CompuPro®

A *GODBOUT* COMPANY

MP/M™ 8-16™

Technical Manual and Installation Procedures

MULTI-USER OPERATING SYSTEM
FOR 8 AND 16 BIT OPERATION

MP/M 8-16 Technical Manual & Installation Procedures

Multi-User Operating System for 8-& 16-Bit Operations

CONTENTS

LIST OF FIGURES

LIST OF TABLES

INTRODUCTION

MP/M™ 8-16™ is a proprietary implementation of Digital Research's MP/M-86tm operating system, specially configured for CompuPro hardware. This implementation of MP/M-86 allows 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 2.2 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.

If you should ever need to call CompuPro's Customer Assurance Department and ask questions, we will need to know your version designation. To find your version, look at the sign on when you power up. The version numbers are Digital Research's designations and the letters are CompuPro's designation.

ATTENTION: ARE YOU UPDATING AN EXISTING DISK2 HARD DISK SYSTEM? Starting with version I of MP/M 8-16, we have changed the method of doing bad sector relocation. This means that any DISK2 hard disk system using any previous release of any CompuPro software MUST be reformatted with the DISK2 format program off of one of the newer operating systems. The "ALL" option should be given to the DISK2 program to reformat the hard disk.

HARDWARE REQUIREMENTS

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

Enclosure: Computer enclosure with 21-slot S-100 bus motherboard.

Processor: CPU 8085/8088, CPU 86/87 or CPU 286.

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 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 1 or Disk 1A floppy disk controller with two
                   8-inch double-sided, double-density floppy disk
                   drives that will support 3 ms step rate.

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

DISK 2 --   Winchester disk controller board, and 10, 20 or 40
                   megabyte 8-inch hard disk devices.

DISK 3 --   Winchester disk controller board, and 5 to 80
                   megabyte 5.25-inch hard disk device.

MDRIVE/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 ad-
                   ditional user is recommended. Some applications
                   may require up to 1 megabyte, the maximum
                   supported by MP/M 8-16.

I/O -   additional Interfacer 3 or 4 I/O cards can be
                   added for up to 16 I/O channels.

2

UNPACKING THE SYSTEM

Carefully consider where you want to place 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 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 System Center/Dealer.** Repacking the system in the original containers gives you the best shipping protection.

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.

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.**

Unpacking the Hard Disk Drive

The hard disk storage heads are locked in place for shipping. If you have a Quantum Q540 hard disk drive, there is no external locking. The hardware will unlock when the power is turned on.

If you have a Pragmatic Design hard disk, in order 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.

NOTE: Allow the system to power up or down for at least 20 seconds before turning the system on or off again.

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.

HARDWARE INSTALLATION

This section describes the hardware setup for 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. The jumper and switch settings for each board can be found in section 19 of this manual.

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

Fig. 5-1: Computer Enclosure Back Panel
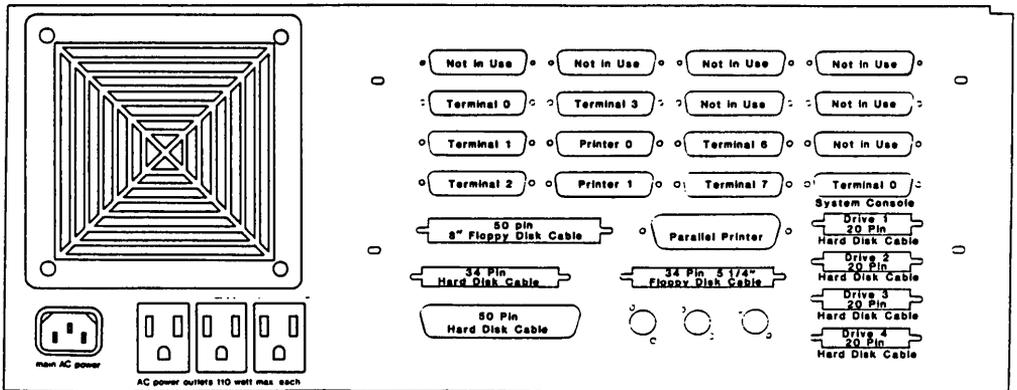
Connecting the Terminals and Serial Printers

The connector for terminals and serial printers is a 25-pin "D" style connector. 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 is given in the table below:

Relative user to logical I/O device mapping

MP/M 86
INTERFACER 3 OR 4

LOGICAL DEVICE	TTY6	TTY5	TTY4	TTY3	PRINTER2	PRINTER1	TTY2	TTY1
USER NUMBER	0	1	2	3	4	5	6	7
LOGICAL DEVICE	PRINTER3	TTY8	TTY9	TTY10	TTY11	TTY12	TTY13	TTY14
USER NUMBER	8	9	10	11	12	13	14	15

Connecting the Floppy Disk Drives

The floppy disk drives 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 drive enclosure. 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.

Connecting the Hard Disk — DISK 3

If you are using the DISK 3, the internal connections are made to the hard disk controller board by a 34-pin control cable and a 20-pin data cable, connected to the leftmost 20-pin connector.

The external connections are made with a 34-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.

Connecting the Hard Disk - DISK 2

Two cable connections are made for the hard disk. If you are using the DISK 2, 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.

Connection Test

Test your connections now. Plug in all power cables. The computer enclosure 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 computer enclosure. Each outlet is rated for a maximum of 120 watts.

1) Turn on power to the computer enclosure by pressing down the top portion of the red power switch on the front panel.

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

3) Turn on power to the hard disk system by flipping up the power switch on the rear panel.

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

- The red RESET button on the computer enclosure 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 off all power to all systems 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 trouble-shooting 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.

FORMATTING THE HARD DISK - DISK 2 & DISK 3

If you have a hard disk or disks, you must run the DISK2 or DISK3 formatter/diagnostic. The DISK2 and DISK3 programs are included on your CP/M diskette. They should be run as follows:

        A>disk2 [drive type] all

                or

        A>disk3 [drive type] all

and press the RETURN ([RET]) key.

DISK 2 drive types:

    M10   Fujitsu 10 megabyte drive
    M20   Fujitsu 20 megabyte drive (default value)
    M20BE   Fujitsu 20 megabyte drive with Pragmatic modification
    M40BE   Fujitsu 40 megabyte drive with Pragmatic modification

DISK 3 drive types:

    Q540   Quantum 40 megabyte drive
    ST506   Seagate 5 megabyte drive

This test takes seventeen (17) hours or more to complete. It begins by formatting the tracks, which is evidenced by something like 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 12 or more errors are reported, consult the DISK 2 or DISK 3 Technical Manuals.

7

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.

USING THE CPU 86/87 or CPU 286

This section describes using the CPU 86/87 or CPU 286 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 must do to run the CPU 86/87 or CPU 286 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 anything else.

3) Replace IC U28 back in its socket and verify that each pin except pin 4 is back in its hole.

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 (or CPU 286). You may proceed with the rest of the manual.

NOTE: If you are going to use the CPU 86/87 or CPU 286 board, you will not be able to run any 8-bit software. Therefore, the file "SW!.CMD" should be removed from your system disk.

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 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. Insert CP/M-86 in drive A: and
MP/M 8-16 in drive B:. Type:

        A>B: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:MPMyxx.SYS[V]

Where "y" is "3" for a DISK 3 or "2" for a DISK 2 and "xx" is the
number of megabytes of your hard disk (10, 20, 40, etc.) .

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.

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 some-
   thing similar to the following message:

        CompuPro MP/M 8-16 V2.1F
        _ _ _ K MDRIVE/H active
        Total memory: _ _ _ K
        (Where total memory should equal the amount of
        memory in your system.)

        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>

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.

Multi-User Mode

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

        0A>logout [RET]

and the system returns in multi-user mode:

        CompuPro MP/M 8-16
        Name:

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 now enter the system by their log on names, or by their
log on name and password (lower case), if password has been estab-
lished. To log out of the system, all users must enter the
"logout" command at the system prompt.

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

PUTTING MP/M 8-16 ON YOUR HARD DISK

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.

If your system runs on a 10 Mb 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 20 Mb 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 Section 11.3 on User Setup Files).

SETTING UP FILES

In order to use MP/M 8-16, you must install several "setup" files. There are three files: the terminal setup (TTYS), the printer setup (LPRS), and the password (PASSWD) files. These files are organized so you enter information in each field. Make sure you put these files on Drive A:, user 0.

The format for each terminal entry (TTYS) is:

```
DEV #:BAUD RATE:HANDSHAKING:#DATABITS#STOPBITSPARITY:TTY0-9:DESCRIPTION
|__| |_____| |_____| |_____| |__| |_____|
   \       \         \              \               \        \
   1       2         3              4               5         6
```

The format for each printer entry (LPRS) is:

```
  DEV #:BAUD RATE:HANDSHAKING:82N:0,LPR0,MANUFACTURER:DESCRIPTION
  |__| |_____| |_____| | |_| |_____| |_____|
     \       \         \      \       \               \
     1       2         3      4       5               6
```

Use the following tables for the setup file entry.

Table 11-1: Baud Rates

```
0  =   9600
1  =    110
2  =    300
3  =    600
4  =   1200
5  =   1800
6  =   2400
7  =   4800
8  =   9600
9  =  19200
```

Table 11-2: Hardware Handshaking

```
0 = No handshaking
1 = Hardware handshaking (DTR)
2 = Software handshaking (XON XOFF)
3 = Hardware and software handshaking (XON/XOFF & DTR)
```

Table 11-3: Serial Communication Parameters

```
#DATA BITS - can be:  8 or 7
#STOP BITS - can be:  2 or 1
    PARITY - can be:  N = No parity
                      E = Even parity
                      O = Odd parity
```

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 any text editor or word processor. Call up the ttys file with your text editor or word processor.

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, so there is no need to type "logout". If the first line is:

        SINGLE

12

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. These lines must be entered with capital letters.

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

The format for each terminal entry (TTYS) is:

```
DEV #:BAUD RATE:HANDSHAKING:#DATABITS#STOPBITSPARITY:TTY0-9:DESCRIPTION
|___| |_____| |_____| |_____| |___| |_____|
   \       \          \              \                   \        \
   1       2          3              4                    5        6
```

1) Number of terminal, corresponding to connection on computer back panel. Numbers are 0-8 for nine user system.

2) Terminal baud rate; 9600 by default. Options listed in Table 11-1.

3) Optional RS-232 hardware/software handshaking. Options listed in Table 11-2.

4) Serial communication parameters; default is 8 data bits, 2 stop bits and no parity. Options listed in Table 11-3.

5) Terminal number in the form of TTY#, where # = 0-9.

6) Description - location, for example (optional).

Information is entered between the colons. The first field (device number) must be entered, but the rest of the fields may not require any entry. Terminals with a 9600 baud rate, for example, are automatically addressed by the system and require no hardware handshaking. If your terminals require selection of a baud rate other than 9600, enter its corresponding number from the following chart:

Hardware handshaking is generally not required for a terminal. Check the specifications for your terminal. If this option is necessary, enter the number corresponding to the type of handshaking needed from Table 11-2.

Information on terminal type and location is entered as a means of reference for the system operator and is optional. For example, it may be helpful to know that terminal 3 is a Teletype Model 43, which runs at 1200 baud, requires hardware handshaking, uses 8 data bits, 2 stop bits, no parity and is located in the Accounting Office. In this case, the TTYS entry for this terminal would look like:

        3:4:1:82N:Teletype,43:Accounting Office

13

Normally, however, the TTYS file will resemble the following example:

```
0::::
1::::
2::::
3::::
```

In this example, all four terminals run at the default 9600 baud rate.

If your system has only one INTERFACER 4, you should delete the entries for device number 3-6 from the TTYS file (lines 4-7). This will "turn off" nonexistent relative user numbers 0-3.

Printer Setup File (LPRS)

An entry for each printer is made in an "LPRS" file. Again, this file may be entered and edited with the ED (Digital Research) text edit program; the information needed follows the same format as the TTYS file:

```
DEV #:BAUD RATE:HANDSHAKING:82N:0,LPR0,MANUFACTURER:DESCRIPTION
|__| |_____| |_____| | |_| |_____| | |_____|
   \      \        \        \         \               \
   1      2        3        4         5               6
```

1. Number of printer, corresponding to connection on computer back panel. Printer 0 is user default printer.

2. Printer baud rate; 9600 by default. Baud rates listed in Table 11-1.

3. RS 232 hardware handshaking. Options listed in Table 11-2.

4. Serial communication parameters; Default is 8 data bits, stop bits and no parity. Options listed in Table 11-3.

5. Printer number, name in the form of LPR#, and manufacturer name.

6. Description - location, for example (optional).

Check the manufacturer's manual for the baud rate and, if necessary, hardware handshaking requirements.

For a parallel printer, ignore the baud rate and parity entries. You must complete all the other entries. (Set the handshaking to 0 for no handshaking.)

14

Baud rates correspond to the same numbers established for terminals, as do the numbers for hardware handshaking (refer to Tables 11-1 and 11-2).

A sample "LPRS" file might look like:

```
0:8:2:82N:LPR0,0:Diablo 630 in Room 5
1:8:1:82N:LPR1,1:Microline 80A in Room 10
2::0::LPR2,2:Microline 80A 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 a Microline 80A that runs at 9600 baud, requires hardware handshaking and is located in Room 10.

User Setup File (PASSWD)

Passwords are set with the "PASS" utility. This program can be password protected with MP/M-86's file password capability. (See MP/M-86 System User Guide for further information.) PASS will prompt you for needed information about each user on the system and save the information in an encrypted file called "PASSWD".

Type:

    0A>PASS   then press the carriage return

The following will appear:

    CompuPro MP/M 8-16 Password Maintenance Program V1.x

    0 - Return to MP/M without saving passwords
    1 - Return to MP/M with saving passwords
    2 - Display passwords
    3 - Add a password
    4 - Delete a password
    5 - Print this menu

    Selection: _

To add a password, enter a "3", press the carriage return and follow the prompts on the screen.

    Name (must have one):   Enter no more than eight characters
                             with no spaces. (Lower case only.)

    Password: Enter no more than eight characters
                             with no spaces (lower case only) or
                             a return for no password.

15

Default drive:	Enter one character drive name. Default is A: if a return is pressed.
Default user:	Enter a user number (0-15). Default is 0 if a return is pressed.
*Default printer:	Enter a printer number (0-2). Default is 0 if a return is pressed.
User enable:	"Y" if you want this user to be able to run the user command, "N" if not.
Terminals:	Enter the number of the console(s) this user can use, separating them by a comma. (Example: 0,2) Defaults to all consoles if a return is pressed.
Command:	Enter command of initial program to be executed. Example: To run MENU, type: SW! MENU816 at this prompt. Defaults to operating system prompt if a return is pressed.
Comment:	40 characters maximum. This comment is for information use only.
Selection: _	Enter a number from 0-5 (see selection menu above).

*A user can select a printer other than their default printer by typing "PRINTER x", and pressing the <return>, where "x", (usually 0-2), is one of the names given in the LPRS file. Example:

        OA>PRINTER 1

A user name must be entered in lower case 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.

THE "WHO" COMMAND

If you want to see if anyone is signed on to the system, or who is using which terminal, type "WHO" at the system prompt. Console numbers and the sign on name will appear. "WHO" will only work if password logon B is also used.

MESSAGE OF THE DAY (MOTD)

The MOTD file enables a system-wide message to appear on the terminal screens upon log on. The contents of this file is edited with your word processing program. When you load the MOTD existing lines are deleted and new lines are entered for the current message of the day.

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 begining 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

USING THE GENSYS COMMAND

This section describes the use of the MP/M-86 GENSYS command. The GENSYS 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 GENSYS. However, if you want a system that supports Day File Logging or change the maximum amount of memory allowed a process, or if you are installing "ACCESS MANAGER", you must do a GENSYS.

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 XIOS for your system 0A>PIP XIOS.MPM=XIOSyxx.MPM where "y" is "3" for a DISK 3 or "2" for a DISK 2 and "xx" is the number of megabytes for your hard disk (10, 20, 40, etc.).

Executing the GENSYS command will result in the following questions asked of the user. All numbers are in hex.

17

```
Delete Old MPM.SYS File (N) ? Y
Do not do a GENSYS 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 (These two numbers should
Number Of System Printers (2) = 2 reflect your system)

Total Character Control Blocks (9) =9 (This should be the sum
                                       of the above two numbers)
Enable Compatibility Attributes (N) ? Y
Number of Ticks Per Second (3C) = 3C
These parameters should 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 (FF for Access
                                                 Manager)
*  Total Locked Records in System (10) = 10 (FF for Access
                                             Manager)
*  Maximum Open Files per Process (FF) = FF
*  Total Open Files in System (FF) = FF
   These parameters should not be changed.

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

*  Number of Flags (30) = 30
*  Number of Extra Process Descriptors (40) = 40
   These parameters should 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 (10) = 10 (FF for Access
                                             Manager)
*  Size of Queue Buffer Area in Bytes (200) = 100 (F00 for
                                                   Access Manager)
   Number of Extra Memory Descriptors (30) = 0
   This parameters may not be changed.

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

Include Resident System Processes

```
CLOCK        (Y) ? N
MPMSTAT      (Y) ? N
ECHO         (Y) ? N
TMP          (Y) ? N
SHELL        (Y) ? Y
HD           (Y) ? Y
```

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.

*Consult the MP/M-86 Operating System System Guide for
information on changing these parameters.

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, Inc., remain intact. The only differences are
enhancements made to areas that Digital Research, Inc. designed to
be user-modified. Several of these modifications were made in the
TMP, and these will be described first.

Terminal Message Process Enhancements

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

1) Terminal, printer, user and drive assignment during log on.
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 log on and logout functions.
7) Execution of the "WHO" command.

The "SYNC" command

Another function performed by the "Shell" is to force an update of
the hard disk. CompuPro's implementation of MP/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, type the command "SYNC" as below:

        0A>SYNC

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. The SWITCH program is transparent
to the user; there is nothing you need to do to in order to have
the program up and running.

When a command is executed, the Shell first checks the default user
directory for 8088 (16-bit) files with a ".cmd" extension. If that

20

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-bit 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 Proteus Engineering's WRITE program and open the "user.txt" file. The user enters:

        3A>write user.txt

The Shell first searches for the "WRITE.CMD" file. When it can't find that, it invokes SWITCH to seek out the file. SWITCH then loads the "WRITE.CMD" 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 "WRITE" command with the "WRITE.TXT" 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. MP/M 8-16 simply makes a good multi-user operating system great, by adding dual processor capability and user-oriented utilities.

ERROR MESSAGES THAT MAY OCCUR WITH MP/M 8-16

This list contains possible error messages that may be generated by
MP/M 8-16. They are arranged alphabetically. Additional errors
may be generated by the Digital Research MP/M-86 modules. Those
errors may be found in the MP/M-86 System User's Guide and MP/M-86
System Programmers Guide.

```
==================================================================
MESSAGE            | PROBABLE CAUSE & RESULT    |   REMEDY
==================================================================
```

MESSAGE	PROBABLE CAUSE & RESULT	REMEDY
BIOS Calls Not Supported	An 8-bit program attempted to do a "direct" BIOS disk call. 8-bit program will abort. (Program will not run under MP/M.)	Use another program.
Drive A: Not Ready	Floppy drive is not ready or no disk is in the drive. Current process is aborted.	Keep drive loaded. Work mostly with Drive A:.
ERROR: Divide by Zero	Assembly language divide by 0. Current process will abort.	Call your System Center/Dealer.
Format Error	Hardware failure in the controller or drive. Format program will abort.	Check disk controller board.

22

Invalid Drive Specified	An attempt was made to format a non-existent floppy drive, a hard disk or a memory disk. User is asked for another drive.	Enter another drive name.

No Program or Bad Copy	Program requested is not on the default drive or is unreadable. Formatting sees your system as floppy only.	Put program on disk and retry.

PANIC: **Panic trap:** **Wild interrupt!**	Something has happened that the system software cannot deal with. System will HALT. Name of XIOS routine will also be printed.	Make sure all peripherals are powered up. Make a note of where the "panic" happened. Have you performed this routine sucessfully before? If so, you might have a hardware problem. Call your System Center/Dealer. Power down, then reboot the system. Use your backup software and try to recreate the problem. If this is a first time occurrence of the problem, you may be caught in an interrupt. Call your System Center/Dealer.

Program File Cannot be Opened	No 8-bit (COM) or 16-bit (CMD) program available.	Check to see if your program is on your logged drive and user number. If not, look for your program on other drives, user numbers and disks.
	User is returned to the system prompt.	
Seek Error	Hardware failure in the controller or drive.	Check disk controller board.
	Format program will abort.	
SW! Disk Read Error	Unable to completely read a ?.COM file.	Erase SW! and PIP it again from your master disk.
	8-bit program will not load.	
	Probably a bad copy of the program or memory problem on the slave.	
Unitialized Interrupt	Unknown hardware or software interrupt has occurred.	Make sure all peripherals are powered up. (See "PANIC" instructions, above.)
	Current process will abort. The system may HALT.	
	Current process name will be printed.	
	Associated with "PANIC" trap.	

Waiting for ready on hard unit x

Hard disk has not come up to speed.

System will wait for the hard disk to come up to speed.

If the hard disk does not come up to speed in one minute, there could be a drive fault.

Make sure the hard disk is turned on and plugged in.

Did you wait 20 seconds for the system to come up to speed before entering a command?

Power down the system. Wait 15 seconds. Power up the system. Wait 20 seconds. Now, try your command again.

Are the system cables installed properly?

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.

26

Problem	Probable Cause	Remedy
	FLOPPY DISK (cont.)	
Disk drive indicator light does not blink	Cable improperly connected	Reconnect it.
	System not initialized.	Push RESET on computer enclosure front panel.
Drive head loads, seeks, but system does not power up	Incorrect diskette inserted.	Insert MP/M boot diskette.
	Cables and plugs	See Section 9
	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 reconnect.
	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.

| | SYSTEM | |

System hangs after "Total memory:384"	Interrupt jumper not connected on Disk 1 or Disk 2.	Reconnect 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 8-16

HARDWARE SETTINGS FOR MP/M 8-16

CPU 8085/88 - 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
|        |           |        |           |        |
```
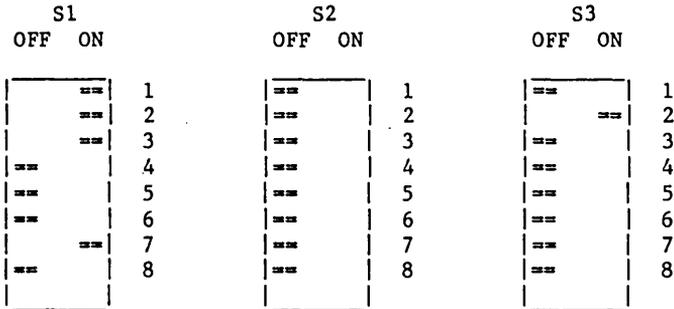
CPU 86/87 - Switch settings:

```
    S1              S2              S3              S4              S5
 OFF   ON        OFF   ON        OFF   ON        OFF   ON        OFF   ON

|==      | 1    |==      | 1    |==      | 1    |==      | 1    |==      | 1
|==      | 2    |==      | 2    |      ==| 2    |==      | 2    |==      | 2
|==      | 3    |==      | 3    |      ==| 3    |      ==| 3    |==      | 3
|==      | 4    |==      | 4    |      ==| 4    |      ==| 4    |==      | 4
|==      | 5    |==      | 5    |==      | 5    |      ==| 5    |==      | 5
|==      | 6    |==      | 6    |==      | 6    |      ==| 6    |==      | 6
|==      | 7    |==      | 7    |      ==| 7    |      ==| 7    |==      | 7
|==      | 8    |==      | 8    |==      | 8    |      ==| 8    |==      | 8
|==      | 9    |==      | 9    |        |      |      ==| 9    |==      | 9
|==      | 10   |==      | 10   |_____|      |      ==| 10   |==      | 10
|        |      |        |                      |        |      |        |
```
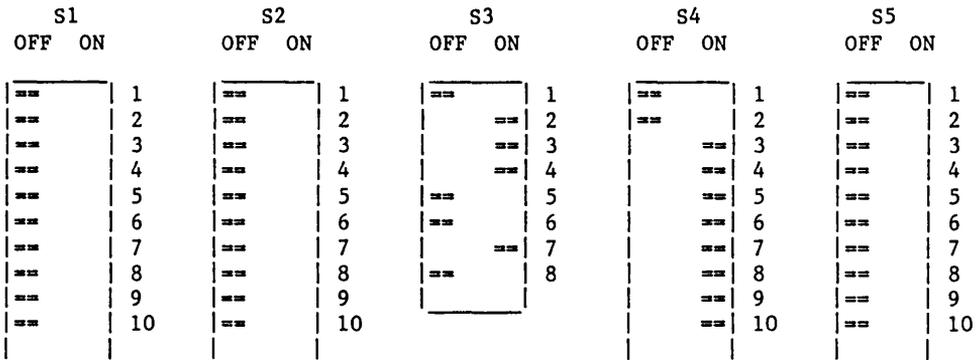
Jumpered settings: J8 -- No shunt installed if using an
                       8087 coprocessor, otherwise
                       install shunt.

IN MPM 86 575   PULL PIN 4 OF U28

CPU 286 - Switch and jumper settings:

```
      S1              Jumper Settings
   OFF   ON
                      J1 - Install jumper across A-C.  (The top two pins and
|==      | 1                                           bottom two pins on the
|==      | 2          J2 - Install jumper across A-C.   six located next to
|==      | 3                                           U13 should have
|      ==| 4                                           shunts.)
|==      | 5          J3 - Install shunts in position A and B (the top two
|==      | 6               locations.)
|==      | 7          J4 - (single pair of pins immediately below J3)  No
|==      | 8               shunt.
|        |
|_____|
```

31
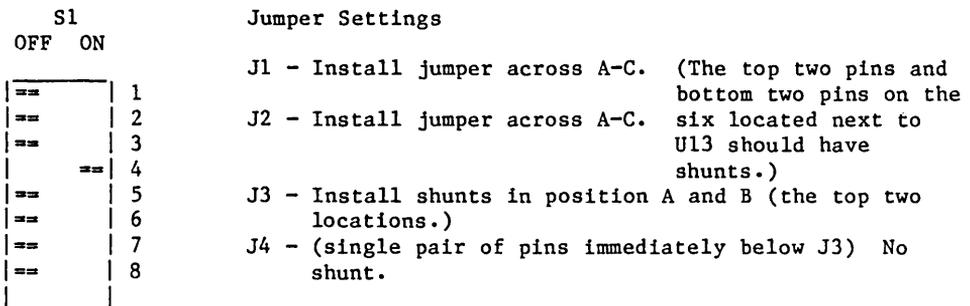
SYSTEM SUPPORT 1 - Switch settings:

```
        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
    |_____|             |_____|             |_____|
```
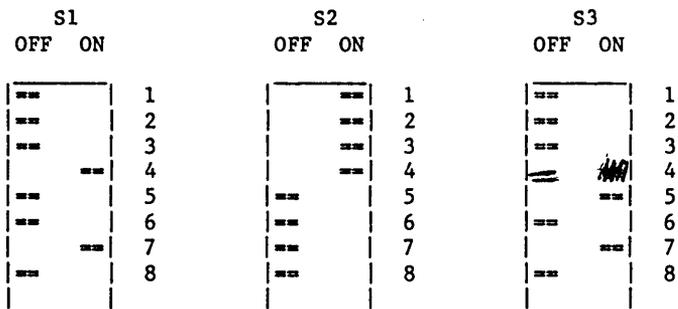
Jumpered settings:

J1 -- Serial port connection.

J2 -- Insert an 8-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 your System Center/Dealer for help.

RAM 22 MEMORY BOARD - Switch setting for S1:

```
   1st 256K             2nd 256K             3rd 256K             4th 256K
   OFF   ON             OFF   ON             OFF   ON             OFF   ON

  |  ---    |1         |  ---    | 1        |  ---   | 1         |  ---    | 1
  |     == |2         |     == | 2        |     == | 2         |     == | 2
  |     == |3         |     == | 3        |     == | 3         |     == | 3
  |     == |4         |     == | 4        |     == | 4         |     == | 4
  |     == |5         |     == | 5        |     == | 5         |     == | 5
  |     == |6         |     == | 6        | ==     | 6         | ==     | 6
  |     == |7         | ==     | 7        |     == | 7         | ==     | 7
  |  ---   |8         |  ---   | 8        |  ---   | 8         |  ---   | 8
  |_____|          |_____|          |_____|          |_____|
   0-3FFFF             40000-7FFFF         80000-BFFFF         C0000-FFFFF
```
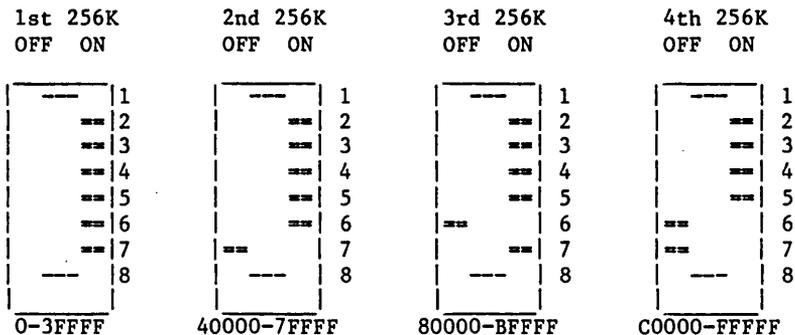
RAM 21 MEMORY BOARD – Switch settings for S1:

```
  1st 128K        2nd 128K        3rd 128K        4th 128K
  OFF   ON        OFF   ON        OFF   ON        OFF   ON

 |      ==|1     |      ==| 1     |      ==| 1     |      ==| 1
 |      ==|2     |      ==| 2     |      ==| 2     |      ==| 2
 |      ==|3     |      ==| 3     |      ==| 3     |      ==| 3
 |      ==|4     |      ==| 4     |      ==| 4     |      ==| 4
 |      ==|5     |      ==| 5     |      ==| 5     |      ==| 5
 |      ==|6     |      ==| 6     |==      | 6     |==      | 6
 |      ==|7     |==      | 7     |      ==| 7     |==      | 7
 |     ---|8     |     ---| 8     |     ---| 8     |     ---| 8
 |_____|      |_____|        |_____|        |_____|
  0-1FFFF        20000-3FFFF     40000-5FFFF     60000-7FFFF
```
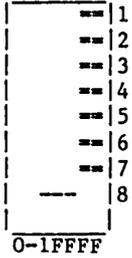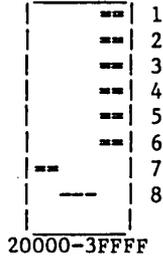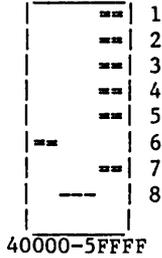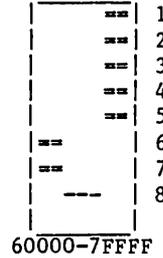
RAM 17 MEMORY BOARD – Switch settings for S1:

```
        OFF   ON
 |==      | 1
 |      ==| 2
 |      ==| 3
 |      ==| 4
 |      ==| 5
 |      ==| 6
 |      ==| 7
 |      ==| 8
 |      ==| 9
 |      ==| 10
 |_____|
```
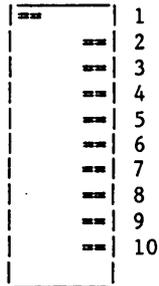
Switch settings for S2:

```
  1st 64k         2nd 64k         3rd 64k         4th 64k
  OFF   ON        OFF   ON        OFF   ON        OFF   ON

 |==      | 1     |==      | 1     |==      | 1     |==      | 1
 |      ==| 2     |      ==| 2     |      ==| 2     |      ==| 2
 |      ==| 3     |      ==| 3     |      ==| 3     |      ==| 3
 |      ==| 4     |      ==| 4     |      ==| 4     |      ==| 4
 |      ==| 5     |      ==| 5     |      ==| 5     |      ==| 5
 |      ==| 6     |      ==| 6     |      ==| 6     |      ==| 6
 |      ==| 7     |      ==| 7     |      ==| 7     |      ==| 7
 |      ==| 8     |      ==| 8     |==      | 8     |==      | 8
 |      ==| 9     |==      | 9     |      ==| 9     |==      | 9
 |      ==| 10    |      ==| 10    |      ==| 10    |      ==| 10
 |_____|        |_____|        |_____|        |_____|
   0-FFFF        10000-1FFFF     20000-2FFFF     30000-3FFFF
```
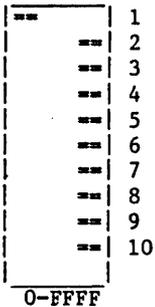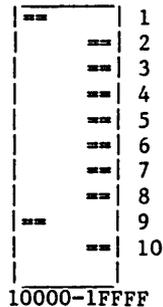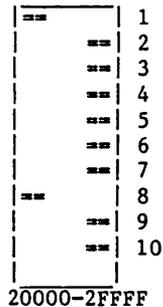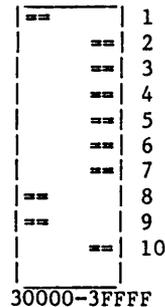
RAM 16 MEMORY BOARD – Switch settings for S1:

```
  1st 64K            2nd 64K            3rd 64K            4th 64K
  OFF   ON           OFF   ON           OFF   ON           OFF   ON

 |      ==|1        |      ==| 1       |      ==| 1       |      ==| 1
 |      ==|2        |      ==| 2       |      ==| 2       |      ==| 2
 |      ==|3        |      ==| 3       |      ==| 3       |      ==| 3
 |      ==|4        |      ==| 4       |      ==| 4       |      ==| 4
 |      ==|5        |      ==| 5       |      ==| 5       |      ==| 5
 |      ==|6        |      ==| 6       |      ==| 6       |      ==| 6
 |      ==|7        |      ==| 7       | ==     | 7       | ==     | 7
 |      ==|8        | ==     | 8       |      ==| 8       | ==     | 8
 |       |          |       |          |       |          |       |
   0-FFFF            10000-1FFFF        20000-2FFFF        30000-3FFFF
```

DISK 1 – FLOPPY DISK CONTROLLER – Switch settings:

```
       S1                 S2
   OFF   ON           OFF   ON

 |      ==| 1       |==     | 1
 |==     | 2       |      ==| 2          ^ OFF to BOOT from a floppy disk
 |==     | 3       |==     | 3            ON to BOOT from a hard disk
 |==     | 4^      |==     | 4
 |==     | 5       |      ==| 5
 |==     | 6       |      ==| 6
 |==     | 7       |      ==| 7
 |==     | 8       |      ==| 8
 |       |          |       |
```
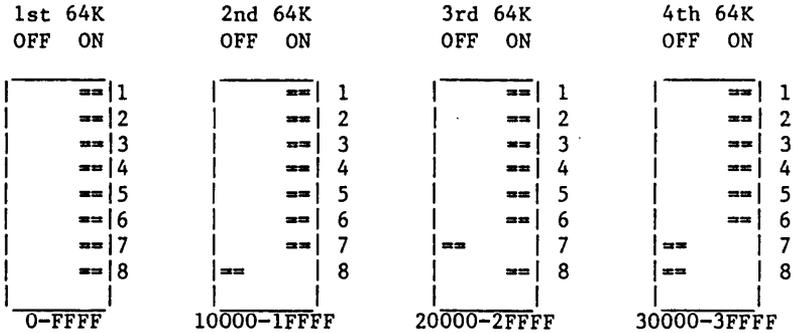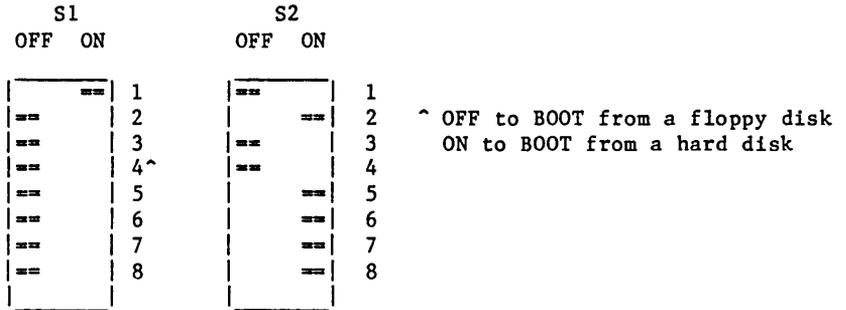
Jumpered settings: J16 -- Install a jumper on B-C
                      J17 -- Jumper A-C if using a CPU 8085/88
                             Jumper B-C if using a CPU 86/87
                      J4 -- Install a jumper

DISK 1A – FLOPPY DISK CONTROLLER – 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
 |       |          |       |          |       |
```
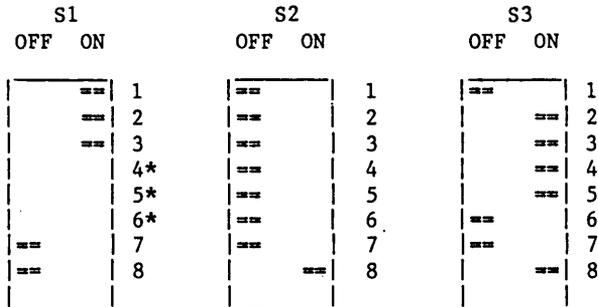
*Set S1 positions 4-6 as shown below depending on the type of CPU
and console I/O device you are using.

S1 POSITION			CPU TYPE	CONSOLE I/O DEVICE
4	5	6		
ON	ON	ON	CPU 86/87	INTERFACER 1 OR 2
ON	ON	OFF	CPU 68K	SYSTEM SUPPORT/INTERFACER 3 OR 4
ON	OFF	ON	CPU 86/87	SYSTEM SUPPORT
ON	OFF	OFF	CPU 86/87	INTERFACER 3 OR 4
OFF	ON	ON	CPU 85/88	INTERFACER 1 OR 2
OFF	ON	OFF	NOT SUPPORTED	
OFF	OFF	ON	CPU 85/88	SYSTEM SUPPORT
OFF	OFF	OFF	CPU 85/88	INTERFACER 3 OR 4

```
        J1 - Position 5
        J2 - Position 5
        J3 - Position 8
        J4 - Position 8
        J5 - Removed
        J6 - A-C for minifloppies generating ready, otherwise B-C
        J7 - B-C (two wait states)
        J8 - Leave as shipped
        J9 - Leave as shipped
       J10 - Shunt on "4"
       J11 - Shunt installed
       J12 - Leave as shipped
       J13 - Leave as shipped
```

These settings select DMA arbiter priority 15, port C0H-C3H, wait
states enabled, and the BOOT routine as selected.

DISK 2/SELECTOR CHANNEL - HARD DISK CONTROLLER

DISK 2 - Switch settings:

```
        S1                  S2
    OFF   ON            OFF   ON                J6

   |==      | 1        |==      | 1       C -- Shugart 400x
   |==      | 2        |==      | 2
   |     ==| 3         |     ==| 3        C̄ -- Fujitsu 2300
   |==      | 4        |     ==| 4               Memorex 101
   |     ==| 5         |==      | 5
   |==      | 6        |     ==| 6       Jumper setting:
   |     ==| 7         |     ==| 7
   |==      | 8        |     ==| 8         8 -- Install a jumper
   |==      | 9        |_____|
   |==      | 10
   |_____|
```

35

SELECTOR CHANNEL - Switch settings:
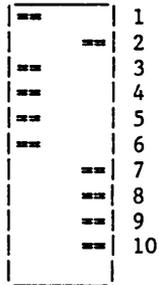
```
       S1
   OFF   ON

  |══    |  1
  |   ══ |  2
  |══    |  3
  |══    |  4          Jumper settings:
  |══    |  5
  |══    |  6
  |   ══ |  7            J8 — "G"
  |   ══ |  8            J9 -- "+"
  |   ══ |  9            J10 — Jumper installed on "G" if CPU 8085/88
  |   ══ | 10                 Jumper installed on "+" if CPU 86/87
  |_____|
```

DISK 3 Switch Settings:

```
            S1                    S2
        OFF   ON              OFF   ON

       |══    |  1          |══    |  1
       |   ══ |  2          |   ══ |  2
       |   ══ |  3          |   ══ |  3
       |══    |  4          |══    |  4
       |   ══ |  5          |  --- |  5
       |   ══ |  6          |  --- |  6
       |   ══ |  7          |  --- |  7
       |  --- |  8          |  --- |  8
       |_____|             |_____|
```
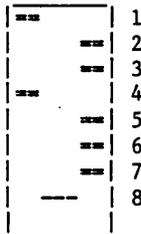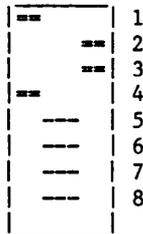
Jumper Settings:

J1	Connector for drive 1 radial cable.
J2	Connector for drive 2 radial cable.
J3	Connector for drive 3 radial cable.
J4	Connector for drive 4 radial cable.
J5	Connector for daisy chained cable cable for all drives.
J6	(Not currently used.)
J7	B-C
J8	A-C
J9	Jumper position 1.
J10	Jumper top position.

INTERFACER 3 – Switch settings for S1:

```
   OFF   ON              Jumpered settings:

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

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

```
  OFF   ON               Jumper Settings:

| ==      | 1             All jumper settings are the same as
|     == | 2             above, see the Interfacer 3 jumper
|     == | 3             settings.
|     == | 4
| ==      | 5
|     == | 6
| ==      | 7
|     == | 8
|_____|
```

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 Microline 80A printer.
               No shunt otherwise.
          J3 — Top installed with Microline 80A.
               No shunt otherwise.
          J4 — Bottom installed with both Microline 80A
               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:

```
       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 Microline 80A printer.
               No shunt otherwise.
          J3 — Top installed with Microline 80A.
               No shunt otherwise.
          J4 — Bottom installed with both Microline 80A
               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

38

MDRIVE/H - Switch settings:

```
        S1                     Board          Switch Number*
    OFF    ON                  Number        8      9      10

    |==       | 1              1st . . . .   ON     ON     ON
    |==       | 2              2nd . . . .   ON     ON     OFF
    |     ==| 3                3rd . . . .   ON     OFF    ON
    |     ==| 4                4th . . . .   ON     OFF    OFF
    |     ==| 5                5th . . . .   OFF    ON     ON
    |==       | 6              6th . . . .   OFF    ON     OFF
    |==       | 7              7th . . . .   OFF    OFF    ON
    |     ==| 8 ·              8th . . . .   OFF    OFF    OFF
    |     ==| 9
    |     ==| 10               *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 CompuPro System
Center/Dealer.

MP/M 8-16

CompuPro®