

TECHNICAL MANUAL
AND INSTALLATION PROCEDURES

MP/MTM

8-16TM

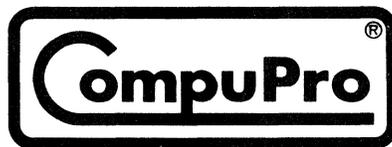
MULTI-USER OPERATING SYSTEM
FOR 8 AND 16 BIT OPERATION



A **GODBOUT** COMPANY

MP/M 8-16™ Technical Manual & Installation Procedures

Multi-User Operating System for 8 & 16 Bit Operations



A **GODBOUT** COMPANY

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MP/M 8-16 TECHNICAL MANUAL/INSTALLATION PROCEDURES

1. INTRODUCTION

MP/M 8-16 is a proprietary implementation of Digital Research's MP/M 86™ operating system, specially configured for CompuPro hardware. This implementation of MP/M 86 enables a CompuPro-based system to run both 8 and 16-bit programs simultaneously in a multi-user, multi-tasking environment. This sophisticated software engineering is fully interrupt-driven and allows MP/M 8-16 complete compatibility with current CP/M® and MP/M™ environments - CP/M 2.2, MP/M 86 and CP/M 86®.

The MP/M 8-16 system makes full use of the MP/M 86 kernel. MP/M 8-16 can handle up to fifteen terminals and multiple printer configurations. It also takes advantage of the increased program area and file and disk sizes offered by MP/M 86.

Other software enhancements include file protection and on-line message features, user account files and easy-to-use user, terminal and printer setup files. Combined with state of the art hardware from CompuPro, MP/M 8-16 offers users the most advanced, yet also the "friendliest," multi-user microcomputer system environment available on the market today.

NOTE: Some commands and command syntax are different between MP/M 8-16 and CP/M 2 or CP/M 86. Please take some time to familiarize yourself with the MP/M 86 Operating System Users Guide that is included with your MP/M 8-16 system disk.

2. HARDWARE REQUIREMENTS

The following CompuPro products are needed to configure a basic two-user system:

- Enclosure: **Enclosure 2** with 20-slot S-100 bus motherboard
- Processor: **CPU 8085/8088** or **CPU 86/87**.
- Support: **System Support 1** featuring one serial port for connection to system console, interrupt controller, real-time calendar/clock, three interval timers, EPROM sockets with "GO 86" EPROM or 6116 RAM chip installed.
- Memory: **RAM 16, 17, 21, or 22** to provide 192K or more of memory.
- I/O Control: **Interfacer 3** or **4** series for hardware I/O control.
- Mass Storage: **Disk I** floppy disk controller with two 8-inch double-sided, double-density floppy disk drives that will support 3msec. step rate.

The following CompuPro hardware is recommended for three or more users:

- Disk 2 --** hard disk controller board, and 10 or 20-megabyte hard disk devices. The system easily handles up to 40 megabytes of hard disk storage.
- M-DRIVE/H -** disk emulator for up to 4 megabytes of high speed RAM disk.
- MEMORY -** Increased memory is necessary to support a large number of users. At least 64K per additional user is recommended. Some applications may require up to 1 megabyte, the maximum supported by MP/M 8-16.

3. SOFTWARE ENHANCEMENTS

This section describes the enhancements to Digital Research's MP/M 86 operating system that are incorporated in MP/M 8-16 for your CompuPro system. If you have read through the MP/M 86 manuals, you know that MP/M is a sophisticated operating system. Basically, it has three levels of interface:

- (1) The user interface, which is a Resident System Process (RSP) called the TERMINAL MESSAGE PROCESS (TMP);
- (2) The logically invariant interface, consisting of the MP/M 86 system function calls; and
- (3) The physical interface, which communicates with the hardware environment and receives transient and resident commands from the invariant interface.

Under MP/M 8-16 for CompuPro systems, the interface levels and basic structure of the operating system, as designed by Digital Research, remain intact. The only differences are enhancements made to areas that Digital Research designed to be user-modified. Several of these modifications were made in the TMP, and these will be described first.

3.1. Terminal Message Process Enhancements

Under MP/M 8-16, the TMP has been modified as the system "Shell." The Shell has six main functions:

1. Terminal, printer, user and drive assignment during login.
2. Changes in printer default assignment.
3. Changes in user default number.
4. Changes in user default drives.
5. Acceptance and execution of user command lines.
6. User login and logout functions.

The system comes up initially in single user mode. In single user mode, only the system console (console 0) is active and it has access to all system resources (RAM, hard disks, etc.) The remainder of the terminals are inactive.

In order to run the system in multi-user mode, the system operator must log out at the system console (console 0) by typing "logout". Once this is done, the Shell reads a terminal setup file (called "ttys") and a printer setup file (called "lprs") and initializes the terminals and printers according to information contained in these files.

Users may enter the system once their names and user information have been entered into the "passwd" file. MP/M 8-16 searches this file to verify each name entered. Upon successful entry, the system displays the "message of the day" (contained in the file called "motd") and then begins accepting and executing user commands.

If the user's name requires a password, the system prompts for the password after correct entry of the login name. The system generates an error message if the login name is not contained in the "passwd" file, or if a required password was incorrectly entered (e.g., if the RETURN key was pressed).

The "passwd" file contains information defining user entry, access and use of the system. The system operator can modify this file to suit the needs of each user. For example, by default the system accepts and executes system-wide programs, but this file can be modified so that a user is automatically entered into just one program at login. The procedures for entering data into this file, as well as into the files for terminals, printers, and the message of the day, are explained later in this manual.

In addition to the logon features described above, the "SHELL" performs a number of functions once a user has logged on the system. The first of these functions is allowing a user to select a printer other than the user's default printer. A user can select a printer other than their default printer by typing "PRINTER xxxx", where "xxxx" is one of the names given in the lprs file (usually 0-2), as in the example below:

```
0A>PRINTER 1
```

Another function performed by the "SHELL" is to force an update of the hard disk. CompuPro's implementation of MPM/M 8-16 includes a "most-recently-used (MRU) cache buffer" for the hard disk. This means that sectors are kept in memory once they are read in. Then, if a sector is requested again, it can be read from the cache, instead of the disk, thus saving time. Write operations are also done to the cache. The "cache" buffer is updated to the hard disk when any one of five things happen: 1) more than 1/2 of the sectors in the cache need to be written, 2) the least recently used sector needs writing, 3) the system "update" timer goes off (usually every 30 seconds), 4) a user logs off of the system with the LOGOUT command, 5) the SYNC command is executed by a user.

To execute the SYNC command a user types the command "SYNC" as below:

```
0A>SYNC
```

To log off of the system, a user should type "LOGOUT" as below:

```
0A>LOGOUT
```

3.2. The SWITCH Program

The SWITCH program is the most innovative part of CompuPro's enhancements to MP/M 86. This program enables the system's 8 and 16-bit file access capability.

When a command is executed, the Shell first checks the default user directory for 8088 (16-bit) files with a ".cmd" extension. If that file is not found, the Shell invokes SWITCH, which searches for an 8085 (8-bit) file with the same file name, but with a ".com" extension.

If the ".com" file does not exist, SWITCH returns an error message to user.

If the file does exist, SWITCH then allocates a 64K block of memory into which it moves processor switching code. It loads the ".com" file into that segment then jumps to this 64K block to set up a CP/M 80 environment.

SWITCH intercepts all system calls, sets up the proper operating environment (8 or 16 bit), switches the CPUs, then invokes the appropriate MP/M 86 function.

The processor switching code switches to the 8088 environment on two conditions:

- (1) an MP/M system call, and
- (2) an interrupt.

Otherwise, it simulates CP/M 80 calls to let programs believe they are in a CP/M 80 environment.

To illustrate, suppose that a user wishes to execute an 8 bit version of MicroPro's Wordstar program and open his "user.doc" file. The user enters:

```
3A>ws user.doc
```

The Shell first searches for the "ws.cmd" file. When it can't find that, it invokes SWITCH to seek out the file. SWITCH then loads the "ws.com" file into the 64K memory bank, sets up MP/M 8-16 to change from the 8088 processor to the 8085, sets up the CP/M 80 command line and executes the "ws" command with the "user.doc" file. All this is done quickly and transparently; the user simply enters the command line.

The MP/M 8-16 enhancements made by CompuPro do not interfere with the normal operation of Digital Research's MP/M 86 operating system. All functions, as described in the accompanying manuals by Digital Research, are valid. MPM 8-16 simply makes a good multi-user operating system great, by adding dual processor capability and user-oriented utilities.

4. UNPACKING THE SYSTEM

Before you begin setting up your system, consider carefully the actual location you want to place up your computer. Make sure you have an adequate

amount of power outlets for the plugs and enough space surrounding your system for ventilation. You will also need to work at both the back and front of the computer to install your system. Allow yourself enough room initially to get to both these areas.

Your computer has been shipped in packing materials that help prevent damage during shipping. **Save these packing materials in the event that you must return any equipment to your dealer.** Repacking the system in the original containers provides the best protection during shipping.

An invoice is shipped with each system. Use it to verify that all components have been received. We suggest you file the invoice away with your records for future reference.

Open all boxes and carefully remove each unit from the packing material. Place the units on a flat surface and inspect the cabinets for any signs of shipping damage. Find and remove all the cables, cords, and system diskettes and put them aside for the moment.

4.1. Unpacking the Floppy Disk Drives

To prevent shipping damage, the floppy disk drives are shipped with a cardboard shipping diskette inserted in the drive slots. Be sure to remove this diskette before using the drive. **Save these cardboard diskettes and packing materials in case the disk drives need to be re-shipped.**

4.2. Unlocking the Hard Disk Drive

The hard disk storage heads are locked in place for shipping. To unlock the heads, remove the cover, then find the LOCKED and UNLOCKED label on the drive. There is a lever underneath this label. Unlock the drive by switching the lever to the UNLOCKED position. This lever is held in place in two notched areas. Hold the lever down, pulling it out of the first notched area marked LOCKED, then slide it across and up to the second notched area marked UNLOCKED. Your hard disk is now unlocked.

5. REPACKING THE SYSTEM

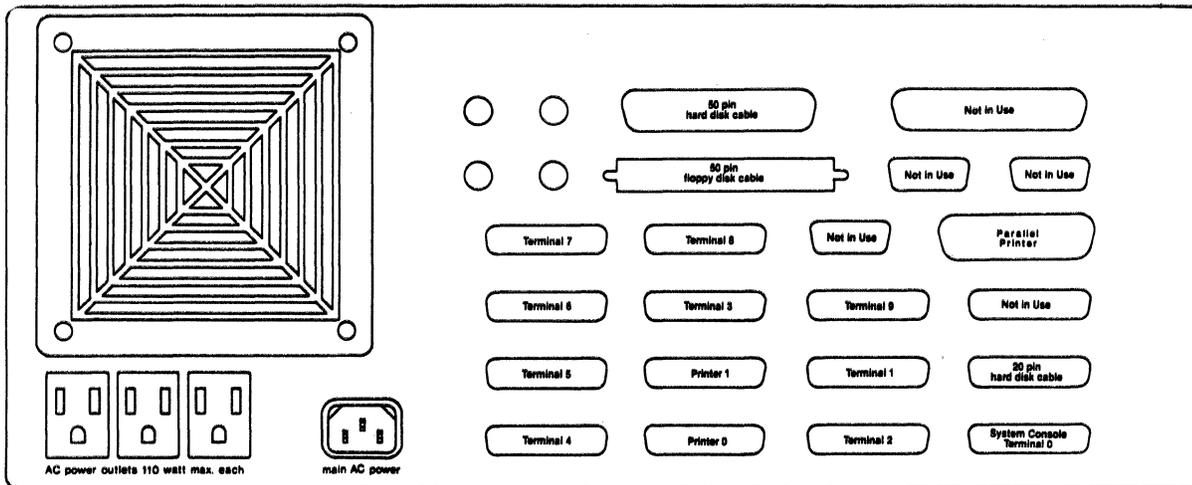
If it is necessary to repack your system, make sure it is packed as it was originally shipped. Take special care in repacking the disk drives. It is important that both the floppy and hard disk drives be secured before moving or shipping. Reverse the procedure in the section above so that your hard disk is LOCKED.

6. HARDWARE INSTALLATION

This section describes the hardware setup for the MP/M 8-16. It is assumed at this point that all necessary boards are installed within the enclosure and all necessary jumper and switch settings have been made.

Use the following illustration as a guide for making the external connections to your system.

Fig. 6-1: Enclosure 2 Back Panel



6.1. Connecting the Terminals and Serial Printers

The connector for terminals and serial printers is a 25-pin "D" style connector. Before making external connections for these devices, check the following:

INTERFACER 3

1. Interfacer 3 board should be firmly installed in the motherboard.
2. Two 50-pin serial connections at the RIGHT of the Interfacer 3 (front view) should be firmly in place. These connections each connect three 25-pin serial devices, normally terminal ports 3 through 6 and printers 0 and 1. Printer 0 is relative user 4 and printer 1 is relative user 5.
3. The 26-pin connection to the LEFT of the two 50-pin connectors is firmly in place. This connects terminal 2.
4. The next 26-pin connection is for terminal 1. If this connection is used, check that it is secure. The system console terminal is connected to the 26-pin serial connector on the System Support board. Check that this board and connections are secure, then begin the external cable connections.

INTERFACER 4

1. The 50-pin connector on the right of the Interfacer 4 (front view) should be firmly in place. This connects serial terminals 1, 2 and serial printer 1.
2. The 40-pin connector in the middle is for a Centronics printer, usually printer 0.

These connections are simplified by the "D" shape of the connectors. Use Figure 6-1 to help you make your connections.

Make a complete connection, first connecting the cable connector to the back panel connection, then connecting the other end of the cable to the terminal or printer. Begin with the system console, then proceed to terminal 1, terminal 2, and so on until all terminals and printers are connected. The mapping of MP/M console number to physical device numbers are given in the table below:

1ST BOARD - I/03 & I/04 relative user numbers

TTY1	TTY2	PRINTER1	PRINTER2	TTY3	TTY4	TTY5	TTY6
7	6	5	4	3	2	1	0

2ND BOARD - I/04

TTY14	TTY13	TTY12	TTY11	TTY10	TTY9	TTY8	PRINTER3
15	14	13	12	11	10	9	8

6.2. Connecting the Floppy Disk

The floppy disks are connected internally to the floppy controller board with one 50-pin cable connected to the left 50-pin connector (rear view). Double-check that the board and cable connections are securely installed.

The external connection is made with a 50-pin cable. The connection is correct if the cable leads down from the back panel connector.

Connect the end of this cable to the back panel of the floppy disk. Here the connection is correct if the cable extends up from the connection. Take care not to bend the pins, and be sure that all the pins are included when you plug in the cable.

6.3. Connecting the Hard Disk

Two cable connections are made for the hard disk. The internal connections are made to the hard disk controller board by a 50-pin control cable and a 20-pin data cable, connected to the leftmost 20-pin connector.

The external connections are made with a 50-pin and a 20-pin cable. The connections are correct if the cables lead down from the back panel connector. Connect the end of these cables to the back panel of the hard disk. The connections are correct if the cables lead down from the connection. Take care not to bend the pins and be sure that all the pins are included when you plug in the cable. (Mini-Winchesters are connected by a 34-pin control cable.)

6.4. Connection Test

Test your connections now. Plug in all power cables. The Enclosure 2 has provisions on the rear panel for plugging in disk drives, terminals or printers. These AC utility outlets are switched by the main power switch, located on the front of the Enclosure 2. Each outlet is rated for a maximum of 120 watts.

Turn on power to the Enclosure 2 by pressing down the top portion of the red power switch on the front panel.

Turn on power to the floppy disk system by flipping up the toggle switch on the back panel.

Turn on power to the hard disk system by pressing down the right portion of the power switch on the rear panel.

Go to the front of the system now and check for the following:

- The red RESET button on the Enclosure 2 is lit. Press this button to insure proper system operation.
- The red indicator light on the left side of the disk system is blinking.

If the indicator light is lit (not blinking), and pressing the RESET button does not start it blinking, you have made an improper cable connection. Turn power to all systems off before going any further.

First try correcting the problem by unplugging the rear panel connection on the floppy disk. Turn the ribbon cable connector over and re-connect it.

Turn on power to the systems and go over the above check again. If the system still does not power up correctly, make sure that you followed previous connection instructions correctly. A troubleshooting chart follows at the end of this manual; check this out also.

If you are satisfied that all connections are made properly, but are still unable to get your system to operate correctly, contact your dealer.

7. USING THE CPU 86/87

This section describes using the CPU 86/87 processor board with MP/M 8-16. If you are using the CPU 8085/88 processor board you may skip this section.

The first thing you should do to run the CPU 86/87 with SYSTEM SUPPORT 1 interrupt controllers, is to perform the following steps on the SYSTEM SUPPORT 1 board:

- 1) Carefully pull IC U28 from its socket. (IC U28 is located on the right hand side of the board.)
- 2) Bend out pin 4 so that when the IC is replaced, pin 4 will not make contact with the socket or any thing else.
- 3) Replace IC U28 back in its socket and verify that every pin except pin 4 are back in thier holes.

Now bring up a CP/M 86 system and put a **copy** of your MP/M 8-16 disk in the B drive. Use the MPMGEN command in the following manner:

```
A>B:MPMGEN B:MPMLDRFY.86
copysys Version x.x
Destination Drive name (or return to terminate):B
Function complete.
Destination Drive name (or return to terminate):<cr>
A>
```

Your MP/M 8-16 disk will now have a loader for the CPU 86/87. You may proceed with the rest of the manual.

NOTE: If you are going to use the CPU 86/87 board, you will not be able to run any 8 bit software. Therefore, the file "SW!.CMD" should be removed from your system as soon as it is up.

8. MAKING A BACKUP SYSTEM

The first thing you must do is to make a backup copy of your MP/M 8-16 system disk. **Use the backup copy to run the system with and put the original master in a safe place.**

To make a copy of your MP/M 8-16 disk, you must bring up a CP/M 80 or CP/M 86 system. Use the CompuPro format utility provided with CP/M 80 and CP/M 86 to format a disk (must be single sided and 1024 bytes/sector) and the copy utility to make a track by track copy.

To put your system on a double sided disk or one with different sectoring (256 or 512 bytes/sector), format a disk with CP/M 80 or CP/M 86 as above. To copy the system tracks over, use the MPMGEN utility provided with MP/M 8-16:

```
A>MPMGEN B:MPMLDRFY.85
```

and then PIP the system files over to your new disk under MP/M 8-16. PIP the file "mpm.sys" over first to minimize boot up time.

The MP/M 8-16 distribution disk is set up to run 4 floppies and no hard disk. If your system has a Disk 2 and hard disk, you must install the hard disk loader on the system tracks of your boot floppy. This is done under CP/M 86 using the MPMGEN utility as below:

```
A>B:MPMGEN B:MPMLDRHD.85
```

Before you attempt to boot up the system with the hard disk loader, you must change the "mpm.sys" file to match your hard disk. This can be done under CP/M 80 or CP/M 86 as follows:

```
A>PIP B:MPM.SYS=B:MPMxx.SYS[V]
```

Where "xx" is 10 or 20, depending on the size of your hard disk.

9. FORMATTING THE HARD DISK - DISK2

If you have a hard disk or disks, you must run the DISK2 diagnostic. The DISK2 program is included on your CP/M 80 and CP/M 86 boot diskette (labeled

CP/M 80 or CP/M 86). Press the red RESET button on the front panel of the computer. When the left hand red light begins blinking, insert this diskette into floppy drive A. When the "A>" prompt appears, enter

A>disk2 [drive type] all

and press the RETURN ([RET]) key. The "drive type" is either M10, M20 or M26, depending upon whether your hard disk holds 10, 20 or 26 megabytes. This test takes two hours to complete. It begins by formatting the tracks, which is evidenced by the following display:

Formatting Track : NNN Hard NNN Soft NNN

The track number (NNN) and number (NNN) of hard and soft sector errors are displayed to the right of each entry. If an excessive amount of errors are reported, consult the Disk II technical manual.

The test continues with: Verifying Track
 Data Test Track

and ends with: Seek Test

There are 12 "passes" through the sectors in this last test. Upon completion, a bad sector report is given. Any bad sectors found are "mapped out" or effectively blocked from use.

10. SYSTEM INITIALIZATION

Once you are satisfied that your hard disk is properly formatted and ready for the operating system, follow the instructions below to place the MP/M 8-16 operating system on your hard disk:

1. Insert your MP/M 8-16 boot diskette (labeled "MP/M 8-16") into floppy drive A and close the door.
2. Press the RESET button on the computer front panel.
3. The system displays: MP/M 8-16 Loader Rev. 1.0D.
 Loading MPM.SYS
4. The screen will clear and the system will display the following message.

```
CompuPro: MP/M 8-16 V2.1C
___K M-DRIVE/H active
Total memory: ___K
```

```
MP/M 8-16 V2.F
Copyright (C) Digital Research
MP/M 8-16 Copyright (C) 1982, CompuPro
XIOS, LOADER, SW, SHELL, Copyright (C) 1982 CompuPro
OA>
```

(Where total memory should equal the amount of memory in your system.)

If your system runs on a floppy disk only, you may continue on to the sections on setup files.

If your system runs on a 10Mb hard disk, enter the following to copy the MP/M 8-16 program onto your disk:

```
0A>C:PIP A:=C:*. *[V]
```

If your system runs on a 20Mb hard disk, enter the following:

```
0A>D:PIP A:=D:*. *[V]
```

Once you have completed one of the steps above, enter

```
0A>SET *.CMD [SYS,RO]
```

to set file attributes for all the commands so files may be accessed on any drive or user number. The system returns ready to go. Initially the system is addressed only to the system console in single user mode. At this time, and the system is fully operational, and all functions and utilities can be performed. In fact, this is the proper time for the system operator to perform administrative functions. In the first time set up, the user setup files are edited and user names are entered into the system (see the following sections on USER SETUP FILES).

11. SYSTEM BOOT

Follow the steps described below to boot (start up) your system. For multi-user operation, continue with the procedures described in Section 9.2.

11.1. Sign-On - Single User Mode

1. Insert the MP/M 8-16 boot diskette into floppy Drive A.
2. Press red RESET button on the front panel of the computer.
3. Loading takes a few moments; then this message appears:

```
MP/M 8-16 Loader Rev. 1.0D.  
Loading MPM.SYS
```

4. The screen will clear and the system will display something similar to the following message:

```
CompuPro MP/M 8-16 V2.1F  
   _ _ _ K M-DRIVE/H active  
Total memory: _ _ _ K
```

```
MP/M 8-16 V2.1F  
Copyright (C) Digital Research  
MP/M 8-16 Copyright (C) 1982, CompuPro  
XIOS, LOADER, SW, SHELL, Copyright (C) 1982 CompuPro
```

```
0A>
```

(Where total memory should equal the amount of memory in your system.)

11.2. Multi-User Mode

To enter multi-user mode, the system operator enters the "logout" command at the console terminal after the initial boot sequence:

```
OA>logout [RET]
```

and the system returns in multi-user mode:

```
CompuPro MP/M 8-16  
Name:
```

Users may now enter the system by their login names, or by their login name and password (lower case), if password has been established. To log out of the system, all users must enter the "logout" command after their prompt.

12. USER SETUP FILE (PASSWD)

Each new system user must have a "passwd" file entry established for them before they may enter the system. Entries for this file can be made with Digital Research's ED.CMD program or some other CP/M80 or CP/M86 compatible text editor.

User names are limited to 8 characters. To enter file, type:

```
OA>ed passwd [RET]
```

The format of the file entry is as follows:

```
NAME:PASSWORD:DRIVE:USER:PRINTER:ACCESS:DEF. PROGRAM:COMMENTS  
|_| | | | | | | | |  
|_| | | | | | | | |  
 1   2   3   4   5   6   7   8
```

Field Descriptions

1. User login name [Must be in lower case characters]
2. Optional password field [Must be in lower case characters]
3. Optional default user drive (system default = drive A)
4. Optional default user number (system default = user 0)
5. Optional default user printer (system default = printer 0)
[Must be in upper case]
6. Optional selective terminal access numbers. This is a comma separated list of the console numbers users may be allowed to use. By default, no assignment allows user access to any terminal. The terminals are numbered 0-8 in a nine user system.
7. Optional alternate program
8. Optional comments field

A user login name must be entered for each person using the system. By default, all users enter on drive A as user 0, and may access all terminals and programs and printer 0. Use the format example above as a guide for entering specific information on user entry and access defaults. Do not leave any spaces in the optional fields; remember to enter a colon between each field.

As an example, in this entry:

```
smitty:yttimn:A:3:1,2::WS:Ron Smith, Accountant
```

the user's login name has been entered as "smitty" and "yttimn" his password. His new default is Drive A, user 3, printer 1, terminals 1 or 2, and he can only access MicroPro's Wordstar program. The comments section lists him as "Ron Smith, Accountant."

If "Smitty" had been entered like this:

```
smitty:yttimn:A:3::0,1,2,7,8::Ron Smith, Accountant
```

he would be able to use terminals 0, 1, 2, 7 and 8 with no limits on program access.

This file could also be entered to look like: `smitty:::::`

This is a system default entry. Here "smitty" has access to all terminals and programs within the system. The user's name and password in file "passwd" must be lower case. When the user signs on, upper case or mixed characters can be used for the users name, but the users password must be in lower case.

13. **TERMINAL SETUP FILE (TTYS)**

The "ttys" file establishes information on each terminal used in the system, and whether or not the system will come up in single user mode or directly in multi-user mode. Information for this file may be entered with the Digital Research's ED or similiar text editor, and is called by entering:

```
OA>ed ttys [RET]
```

The first line of the "ttys" file tells the system whether to come up in single user or multi-user mode. If the first line of the ttys looks like:

```
MULTI
```

the system will come up directly in multi-user mode with all of the consoles active (ie there is no need to type "logout"). If the first line is :

```
SINGLE
```

or anything else but "MULTI", the system will come up with only the system console active, and "logout" must be typed to invoke multi-user (see section 11.2).

The remainder of the "ttys" file is for the system to configure the terminals.

Baud rates correspond to the same numbers established for terminals, as do the numbers for hardware handshaking (refer to Tables 12-1 and 12-2).

A sample "lprs" file might look like:

```
0:8:2:82N:DIABLO,630,0:Diablo 630 in Room 5
1:8:1:82N:EPSON,MX-80,1:Epson MX-80 in Room 10
```

In this sample, printer 0 is a Diablo 630 that runs at 9600 baud, requires software handshaking and is located in "Room 5."

Printer 1 is an Epson MX-80 that runs at 9600 baud, requires hardware handshaking and is located in "Room 10."

15. MESSAGE OF THE DAY (MOTD)

The "motd" file enables a system-wide message to appear on the terminal screens upon login. The contents of this file is edited with the ED program (Digital Research) by entering:

```
A>ed motd [RET]
```

Existing lines are deleted and new lines are entered for the current message of the day.

16. AUTO.SUB

If the file "AUTO.SUB" exists on the system drive, the "SUBMIT" command will be invoked in the following form:

```
SUBMIT AUTO
```

See the MP/M 86 USER'S GUIDE for information on using submit files.

NOTE: 8 bit command lines can be used in submit files by putting "sw!" at the beginning of the command line. For instance if you wanted a submit file execute the file "FOO.COM", the submit file would include the following line:

```
SW!.FOO
```

17. USING THE GENSY COMMAND

This section describes the use of the MP/M 86 GENSY command. The GENSY command is covered in section 2 of the MP/M 86 OPERATING SYSTEM SYSTEM GUIDE. You should familiarize yourself with that section before proceeding.

Normally, you should not have to do a GENSY. However, if you desire a system that supports Day File Logging or you want to change the maximum amount of memory allowed a process, you must do a GENSY.

The parameters listed below will give you a system exactly equal to the standard MP/M 8-16 system shipped by COMPUPRO. Some of the parameters below are built into the XIOS, these parameters may not be changed. Attempting to change them may result in an MP/M 8-16 that will not work.

Be sure to "PIP" into the XIOS.MPM file the appropriate one for your system OA>PIP XIOS.MPM=XIOS???.MPM where "???" is FY of a floppy only and 10 for a 10 megabyte hard disk, and 20 for a 20 megabyte hard disk.

Executing the GENSY command will result in the following questions asked of the user (questions marked with a "*" are parameters that may be changed):

Delete Old MPM.SYS File (N) ? Y
Do not do a GENSY on your master disk.

Starting Paragraph of Operation System (40) = 40
Use 800 for a hard disk system and 40 for a floppy only system. You must use one of these two parameters.

Number Of System Consoles (7) = 7
Number Of System Printers (2) = 3 (These 2 numbers should reflect your system)

Total Character Control Blocks (9) = 10 (This should be the sum of the above 2 numbers)

Enable Compatibility Attributes (N) ? Y
Number of Ticks Per Second (3C) = 3C
These parameters may not be changed

- * System Drive (A) = A
- * Temporary File Drive (A) = A
These parameters may be changed. The temporary drive should be the fastest drive in the system.

Maximum Locked Records per Process (10) = 10 ✓
Total Locked Records in System (20) = 10 ✓
Maximum Open Files per Process (FF) = FF ✓
Total Open Files in System (FF) = FF ✓
These parameters may not be changed.

- * Day File Logging at Console (N) = N
This parameter should be "Y" if day file logging is desired.

Number of Flags (20) = 30
Number of Extra Process Descriptors (40) = 40
These parameters may not be changed.

- * Maximum Paragraphs Per Process (2000) = 2000 ✓
This parameter may be increased, depending on system memory usage. The default will allow 128K per process.
- Number of Queue Control Blocks (20) = 10 ✓
- Size of Queue Buffer Area in Bytes (200) = 100 ✓
- Number of Extra Memory Descriptors (30) = 0 ✓
- These parameters may not be changed.

Memory Partitions, End List With ^FFFF^
Starting Paragraph = FFFF
Terminate list immediately.

Include Resident System Processes

CLOCK	(Y) ? <u>N</u>
MPMSTAT	(Y) ? <u>N</u>
ECHO	(Y) ? <u>N</u>
TMP	(Y) ? <u>N</u>
SHELL	(Y) ? <u>Y</u> ✓
HD	(Y) ? <u>Y</u>

Include the HD rsp only if you have a hard disk. The CLOCK and ECHO rsp's should NOT be included. These functions are performed by the XIOS and SHELL.

18. TROUBLESHOOTING YOUR SYSTEM

The following table has been designed to aid you in the event your system does not operate correctly:

Problem	Probable Cause	Remedy
	ENCLOSURE	
Fan off, power indicator not lit:	Power cord not plugged in.	Plug in cord.
	Power cord not plugged into rear panel of system.	Plug in cord.
	Wall outlet not live.	Check outlet. Check circuit breaker.
	Main circuit breaker has tripped.	Check system for shorts; turn breaker OFF, then back ON.
Fan on, power indicator not lit	Indicator light bad.	Contact dealer.
	Internal connection loose.	Contact dealer.
	Power supply connection loose.	Contact dealer.
	FLOPPY DISK	
Power on, but disk drive indicator light does not blink:	Disk drive not plugged in.	Plug it in.
	Power cord not plugged in.	Plug it in.
	Floppy disk drive breaker switch not ON.	Turn it ON.
	Circuit breaker on disk drive rear panel tripped.	Check connections for shorts; turn breaker OFF, then back ON.

Problem	Probable Cause	Remedy
	FLOPPY DISK (cont.)	

Disk drive indicator light does not blink

Cable improperly connected

Re-connect it.

System not initialized.

Push RESET on Enclosure 2 front panel

Drive head loads, seeks, but system does not power up:

Incorrect diskette inserted.

Insert MP/M boot diskette.

Cables and plugs

Refer to Section 6.2.

Problem	Probable Cause	Remedy
	HARD DISK	

Drive does not initialize

Data or control cable connected incorrectly.

Methodically change cable connections.

Power supply connection loose.

Contact dealer.

Drive head not unlocked.

Unlock head.

CPU switch settings incorrect.

Reset switches.

External drive cable unplugged.

Check cable connections.

Internal drive cable disconnected.

Undo cover of drive cabinet and re-connect.

Error in tracks 0 and 1.

Contact dealer.

Problem	Probable Cause	Remedy
	TERMINAL I/O	

System sounds like it booted up but no message on the terminal

Cable incorrectly connected.

Check cable connections.

Terminal incorrectly set.

Check baud rate and word size settings.

Terminal not powered up.

Plug in terminal and turn on.

I/O board switches no set properly.

Reset switches.

I/O board headers not wired correctly.

Recheck connections on headers.

Bad RS232 cable.

Try another cable.

Problem	Probable Cause	Remedy
	SYSTEM	

System hangs after "Total memory:384"

Interrupt jumper not connected on Disk 1 or Disk 2.

Re-connect it.

Interrupts not connected on System Support 1.

Install shunt in J8

Shunt J13 not jumpered on System Support 1.

Install J13 on 8 and C or send board into factory for upgrade.

Malfunctioning System Support 1 board.

Contact dealer.

Additional users won't come up

Switches incorrectly set on Interfacer 3.

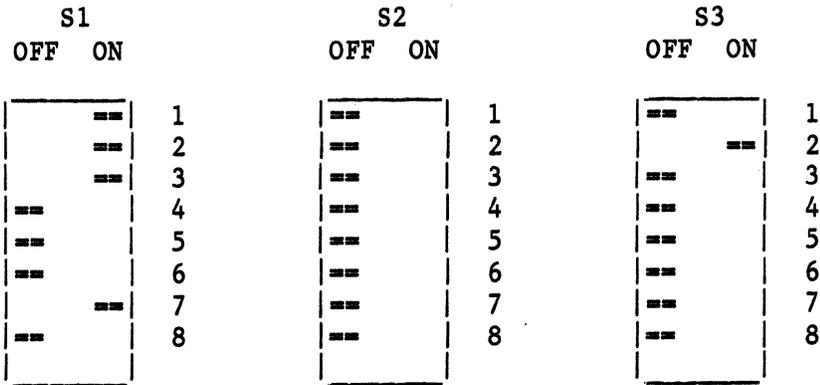
Check switches.

Interrupt headers on Interfacer 3 or 4 not properly wired.

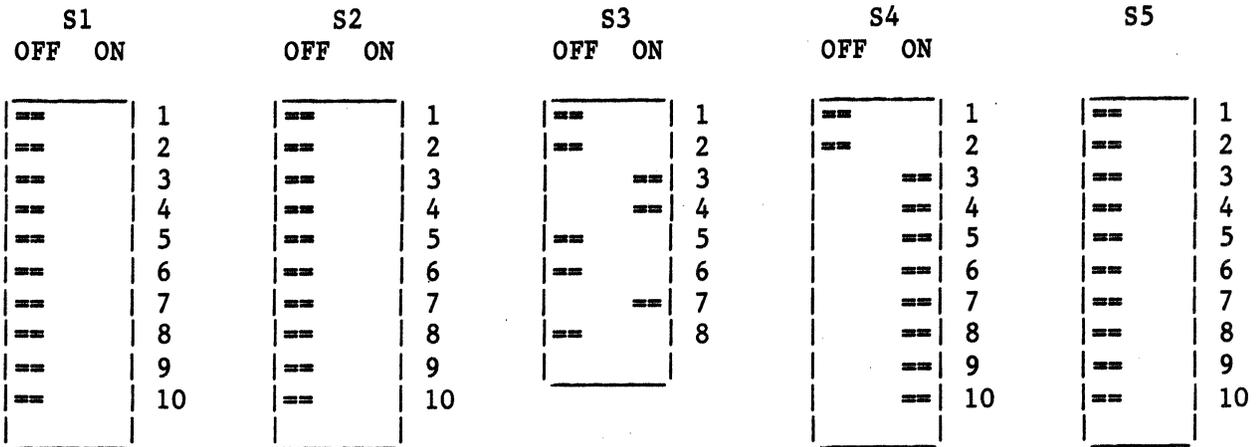
Check wiring of J15 & J16.

HARDWARE SETTINGS FOR MP/M 816

CPU 8085/88 - Switch Settings:

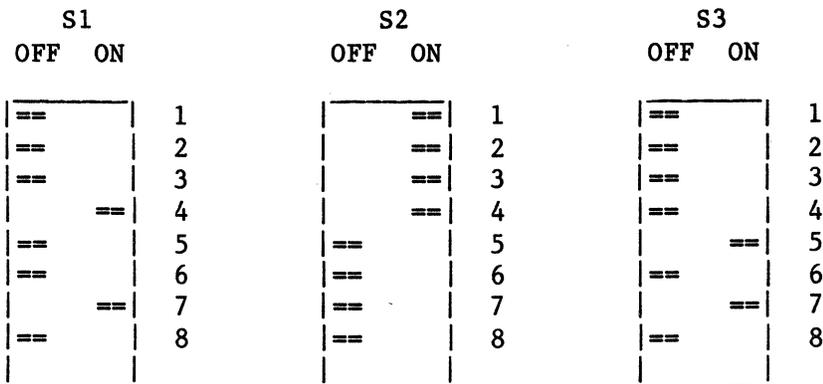


CPU 86/87 - Switch Settings:



Jumpered Settings: J8 -- No shunt installed if using an 8087 coprocessor, otherwise install shunt.

SYSTEM SUPPORT 1 - Switch Settings:



Jumpered Settings:

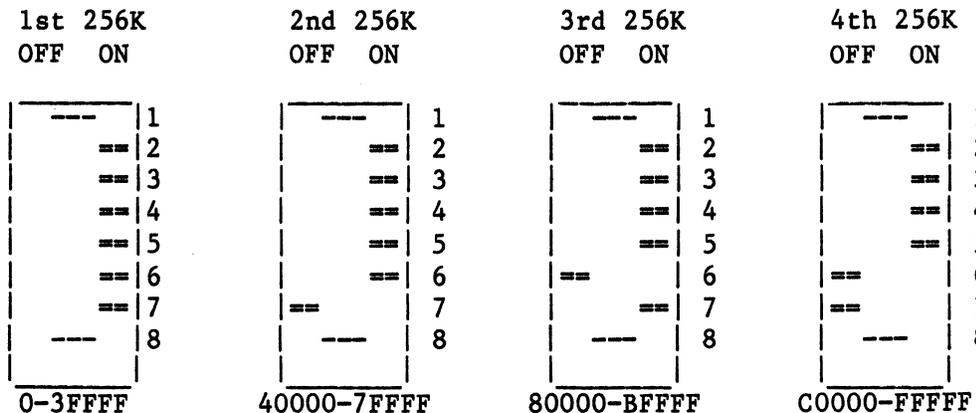
- J1 -- Serial port connection.
 - J2 -- Insert an eight pin dip shunt, leaving the lower five pins on the right side out. Leaving the first three wires shunted effectively makes a 3-wire serial monitor connection with handshaking.
 - J3 -- Plug an auxiliary battery cable into this connector, red wire toward the left.
 - J8 -- Install 8 wire dip shunt.
 - J13 -- Insert a shorting plug onto prongs 8 and C*.
- Remaining jumpers are left unconnected.

Rom Sockets:

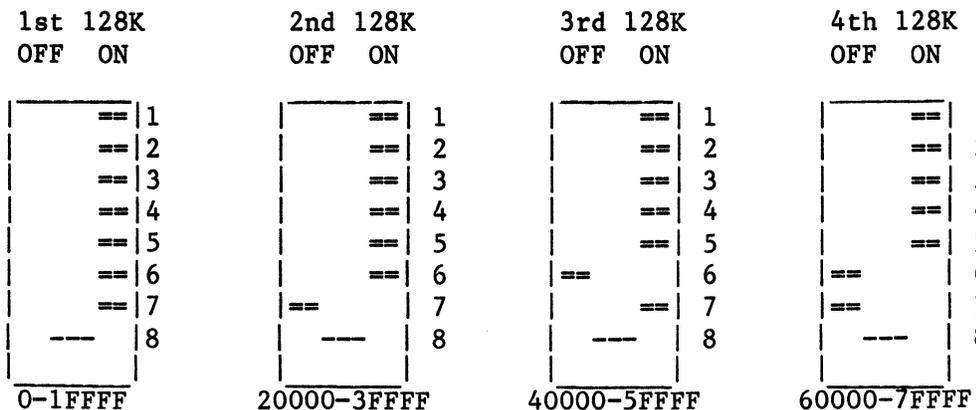
U16 -- Install a "GO 86" EPROM or 6116 RAM chip
(if you have a CPU 8085/88)

* System Support 1 boards with revision numbers previous to 162G will not have this jumper. Contact you dealer or the factory for help.

RAM 22 MEMORY BOARD - Switch setting for S1:

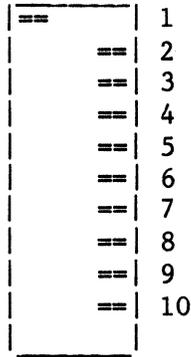


RAM 21 MEMORY BOARD - Switch Settings for S1:



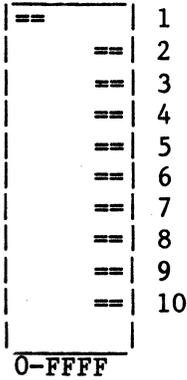
RAM 17 MEMORY BOARD - Switch Settings for S1:

OFF ON

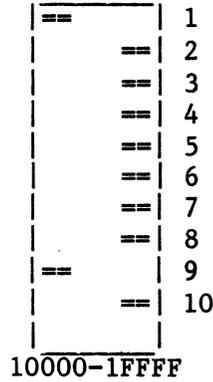


Switch Settings for S2:

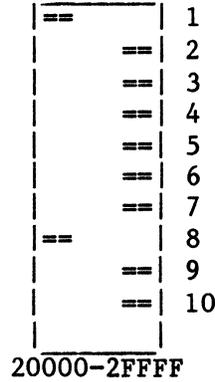
1st 64k
OFF ON



2nd 64k
OFF ON



3rd 64k
OFF ON

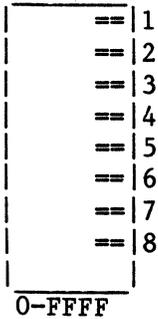


4th 64k
OFF ON

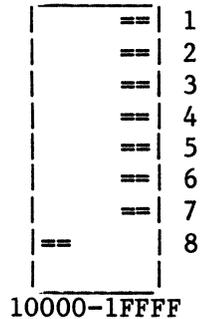


RAM 16 MEMORY BOARD - Switch Setting for S1:

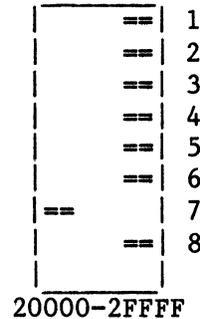
1st 64K
OFF ON



2nd 64K
OFF ON



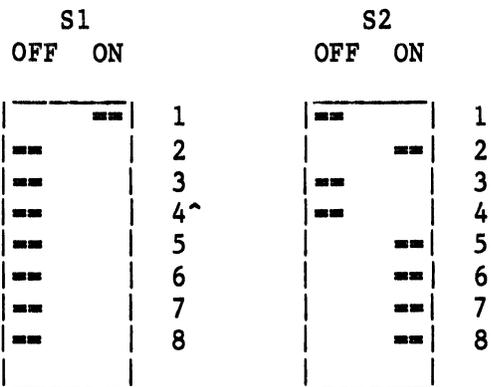
3rd 64K
OFF ON



4th 64K
OFF ON



DISK 1 - FLOPPY DISK CONTROLLER - Switch Settings:



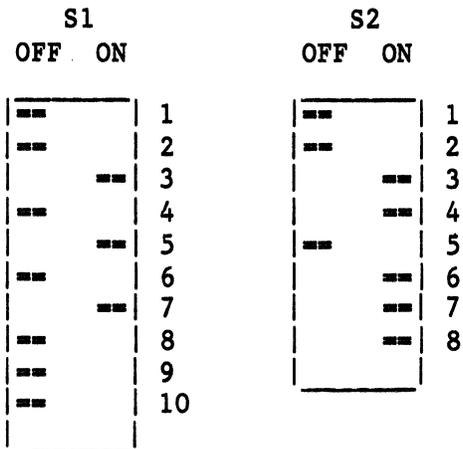
[^] OFF to BOOT from a Floppy disk
ON to BOOT form a Hard Disk

Jumpered Settings:

- J16 -- Install a jumper on B-C
- J17 -- Jumper A-C if using a CPU 8085/88
Jumper B-C if using a CPU 86/87
- J4 -- Install a jumper

DISK 2/SELECTOR CHANNEL - HARD DISK CONTROLLER

DISK 2 - Switch settings:



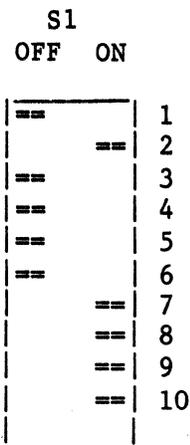
J6

- C -- Shutgart 400x
- \bar{C} -- Fujitisu 2300
Memorex 101

Jumper setting:

- J8 -- Install a jumper

SELECTOR CHANNEL - Switch settings:



Jumper settings:

- J8 -- "G"
- J9 -- "+"
- J10 -- Jumper installed on "G" if CPU 8085/88
Jumper installed on "+" if CPU 86/87

INTERFACER 3 - Switch Settings for S1:

OFF ON		Jumpered Settings:	
==	1	J1	-- Insert a dip shunt, shunting lines 1, 2 and
	== 2		3 for 3-wire, no handshaking. Consult
	== 3		manual for hardware handshaking.
	== 4	J2	-- Insert a dip shunt, shunting lines 1, 2 and
==	5		3 for 3-wire, no handshaking. Consult
	== 6		manual for hardware handshaking.
	== 7	J15	-- Connect pins 9-16 to pin 5
	== 8	J16	-- Connect pins 1-8 to pin 11
		J17	-- Jumper top two pins.
			Remaining jumpers unconnected.

INTERFACER 4: - Switch Settings:

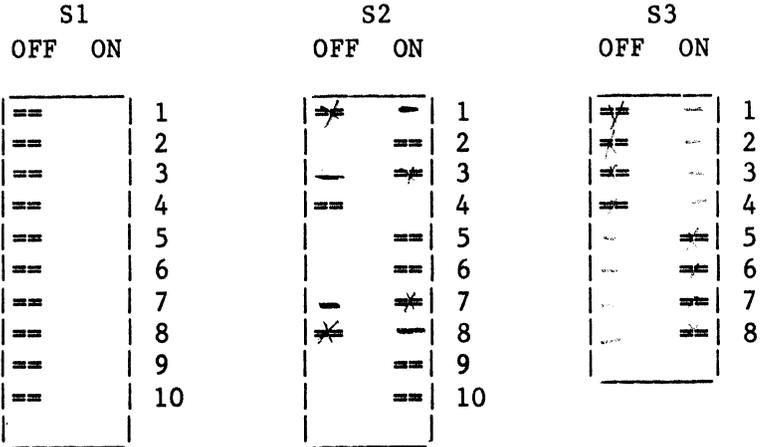
S1		S2		S3	
OFF	ON	OFF	ON	OFF	ON
==	1		== 1		== 1
==	2		== 2		== 2
==	3	==	3		== 3
==	4	==	4		== 4
==	5		== 5	==	5
==	6		== 6	==	6
==	7		== 7	==	7
==	8	==	8	==	8
==	9		== 9		
==	10		== 10		

Jumpered Settings

- J1 -- No Shunt need be installed
- J2 -- Bottom installed with Epson printer / No shunt otherwise
- J3 -- Top installed with Epson / No shunt otherwise
- J4 -- Bottom installed with both Epson and Centronics
- J5-J25 -- Removed
- J26 -- Jumper A-B and C-D
- JS1,JS2,JS3 -- Install shunt, shorting all 8 lines.
- JS4 -- No connections.
- JS5 -- Connect pins 13-16 to pin 5
- JS6 -- Connect pins 9-12 to pin 6

ADDITIONAL INTERFACER 4 OR INTERFACER 4 USED WITH AN INTERFACER 3:

Switch Settings:



Jumpered Settings

- J1 -- No Shunt need be installed
- J2 -- Bottom installed with Epson printer / No shunt otherwise
- J3 -- Top installed with Epson / No shunt otherwise
- J4 -- Bottom installed with both Epson and Centronics
- J5-J25 -- Removed
- J26 -- Jumper A-B and C-D
- JS1,JS2,JS3 -- Install shunt, shorting all 8 lines.
- JS4 -- No connections.
- JS5 -- Connect pins 13-16 to pin 5
- JS6 -- Connect pins 9-12 to pin 6

M-DRIVE/H - Switch settings

S1		Board Number	Switch Number*		
OFF	ON		8	9	10
==		1st	ON	ON	ON
==		2nd	ON	ON	OFF
	==	3rd	ON	OFF	ON
	==	4th	ON	OFF	OFF
	==	5th	OFF	ON	ON
==		6th	OFF	ON	OFF
==		7th	OFF	OFF	ON
	==	8th	OFF	OFF	OFF
	==				
	==				
	==				
	==				

*Switches 1 thru 7 are set the same on all boards.

CUSTOMER SERVICE INFORMATION: If you need further assistance or more information, please contact your dealer.