latest version of the CP/M assembler supports Intel mnemonics.

### CONSOLE

The Console utility displays the system console number of the requesting console.

### DIR

The Directory utility displays a disk directory for the currently logged user. By setting the SYS attribute, files may be made invisible to this utility.

### DSKRESET

The Disk Reset utility resets the allocation map of a drive after the insertion of a new diskette. This allows a write to the new diskette.

### ED

The latest version of the CP/M editor is included.

### ERA

The Erase utility erases a file or files; may be password protected.

### ERAQ

The Erase with Query utility queries the user for confirmation before erasing each specified file.

### MPMSTAT

The MP/M STAT utility displays the run-time system status of MP/M II.

### PIP

The Peripheral Interchange Program supports the movement of files among the various logical devices and drives of the system. PIP also concatenates files or extracts portions of ASCII files. Options in PIP allow for archiving files that have been updated and for moving files between different directories.

### PRINTER

The Printer utility sets the list device for a particular console. Several consoles may share the same list device, but only one can "own" it at a time.

### PRLCOM

The PRLCOM utility creates an absolute executable (.COM) file from a page relocatable (.PRL) file.

### RDT

The RDT utility is a relocatable version of the Dynamic Debugging Tool (DDT).

### REN

The REN utility renames MP/M II files.

### SCHED

The MP/M Scheduler executes a specified program on a specified date at a given time.

### SDIR

The SDIR utility displays all types of MP/M II files as well as their size, time and date stamps and a notation as to whether or not the file is password protected.

### SET

The Set utility allows the setting of various file attributes and passwords. These attributes include Read-Only, SYS (invisible to DIR), and user defined attributes.

### SHOW

The Show utility displays information about the characteristics of a logical drive such as capacity, number of directory entries and directory label information.

### SPOOL

The Spool utility sends files to the spool queue for proper handling by the list device.

### STAT

The STAT utility displays the space, attribute and directory status of drives and files.

### STOPSPLR

The STOPSPLR utility stops the spooling operation in progress and empties the spool queue.

### SUBMIT

The Submit utility executes files of commands, each of which may be a program.

### TOD

The Time Of Day utility displays or sets the system date and time.

### TYPE

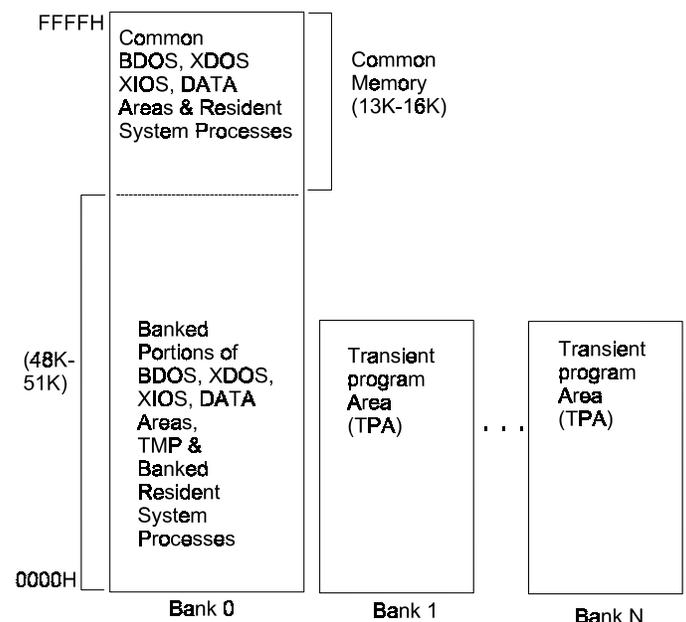
The Type utility types the specified ASCII file on the console.

### USER

The User utility displays or sets the current user (directory) number.

Any or all of the above utilities may be password protected for increased system security.

## MP/M II MEMORY ORGANIZATION



## MP/M II PACKAGE

MP/M II is shipped on two single-sided, single-density, 8-inch diskettes with an IBM-compatible physical format. These diskettes contain the following machine readable files:

### Distribution Disk 1

BNKBDOS.SPR  
MPMSTAT.RSP  
SCHED.BRS  
CONSOLE.PRL  
ERA.PRL  
PRINTER.PRL  
SCHED.PRL  
SPOOL.PRL  
TOD.PRL  
GENHEX.COM  
LINK.COM  
XREF.COM  
RESBDOS.SPR  
SCHED.RSP  
SPOOL.BRS  
DIR.PRL  
ERAQ.PRL  
PRLCOM.PRL  
SDIR.PRL  
STAT.PRL  
TYPE.PRL  
GENMOD.COM  
LOAD.COM  
XDOS.SPR  
SPOOL.RSP  
ABORT.PRL  
DUMP.PRL

MPMSTAT.PRL  
RDT.PRL  
SET.PRL  
STOPSPRL.PRL  
USER.PRL  
GENSYS.COM  
MPMLDR.COM  
ABORT.RSP  
MPMSTAT.BRS  
ASM.PRL  
ED.PRL  
PIP.COM  
REN.PRL  
SHOW.PRL  
SUBMIT.PRL  
DDT.COM  
LIB.COM  
RMAC.COM

### Distribution Disk 2

LDRBIOS.ASM  
MDSXIOS.ASM  
BOOT.ASM  
BNKXIOS.ASM  
DEBLOCKASM  
TODCNV.ASM  
DUMP.ASM  
DISKDEF.LIB

## SYSTEM PERFORMANCE REPORTING

MP/M II is supported by Digital Research's Software Performance Report (SPR) system. This service provides a prompt response to technical problems associated with MP/M II. Users are provided with SPR forms which serve as a communications device to inform the Digital Research Product Support staff of user identified problems. The SPR Status Report periodically informs MP/M II users of product updates and revisions.

## HARDWARE REQUIREMENTS

- 8080/8085 or Z-80 microprocessor, 1 to 16 disk drives of up to 512 Megabytes capacity each, 1 to 16 ASCII consoles, 1 to 16 printers and a real-time clock.
- 48K of RAM
- CP/M 2.2 or MP/M 1.1 must be implemented on the target machine.

## MP/M II UPGRADE KIT

This package converts MP/M 1.1 systems into MP/M II systems. It is available only to registered MP/M 1.1 users. Due to its new XIOS requirements, it will be necessary to reinstall MP/M II. System users unfamiliar with assembly language programming should purchase an MP/M II upgrade kit from their hardware manufacturer either directly or through a dealer.

## DIGITAL RESEARCH

Digital Research, Pacific Grove, CA is the leading producer of microcomputer operating systems and utilities. For eight 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 II and software network CP/NET, form the basis of a family of operating system software products spanning 8 and 16 bit microcomputers. Digital Research users include over 250,000 systems, 300 OEMs and 400 independent software houses.

## ORDERING INFORMATION

Product	Order Description
MP/M II System	Two 8" single-density, single-sided diskettes and five manuals, including the MAC TM and LINK-80 documentation.
MP/M II Documentation	Three manuals: MP/M II User's Guide, MP/M II Programmer's Guide and MP/M II System_Guide.

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