PMM-100

2/4 MHz PATCH INSTALLATION INSTRUCTIONS

for

Magnolia Microsystems CP/M Version 2.424

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INTRODUCTION

These instructions cover the modification of Magnolia Microsystems, Inc. CP/M Version 2.242, to allow use of their double density floppy disk controller board at system speeds of 2 or 4 MHz. This modification also allows a hard-sectored diskette to be accessed at 2 or 4 MHz using the Heath H-88-1 controller board.

When the patches are completely installed, any bootable disk created with the patched CP/M can be booted at either 2 MHz or 4 MHz. In addition, when using any diskettes other than 8 inch double density, you may toggle the system's speed between 2 MHz and 4 MHz after you boot. This may also be done if you have the 8 inch double density diskettes on line, so long as you do not access them.

When using the 8 inch double density diskettes, ANY access MUST be at the speed at which you booted, even if you did not boot from them. Thus to run these diskettes at 4 MHz you must boot at 4 MHz which requires a boot ROM capable of operation at the increased speed (Consult the DSM-240 manual section "Monitor ROM considerations").

The KRES/UltiMeth KMR-100 monitor ROM will run at 4 MHz, and will boot any of the popular drive types including the Magnolia Microsystems controller at either 2 MHz or 4 MHz. In addition, it contains commands to allow you to toggle the CPU and system speed from the monitor BEFORE you boot. This gives you an easy means of control of system speed for the 8 inch double density diskettes which must be run at the boot speed. This ROM is available for an additional charge from KRES Engineering.

Follow either the brief installation instructions beginning on page 2, OR the detailed installation instructions beginning on page 7, to modify your CP/M to run at either 2 or 4 MHz. Either set of instructions, if followed precisely, will "patch" your Magnolia CP/M to allow use with the DSM-240 2/4 MHz Board. If you are experienced with DDT.COM and Operating Systems, you may be able to omit some steps and do the patches directly. But for sure, safe results follow these instructions step by step.
Even if you rarely use DDT, the steps included in the detailed section are explicit enough, IF YOU FOLLOW THEM PRECISELY, to lead you through the patches without error.

BRIEF INSTALLATION INSTRUCTIONS

USE THESE INSTRUCTIONS IF YOU ARE FAMILIAR WITH CP/M, DDT, AND 8080 ASSEMBLY LANGUAGE MNEMONICS

Perform the following steps:

1.   Boot at 2 MHz the diskette containing the CP/M version 2.242 system to be modified.   This diskette must contain the following programs (supplied by Magnolia):

```
              LINK.COM      MOVCPM.COM    DDT.COM    SYSGEN.COM
and:          SETUP.COM     FORMAT.COM    (ver 2.242)
or:           DDSETUP.COM   DDFORMAT.COM  (ver 2.23)
```

2. Insert the distribution diskette in another disk drive (say, "B"). Make sure that the mode of the disk drive is compatible with the diskette.

3.   Enter the following command -

for an 8" CP/M system diskette:

LINK B:BTV4DD8Z

for a 5" CP/M system diskette:

LINK B:BTV4DD5Z

4.   Use "DDT MOVCPM.COM" to examine the following locations in MOVCPM.COM (values in parentheses may be different; note the "NEXT" value given upon entry to DDT for step #6 below):

```
              097B    MVI   A,18
              097D    STA   2024        (references 2A24)
              0980    STA   2049        (references 2A49)

              2A21    CALL  (20ED)
              2A24    ??=   28          ***
              2A25    INX   B
              2A26    LXI   D,(2114)
              2A29    MVI   B,88

              2A44    ??=   38
              2A45    PCHL
              2A46    CALL  (20ED)
              2A49    ??=   28          ***
              2A50    INX   B
              2A51    LXI   D,(2137)
              2A54    MVI   B,A8
```

The above assumes that the double-density floppy disk controller I/O module is the first module in the BIOS.   The Magnolia modules LINK.COM, BASECPM.COM, and M316.HEX may be used to construct a MOVCPM.COM which has the double-density floppy disk controller I/O module as the first module in the BIOS.   Refer to the Magnolia user's manual.

If the above values are not found in the corresponding locations, the
above instruction sequences must be located, and the above references
in the boot track area (locations 0900-09FF) must be patched to point
to the proper locations (note the offset of 0A00).

5.   Remain in DDT and patch the following location in MOVCPM.COM if
you wish to access the Heath H-17 hard-sectored controller board at 4
MHz:

```
        3286     MVI    A,FD
        3288     MVI    D,50          ***
        328A     OUT    7E
        328C     IN     7E
        328E     IN     7F

        change   3288 MVI  D,50 to MVI  D,A0
                 (3289 50 to A0)
```

The above assumes that the Heath H-17 mini-floppy disk controller I/O
module is the second module in the BIOS.   The Magnolia modules
LINK.COM, BASECPM.COM, and Z17.HEX may be used to construct a
MOVCPM.COM which has the Heath H-17 mini-floppy disk controller I/O
module as the second module in the BIOS.   Refer to the Magnolia user's
manual.

If the above values are not found in the corresponding locations, the
above instruction sequence must be located and patched as shown.

6.   Save the resultant MOVCPM.COM as follows:

                    SAVE 60 MOVCPM.COM

Note that the value "60" may be different for your system.   Compute
the proper value from the "NEXT" value shown upon entry to DDT (as
described on page 2 of the DDT user's guide).

7.   Run SETUP (ver 2.242) or DDSETUP (ver 2.23) and enter the "SET
LOGICAL/PHYSICAL DRIVE ASSIGNMENTS" menu.   Depress the <BLUE> key to
update MOVCPM; then exit to CP/M.

8.   Run MOVCPM and SYSGEN to generate a new system.

9.   Reboot and try the CP/M system diskette at both 2 4 MHz.   Note
that in order to boot an 8" CP/M diskette at 4 MHz, you will need a
monitor/boot ROM from KRES Engineering.

10.   If you have ver 2.242 utilities (FORMAT.COM is the only
formatting program), perform steps 10A-12A. If you have ver 2.23
utilities (DDFORMAT.COM and FORMAT.COM are used for formatting),
perform steps 10B-12B.

10A. Rename "FORMAT.COM" to "FORMAT2Z.COM" as follows:

        REN FORMAT2Z.COM=FORMAT.COM

11A.   Use "DDT FORMAT2Z.COM" to examine and patch the following
locations in FORMAT2Z.COM, creating a NEW formatting program called
FORMAT4Z.COM (values in parentheses may be different):

```
        08E4     CALL  (09F3)
        08E7     MOV   A,D
        08E8     CPI   07              ***
        08EA     JNC   (08BC)
        08ED     CPI   03              ***
        08EF     JC    (08E4)
        08F2     CALL  (09F3)
        08F5     MOV   A,D
        08F6     CPI   03              ***
        08F8     JNC   (08F2)
        08FB     XRA   A

        change   08E8 CPI   07 to CPI   0C
                 08ED CPI   03 to CPI   06
                 08F6 CPI   03 to CPI   06
                 (08E9 07 to 0C)
                 (08EE 03 to 06)
                 (08F7 03 to 06)

        0979     CALL  (09F3)
        097C     MOV   A,D
        097D     CPI   03              ***
        097F     JC    (0979)
        0982     CALL  (09D8)

        change   097D CPI   03 to CPI   06
                 (097E 03 to 06)

        09DB     MVI   A,FD
        09DD     MVI   D,50            ***
        09DF     OUT   7E
        09E1     IN    7E
        09E3     IN    7F

        change   09DD MVI   D,50 to MVI   D,A0
                 (09DE 50 to A0)
```

```
0A78       PUSH PSW
0A79       LXI   B,00AB          ***
0A7C       DCX   B
0A7D       MOV   A,B
0A7E       ORA   C
0A7F       JNZ   (0A7C)

change     0A79 LXI   B,00AB  to  LXI   B,0155
           (0A7A AB to 55)
           (0A7B 00 to 01)

0ABB       CALL (0AD0)
0ABE       LXI   B,84D0          ***
0AC1       IN    3C
0AC3       RLC
0AC4       JNZ   (0ACD)
0AC7       DCX   B
0AC8       MOV   A,B
0AC9       ORA   C
0ACA       JNZ   (0AC1)

change     0ABE LXI   B,84D0  to  LXI   B,0
           (0ABF D0 to 00)
           (0AC0 84 to 00)

0AE5       MVI   C,3F
0AE7       ??=   CB
0AE8       MOV   M,B
0AE9       JNZ   (0AF1)          ***
0AEC       ??=   CB
0AED       MOV   D,B

change     0AE9 JNZ  ... to JMP  ...
           (0AE9 C2 to C3)

0B34       MVI   C,3F
0B36       ??=   CB
0B37       MOV   D,D
0B38       ??=   28              ***
0B39       INR   B

change     0B38 ??=   28 to ??=   18
           (0B38 28 to 18)
```

If the above values are not found in the corresponding locations, the
above instruction sequences must be located and patched as shown.

Save the result with "SAVE 35 FORMAT4Z.COM".

12A.   Use "FORMAT2Z.COM" when formatting diskettes at 2 MHz;   use
"FORMAT4Z.COM" when formatting diskettes at 4 MHz.

10B. Rename "DDFORMAT.COM" to "DDFMT2Z.COM" as follows:

REN DDFMT2Z.COM=DDFORMAT.COM

11B.   Use "DDT DDFMT2Z.COM" to examine and patch the following
locations in DDFMT2Z.COM, creating a NEW formatting program called
DDFMT4Z.COM (values in parentheses may be different):

```
            0284      MOV   A,M
            0285      ANI   41
            0287      CPI   41
            0289      MOV   A,M
            028A      LXI   H,(0481)
            028D      JNZ   (0293)
            0290      LXI   H,(0492)      ***
            0293      SHLD  (04BC)
            0296      XCHG

            change    0290 LXI   H,... to LXI   B,...
                      (0290 21 to 01)

            02E0      LDA   000D
            02E3      ANI   FD
            02E5      OUT   F2
            02E7      CALL  (0464)
            02EA      LXI   B,84D0        ***
            02ED      IN    3C
            02EF      RLC

            change    02EA LXI   B,84D0 to LXI   B,0
                      (02EB D0 to 00)
                      (02EC 84 to 00)

            0338      OUT   38
            033A      MVI   A,92          ***
            033C      DCR   A
            033D      JNZ   (033C)
            0340      IN    3C
            0342      ORA   A

            change    033A MVI   A,92 to MVI   A,0
                      (033B 92 to 00)
```

If the above values are not found in the corresponding locations, the
above instruction sequences must be located and patched as shown.

Save the result with "SAVE 8 DDFMT4Z.COM".

12B.   Use "DDFMT2Z.COM" when formatting diskettes at 2 MHz;   use
"DDFMT4Z.COM" when formatting diskettes at 4 MHz.

DETAILED INSTALLATION INSTRUCTIONS

USE THESE INSTRUCTIONS (WHICH BEGIN WITH A REVIEW OF DDT) IF YOU ARE NOT FAMILIAR WITH CP/M, DDT AND 8080 ASSEMBLY LANGUAGE MNEMONICS

USING DDT

The patches you will install require the use of a utility program on your original CP/M distribution disk called DDT.COM. DDT stands for Dynamic Debugging Tool. It will allow you to change portions of a CP/M file. We will use it to change some of your CP/M operating system and utility programs so they will run at 2 MHz or 4 MHz. Complete information on the use of DDT can be found in the CP/M manual. Although there are many commands available in DDT, we will only use two of them to make our changes, and they are detailed in this section. These commands allow you to:
    1. Look at the values in memory (the **List** command)
    2. Change the values in memory (the Substitute or Set command)
Since it is actually disk files that we want to change, rather than memory locations, we will first put a file into memory; then change memory locations; and finally save the values in memory back into a disk file.

THESE STEPS ARE EXAMPLES ONLY. ACTUAL PATCHES START ON PAGE 10

1.) First, DDT will automatically put any one disk file into memory when we first give the DDT command. It uses the file name you type after the DDT command at the CP/M "A>" prompt. For example, when you see the "A>" prompt you type:

DDT MOVCPM.COM <cr>

You will begin to run the DDT program, and DDT will find the disk file named MOVCPM.COM and load it into memory.   When DDT signs on, after it tells you what it is and what version you are running, it also tells you the NEXT available memory location after the loaded program, and the Program Counter setting (100H) to run this COM file. This information should be written down, as you will use it to determine the length of the modified file to save. When DDT is ready for you to enter a command, it prompts you with a "-". Now that the file is in memory, we can use some DDT commands to look at memory locations, and change them if we wish.

2.) The **List** command will list the contents of the memory location specified as assembly language mnemonics. We will be using this command only to verify that what you have in the file at a particular location is what it should be. We will use the command by typing L followed by a memory address and DDT will respond by listing lines of assembly language code. All you need do is compare what you see on the screen with what is printed in this manual. For example, if we wanted to look at what is in our file at location 097B, at the "-" prompt we would type:

L097B <cr>

and your machine would respond with the memory location followed by
the mnemonics it found at that location, for example:

```
097B    MVI     A,18
097D    STA     2024
0980    STA     2049
....
```

Note that every memory address is not listed. Some instructions take
more than one memory location. In our example above, the instruction
corresponding to "MVI A," is in location 097B, and the value 18 is in
location 097C. Similarly, the location 097D contains the instruction
corresponding to "STA", and memory locations 097E and 097F contain the
value 2024. (The 24 is stored first, then the 20.)

3.) When you are told to change a memory location to another value,
you will use the Substitute (or Set) command. This command will
display the value stored in a memory location, and allow you to change
the value if you wish. We will use the command by typing S followed
by a memory location. DDT will return with the value in that
location, and wait for your command. You may then either:
        a. Type in a new Hexadecimal value
        b. Press the Return key (<cr>) to go on to the next location
and leave the data unchanged
        c. Press the period (".") followed by the RETURN key to leave
this command and return to the "-" prompt.

4.) When all of the changes have been made, you have software that
can run at 2 MHz or 4 Mhz, but it is still in memory. You want it in
a disk file so you can continue to reuse it. We will need to exit DDT
and return to CP/M so the file can be saved. DDT is exited by typing
GO ("G" ZERO) which returns control to CP/M.

5.) Finally we use the CP/M SAVE command to write the memory back to
a disk file. **DOING ANYTHING ON YOUR COMPUTER BETWEEN THE GO AND
THE SAVE COMMAND CAN BE DISASTROUS.** The values you wrote down in
step one are now used to determine the length of the file. We need to
make a conversion from Hexadecimal to Decimal for use with the SAVE
command. The proper value can be found in TABLE I on the next page.

For example, let's say when DDT signed on the computer screen read:

```
DDT VER 2.2
NEXT PC
3D00 0100
```

Find the table entry that contains 3D00 in the given range. This is
the line reading:

```
3C01-3D00     60
```

Then to SAVE our MOVCPM.COM example file, we would type at the CP/M
prompt:

```
SAVE 60 MOVCPM60.COM
```

And we are done. Now that you understand enough about what you are
about to be doing, let's proceed and make the actual patches.

DECIMAL SAVE VALUE FROM DDT

NEXT RANGE	USE	NEXT RANGE	USE	NEXT RANGE	USE
0100-0200	1	2101-2200	33	4101-4200	65
0201-0300	2	2201-2300	34	4201-4300	66
0301-0400	3	2301-2400	35	4301-4400	67
0401-0500	4	2401-2500	36	4401-4500	68
0501-0600	5	2501-2600	37	4501-4600	69
0601-0700	6	2601-2700	38	4601-4700	70
0701-0800	7	2701-2800	39	4701-4800	71
0801-0900	8	2801-2900	40	4801-4900	72
0901-0A00	9	2901-2A00	41	4901-4A00	73
0A01-0B00	10	2A01-2B00	42	4A01-4B00	74
0B01-0C00	11	2B01-2C00	43	4B01-4C00	75
0C01-0D00	12	2C01-2D00	44	4C01-4D00	76
0D01-0E00	13	2D01-2E00	45	4D01-4E00	77
0E01-0F00	14	2E01-2F00	46	4E01-4F00	78
0F01-1000	15	2F01-3000	47	4F01-5000	79
1001-1100	16	3001-3100	48	5001-5100	80
1101-1200	17	3101-3200	49	5101-5200	81
1201-1300	18	3201-3300	50	5201-5300	82
1301-1400	19	3301-3400	51	5301-5400	83
1401-1500	20	3401-3500	52	5401-5500	84
1501-1600	21	3501-3600	53	5501-5600	85
1601-1700	22	3601-3700	54	5601-5700	86
1701-1800	23	3701-3800	55	5701-5800	87
1801-1900	24	3801-3900	56	5801-5900	88
1901-1A00	25	3901-3A00	57	5901-5A00	89
1A01-1B00	26	3A01-3B00	58	5A01-5B00	90
1B01-1C00	27	3B01-3C00	59	5B01-5C00	91
1C01-1D00	28	3C01-3D00	60	5C01-5D00	92
1D01-1E00	29	3D01-3E00	61	5D01-5E00	93
1E01-1F00	30	3E01-3F00	62	5E01-5F00	94
1F01-2000	31	3F01-4000	63	5F01-6000	95
2001-2100	32	4001-4100	64	6001-6100	96

Note in all cases the value under PC is assumed to be 0100.

TABLE I

PATCHING MAGNOLIA MICROSYSTEM'S CP/M

PART I - Creating MOVCPM.COM

During PART I you will make a new copy of MOVCPM.COM. This MOVCPM.COM
will contain the modules in a specific order, so that when you later
use DDT to examine the code, and alter some bytes, the code will be in
a specific location.

( ) With your system running at 2 MHz, use PIP to transfer the
following files onto your present bootable disk. The PIP command is
detailed in the DSM-240 manual under the Software Configuration for
Heath/Zenith CP/M section.   The following files are on your original
Magnolia CP/M disks.

    ( ) BASECPM.COM
    ( ) M316.HEX
    ( ) Z17.HEX

        B8316.HEX (to boot from an eight inch drive)
    ( ) or
        B5316.HEX (to boot from a 5 1/4 inch drive)

    ( ) ICON.HEX (if you want the type-ahead keyboard)
    ( ) LINK.COM
    ( ) DDT.COM
    ( ) SYSGEN.COM
    ( ) SETUP.COM (Version 2.242 only)

        FORMAT.COM (Version 2.242 only)
    ( ) or
        DDSETUP.COM (Version 2.23 only)
        DDFORMAT.COM (Version 2.23 only)

    ( ) PIP.COM (for later use moving files, etc.)

( ) Also PIP the following files onto the same disk.   These are
located on the disk that came with these patches.:

    ( ) BTV4DD8Z.HEX
    ( ) BTV4DD5Z.HEX

( ) Then make a fresh copy of MOVCPM.COM with the double density
module as the first module and the H/Z-17 controller module as the
second module by executing the following commands:

  ( )   If MOVCPM.COM exists on your disk, either erase it
      or give it some other name

  ( )   REN MOVCPM.COM=BASECPM.COM
  ( )   LINK M316.HEX MOVCPM.COM
  ( )   LINK Z17.HEX MOVCPM.COM

  ( )   LINK ICON.HEX MOVCPM.COM (if desired)

      LINK BTV4DD8Z.HEX MOVCPM.COM (for an 8-inch diskette)
  ( )   or
      LINK BTV4DD5Z.HEX MOVCPM.COM (for a 5-inch diskette)

PART II   -   Checking MOVCPM.COM with DDT

Now, using DDT.COM, the MOVCPM.COM file just created will be examined and possibly patched.   If prior procedures have been followed accurately, no changes should have to be made in this section--only verification is needed.   If you have trouble using DDT, refer back to page 7 of this manual for the section on DDT, or refer to your Magnolia Microsystems CP/M manuals for complete documentation.

( ) Type the following command:

 DDT MOVCPM.COM <cr>

The computer will respond with:

DDT VER 2.2
NEXT PC
3D00 0100
-

( ) Write down the values displayed on your screen under "NEXT" and "PC" for use in PART IV:

     Value from next: _ _ _ _
     Value from PC: _ _ _ _

( ) Use the DDT "L" for "LIST" command and look at the memory beginning at location 097B by typing:

 L097B <cr>

Your computer will respond with:

 097B   MVI   A,18   <===
 097D   STA   2024   <===   **Verify these three lines read correctly**
 0980   STA   2049   <===

(The offset for this section of code is 0A00, so the STA 2024 actually references 2A24, and the STA 2049 actually references 2A49. Don't worry about this offset - its just a comment for those who are interested and want to follow what is happening, or those whose code doesn't match later on)

( ) Use DDT "L" command again to look at the memory beginning at location 2A21 by typing:

   L2A21 <cr>

Your computer will respond with (Values in parentheses may vary.):

   2A21   CALL   (20ED)
   2A24   ??=   28   **<===Confirm the value printed here.**
   2A25   INX   B
   2A26   LXI   D,(2114)
   2A29   MVI   B,88

( ) Next look at the memory locations beginning at 2A44 by typing:

   L2A44 <cr>

Your computer will respond with (Again, values in parentheses may vary.):

   2A44   ??=   38
   2A45   PCHL
   2A46   CALL   (20ED)
   2A49   ??=   28   **<===Confirm the value printed here**
   2A50   INX   B
   2A51   LXI   D,(2137)
   2A54   MVI   B,A8

ALL VALUES YOU HAVE EXAMINED WITH DDT SHOULD MATCH WHAT HAS BEEN PRINTED HERE IN THIS MANUAL. YOU SHOULD NOT HAVE MODIFIED ANY VALUES IN THESE FILES.

If something does not match, and you are sure you have version 2.242, then go back to PART I and relink the specified modules into MOVCPM.COM in the **EXACT** order they are specified. The double density floppy disk controller I/O module must be the first module in the BIOS. This should be the case if earlier steps to make a fresh copy of MOVCPM.COM were followed. If things still do not match, you must locate the second two sequences of code now while you are in DDT (the sections that start at memory locations 2A21 and 2A44 and note where the IDENTICAL code sections are in memory). Then you must:
        A. Write down the address of the memory that contains the same value as SHOULD have been at location 2A24 and subtract 0A00 Hex from that value.
        B. Write down the address of the memory that contains the same value as SHOULD have been at location 2A49 and subtract 0A00 Hex from that value.
        C. Go back to the code you first examined at location 097B and use DDT to patch the STA instructions at 097D to read STA followed by the value you obtained from the subtraction in step 1 above.
        D. Similarly, replace the address referenced by the STA instruction in 0980.
These patches were designed to work only with version 2.242 of MMS CP/M. If the proper code is not in place, you probably do not have this version. Updates have been available from MMS for a charge in the past; we suggest you obtain the proper version. If, however, you wish to try to patch some other version, the instructions here may work. **YOU ARE ON YOUR OWN.**

PART III   -   H17 Controller patch

This section is required only if you wish to access the H-17 10 hard
sectored disk drives at 4 MHz as well as 2 MHz.

( ) Remain in DDT and patch the following location in MOVCPM.COM if
you wish to access the Heath H-17 hard-sectored controller board while
running at 4 MHz. To look at the code beginning at 3286, you type:

L3286 <cr>

And your computer responds with:

```
3286 MVI A,FD
3288 MVI D,50   <===Change below is for this line
328A OUT 7E
328C IN 7E
328E IN 7F
```

( ) Use the DDT "S" to substitute memory values to change line 3288
by substituting "A0" for the value at location 3289. (Part of the
instruction at memory location 3288 is in location 3289. At the "-"
prompt, you type:

S3289 <cr>

Your computer will display:

```
3289 50
```

And leave the cursor to the right of the typed line. You will change
the 50 to A0 by typing:

A0 <cr>

Your computer will move on to the next memory location when you press
RETURN:

```
3290 31
```

And again leave the cursor to the right of the typed line. We are
done with DDT for the moment; you type a period (".") followed by a
RETURN to return to the DDT prompt "-".

( ) To verify the change, list the memory starting at 3286 by typing:

L3286 <cr>

And the first two lines should now read:

```
3286    MVI  A,FD
3288    MVI  D,A0
```

The H/Z-17 controller I/O module must be the second module in the
BIOS. Again, if a new MOVCPM.COM was created per instructions, there
should be no problem. If the above values are not found in the given
locations, the above instruction sequence must be located and patched
by replacing 50 with A0 as above.

PART IV - Saving MOVCPM.COM, reconfiguring and testing

Although any patches to CP/M itself are now complete, the MOVCPM in
the previous parts is still in memory. We will save the contents of
memory in a file on disk called MOVCPM.COM. Finally, your system must
be reconfigured using SETUP to your particular hardware environment.

( ) Exit DDT and return back to CP/M by typing:

GO <cr>

After some disk accesses, you will return to the CP/M prompt. The
file you changed is still in memory, and you must save it to disk by
using the CP/M SAVE command.

( ) Next you will save the resulting MOVCPM.COM still in memory to
disk. If the values you wrote down at the beginning of section 4
matched the printed value in that section, you may type:

SAVE 60 MOVCPM.COM <cr>

And your patched MOVCPM.COM file will be on disk. If, however the
value for NEXT was something different, you must use the technique for
determining file length outlined in the notes on DDT section on page 7
of this manual. Then type:

SAVE nn MOVCPM.COM <cr>

where nn corresponds to the value you determined from the TABLE I.

( ) Run SETUP (Vers. 2.242) or DDSETUP (Vers. 2.23) and set up your
operating parameters to fit your system. You will need to "SET
LOGICAL/PHYSICAL DRIVE ASSIGNMENTS", set default and disk parameters
for the controllers, set any need serial port parameters, etc. just as
you have done before in setting up your system. Remember to use the
"Blue" function key in each stage of "SETUP" to update your image of
MOVCPM. Then exit to CP/M and the prompt.

( ) Run MOVCPM and SYSGEN to generate a new system on any diskette
you won't mind losing should something have gone wrong.

( ) Shift/Reset your system, move the 4 MHz diskette you have been
creating to the drive you normally boot from and verify that it will
boot properly at 2 and 4 MHz. Again, note that with the double density
card you will be booting 8-inch drives at either 2 or 4 MHz and cannot
software switch. You will have to set Jumpers JJ2 and JJ3 on your
DSM-240 card to "A" for 4 MHz or "B" for 2 MHz, or if you have the
Kres/Ultimeth ROM use the "KRES System" command to set the desired
speed. The ROM Manual and DSM-240 Manual should be consulted for
details on commands and jumper options.

PART V - Patching FORMAT.COM

USE THIS SECTION IF YOU HAVE VERSION 2.242

FORMAT.COM which you have been using to FORMAT disks at 2 MHz must now
be patched, and two FORMAT files will result. The original FORMAT file
will be renamed FORMAT2Z.COM and will be used for formatting disks
when you are running at 2 MHz. DDT.COM will be used again to patch
FORMAT2Z.COM, with the resulting patched version to be saved as
FORMAT4Z.COM and used to format when running at 4 MHz.

If you have Version 2.242, you will be patching FORMAT.COM and should
perform the steps in this part (PART V). If you have Version 2.23,
which uses DDFORMAT.COM and FORMAT.COM, go to PART VI.

( )   Rename "FORMAT.COM" TO "FORMAT2Z.COM" at the CP/M prompt by
typing:

  REN FORMAT2Z.COM=FORMAT.COM <cr>

( )   Use DDT.COM to make necessary patches as follows:

  DDT FORMAT2Z.COM <cr>

The computer responds with:

```
DDT VER. 2.2
NEXT PC
2300 0100
-
```

( ) List the memory locations beginning at 08E4 by typing:

  L08E4 <cr>

Your computer will display (note that values in the parentheses may
vary):

```
08E4    CALL  (09F3)
08E7    MOV   A,D
08E8    CPI   07      <===Value to be changed
08EA    JNC   (08BC)
08ED    CPI   03      <===Value to be changed
08EF    JC    (08E4)
08F2    CALL  (09F3)
08F5    MOV   A,D
08F6    CPI   03      <===Value to be changed
08F8    JNC   (08F2)
08FB    XRA   A
```

( ) Use the "S" command under DDT as you did previously to change the areas indicated above. Enter the S command at the "-" prompt at memory 08E9 by typing:

S08E9 <cr>

Your computer will display:

 08E9 07

As the address and value appear each time, you may type a new value in, which the DDT program will place out beside the present value. Or, you may hit RETURN to leave the value unchanged. Or you may enter a period, "." followed by RETURN to return to the DDT "-" prompt.

( ) Change the value at this memory location 08E9 to 0C by typing:

0C <cr>

Your computer will now display:

 08E9 07 0C
 08EA D2

Continue to press the RETURN key until the next memory location to be changed is displayed (08EE), then change this to the indicated value (06). The last location to be changed is 08F7, also changed to 06. When this change has been made, you may press the period (".") follwed by RETURN to leave the substitute command. The entire sequence would proceed as follows:

 08EA D2 **<cr>**
 08EB BC **<cr>**
 08EC 08 **<cr>**
 08ED FE **<cr>**
 08EE 03 **06 <cr>**
 08EF DA **<cr>**
 08F0 E4 **<cr>**
 08F1 08 **<cr>**
 08F2 CD **<cr>**
 08F3 F3 **<cr>**
 08F4 09 **<cr>**
 08F5 7A **<cr>**
 08F6 FE **<cr>**
 08F7 03 **06 <cr>**
 08F8 D2 **. <cr>**
 -

( ) Then use the "L" list command of DDT to verify the changes marked above have been done, and no other locations were inadvertently changed, by typing:

L08E4 <cr>

Your computer will respond with:

```
08E4    CALL  (09F3)
08E7    MOV   A,D
08E8    CPI   0C
08EA    JNC   (08BC)
08ED    CPI   06
08EF    JC    (08E4)
08F2    CALL  (09F3)
08F5    MOV   A,D
08F6    CPI   06
08F8    JNC   (08F2)
08FB    XRA   A
```

Since you should be familiar with DDT by now, we will simply instruct that an area of code be examined, and some of the code changed. Use the following steps, just as we have done before, to make the changes:
        1. Use the L command to verify the code is as printed in the manual
        2. Use the S command to change the required bytes. We will abbreviate this by showing the computer output, and your input, all in one block. As usual, your input will be differentiated from computer output by bold face.
        3. Use the L command again to verify only the desired bytes have been changed to the proper values.

( ) Examine the memory locations beginning at 0979 by typing L0979 verifying what you see on the screen with the listing printed under the FROM heading below. Make the changes with the S command sequence printed below, then verify the proper changes have been and the code looks the same as what you see printed under the TO heading below by using L0979 again:

CHANGE:

FROM			**TO**			
0979	CALL	(09F3)	0979	CALL	(09F3)	
097C	MOV	A,D	097C	MOV	A,D	
097D	CPI	03	097D	CPI	06	**<=== NOTE CHANGE**
097F	JC	(0979)	097F	JC	(0979)	
0982	CALL	(09D8)	0982	CALL	(09D8)	

BY TYPING:

S097E <cr>

```
097E 03 06 <cr>     (Value changed from 03 to 06)
097F DA . <cr>      (" ." returns you to the "-" prompt)
```

( ) Examine the memory locations beginning at 09DB by typing L09DB.
Make the changes with the S command then verify the proper changes
have been made by using L09DB again:

CHANGE:

FROM			TO			
09DB	MVI	A,FD	09DB	MVI	A,FD	
09DD	MVI	D,50	09DD	MVI	D,A0	<=== **NOTE CHANGE**
09DF	OUT	7E	09DF	OUT	7E	
09E1	IN	7E	09E1	IN	7E	
09E3	IN	7F	09E3	IN	7F	

BY TYPING:
 S09DE <cr>

 09DE 50 **A0** <cr>   (Value changed from 50 to A0)
 09DF D3 **.** <cr>   ("." returns you to the "-" prompt)

( ) Examine the memory locations beginning at 0A78 by typing L0A78.
Make the changes with the S command then verify the proper changes
have been made by using L0A78 again:

CHANGE:

FROM			TO			
0A78	PUSH	PSW	0A78	PUSH	PSW	
0A79	LXI	B,00AB	0A79	LXI	B,0155	<== **NOTE CHANGE**
0A7C	DCX	B	0A7C	DCX	B	
0A7D	MOV	A,B	0A7D	MOV	A,B	
0A7E	ORA	C	0A7E	ORA	C	
0A7F	JNZ	(0A7C)	0A7F	JNZ	(0A7C)	

BY TYPING:

 S0A7A <cr>

 0A7A AB **55** <cr>   (Changes value AB to 55)
 0A7B 00 **01** <cr>   (Changes value 00 to 01)
 0A7C 0B **.** <cr>   ("." returns you to the "-" prompt)

( ) Examine the memory locations beginning at 0ABB by typing L0ABB.
Make the changes with the S command then verify the proper changes
have been made by using L0ABB again:

CHANGE:

FROM				TO			
0ABB	CALL	(0AD0)		0ABB	CALL	(0AD0)	
0ABE	LXI	B,84D0		0ABE	LXI	B,0000	<== **NOTE CHANGE**
0AC1	IN	3C		0AC1	IN	3C	
0AC3	RLC			0AC3	RLC		
0AC4	JNZ	(0ACD)		0AC4	JNZ	(0ACD)	
0AC7	DCX	B		0AC7	DCX	B	
0AC8	MOV	A,B		0AC8	MOV	A,B	
0AC9	ORA	C		0AC9	ORA	C	
0ACA	JNZ	(0AC1)		0ACA	JNZ	(0AC1)	

BY TYPING:

S0ABF <cr>

```
0ABF D0 00 <cr>   (Value changed from D0 to 00)
0AC0 84 00 <cr>   (Value changed from 84 to 00)
0AC1 DB .  <cr>   ("." returns you to the "-" prompt)
```

( ) Examine the memory locations beginning at 0AE5 by typing L0AE5.
Make the changes with the S command then verify the proper changes
have been made by using L0AE5 again:

CHANGE:

FROM				TO			
0AE5	MVI	C,3F		0AE5	MVI	C,3F	
0AE7	??=	CB		0AE7	??=	CB	
0AE8	MOV	M,B		0AE8	MOV	M,B	
0AE9	JNZ	(0AF1)		0AE9	JMP	(0AF1)	<== **NOTE CHANGE**
0AEC	??=	CB		0AEC	??=	CB	
0AED	MOV	D,B		0AED	MOV	D,B	

BY TYPING:
S0AE9 <cr>

```
0AE9 C2 C3 <cr>   (Value changed from JNZ to JMP)
0AEA F1 .  <cr>   ("." returns you to the "-" prompt)
```

( ) Examine the memory locations beginning at 0B34 by typing L0B34. Make the change with the S command then verify the proper changes have been made by using L0B34 again:

CHANGE:

FROM				TO			
0B34	MVI	C,3F		0B34	MVI	C,3F	
0B36	??=	CB		0B36	??=	CB	
0B37	MOV	D,D		0B37	MOV	D,D	
0B38	??=	28		0B38	??=	18	<=== **NOTE CHANGE**
0B39	INR	B		0B39	INR	B	

BY TYPING:

S0B38 <cr>

0B38 28 18 <cr>   (Value changed from 28 to 18)
0B39 04 . <cr>   ("." returns you to the "-" prompt)

If the above values are not found in the corresponding locations, the above instruction sequences must be located and patched as to the values shown.

( ) Exit DDT by typing:

  G0 <cr>   (note that this is "G" zero)

which will return you to the CP/M prompt

( ) Save the file as FORMAT4Z.COM by typing:

  SAVE 35 FORMAT4Z.COM <cr>

( ) At this point, your 4MHz software patches are complete. You now may want to take the diskette you sysgened and tested in PART IV and copy over all the files using PIP. It may also be wise to format and sysgen a second disk with your new 2 and 4 MHz CP/M, and copy over the rest of your system files from your original disk. Name the two new disks something like "2/4MHz MMS SYSTEM MASTER" and "2/4MHz MMS WORKING MASTER". The "System Master" disk then should be filed away in a safe place along with the disks you received with your DSM-240 Board and 4MHZ Patches.

PART VI - Patching DDFORMAT.COM
USE THIS SECTION IF YOU HAVE VERSION 2.23

FORMAT.COM which you have been using to FORMAT disks at 2 MHz must now
be patched, and two FORMAT files will result. The original FORMAT file
will be renamed DDFM Z.COM and will be used for formatting disks when
you are running at 2 MHz. DDT.COM will be used again to patch
DDFMT2Z.COM, with the resulting patched version to be saved as
DDFMT4Z.COM and used to format when running at 4 MHz. If you have
Version 2.242, you will be patching FORMAT.COM and should perform the
steps in PART V. If you have Version 2.23, which uses DDFORMAT.COM and
FORMAT.COM, perform the steps in this part (PART VI).

( )   Rename DDFORMAT.COM to DDFMT2Z.COM by typing:

REN DDFMT2Z.COM=DDFORMAT.COM <cr>

( )   Use DDT.COM to examine DDFMT2Z.COM and make changes which will
be saved as DDFMT4Z.COM, with DDFMT2Z.COM to be used for formatting
while running at 2 MHz and DDFMT4Z.COM to be used for formatting while
running at 4 MHz.

Since you should be familiar with DDT by now, we will simply instruct
that an area of code be examined, and some of the code changed. Use
the following steps, just as we have done before, to make the changes:
        1. Use the L command to verify the code is as printed in the
manual
        2. Use the S command to change the required bytes. We will
abbreviate this by showing the computer output, and your input, all in
one block. As usual, your input will be differentiated by computer
output by bold face.
        3. Use the L command again to verify only the desired bytes
have been changed to the proper values.

( ) Examine the memory locations beginning at 0284 by typing L0284
verifying what you see on the screen with the listing printed under
the FROM heading below. Make the changes with the S command sequence
printed below, then verify the proper changes have been and the code
looks the same as what you see printed under the TO heading below by
using L0284 again:

CHANGE:

FROM				**TO**			
0284	MOV	A,M		0284	MOV	A,M	
0285	ANI	41		0285	ANI	41	
0287	CPI	41		0287	CPI	41	
0289	MOV	A,M		0289	MOV	A,M	
028A	LXI	H,(0481)		028A	LXI	H,(0481)	
028D	JNZ	(0293)		028D	JNZ	(0293)	
0290	LXI	H,(0492)		0290	LXI	B,(0492)	<=== **NOTE CHANGE**
0293	SHLD	(04BC)		0293	SHLD	(04BC)	
0296	XCHG			0296	XCHG		

BY TYPING:
S0290 <cr>

0290 21 **01** <cr>   (Value changed from LXI H to LXI B)
0291 92 **.** <cr>   ("." returns you to the "-" prompt)

( ) Examine the memory locations beginning at 02E0 by typing L02E0.
Make the changes with the S command then verify the proper changes
have been made by using L02E0 again:

CHANGE:
```
     FROM                              TO
02E0    LDA   000D           02E0    LDA   000D
02E3    ANI   FD             02E3    ANI   FD
02E5    OUT   F2             02E5    OUT   F2
02E7    CALL  (0464)         02E7    CALL  (0464)
02EA    LXI   B,84D0         02EA    LXI   B,0000   <=== NOTE CHANGE
02ED    IN    3C             02ED    IN    3C
02EF    RLC                  02EF    RLC
```

BY TYPING:
 S02EB <cr>

```
02EB D0 00 <cr>   (Value changed from D0 to 00)
02EC 84 00 <cr>   (Value changed from 84 to 00)
02ED DB . <cr>    ("." returns you to the "-" prompt)
```

( ) Examine the memory locations beginning at 0338 by typing L0338.
Make the changes with the S command then verify the proper changes
have been made by using L0338 again:

CHANGE:
```
     FROM                              TO
0338    OUT   38             0338    OUT   38
033A    MVI   A,92           033A    MVI   A,00    <=== NOTE CHANGE
033C    DCR   A              033C    DCR   A
033D    JNZ   (033C)         033D    JNZ   (033C)
0340    IN    3C             0340    IN    3C
0342    ORA   A              0342    ORA   A
```

BY TYPING:
 S033B <cr>

```
033B 92 00 <cr>   (Value changed from 92 to 00)
033C 3D . <cr>    ("." returns you to the "-" prompt)
```

If the above values are not found in the corresponding locations, the above instruction sequences must be located and patched as shown.

( ) Exit DDT by typing:

GO <cr>

and you will return to the CP/M prompt.

( ) Save the result by typing:

SAVE 8 DDFMT4Z.COM <cr>

( ) At this point, your 4MHz software patches are complete. You now may want to take the diskette you sysgened and tested in PART IV and copy over all the files using PIP. It may also be wise to format and sysgen a second disk with your new 2 and 4 MHz CP/M, and copy over the rest of your system files from your original disk. Name the two new disks something like "2/4MHz MMS SYSTEM MASTER" and "2/4MHz MMS WORKING MASTER". The "System Master" disk then should be filed away in a safe place along with the disks you received with your DSM-240 Board and 4MHZ Patches.

ADDITIONAL PATCHES FOR MMS AND 8-INCH THIN LINE DRIVES

The patches you have just completed were written assuming a standard heigth eight inch drive on line. These drives, for the most part, use AC motors which are always on. Most of the new thinline drives use DC motors, which come on as the disk is accessed, and shut off again when not needed, just as the 5 1/4 inch drives. Some of the thinline drives require a greater time to come up to speed than the operating system software allows at 4 MHz. The result is frequent BDOS errors when the drive is accessed after the motor has shut off. The following patches provided by Henry Fale, of Quikdata Computer Services, Inc., 2618 Penn Circle, Sheboygan,WI 53081, (414) 452-4172. will help alleviate this problem. The patch is installed using DDT, just as the previous patches were installed. It should be noted that the delay provided in this patch represents the maximum available, and should this not work for you, contact your disk drive dealer for further information on how operation of your drive might be improved.

( ) Go into DDT to modify MOVCPM.COM again by entering:

DDT MOVCPM.COM <cr>

DDT will respond with the usual signon and values. Remember to note the "NEXT" and "PC" values as always with DDT for the purpose of saving the modified MOVCPM.COM after patching.

( ) Enter the following to enter the substitute command to change the required memory locations:

S2CC1 <cr>

Your computer will respond by displaying the contents of 2CC1, and giving you the option of changing it. Be certain the contents of each memory location is as in the table below. If the value is correct, simply type a RETURN to leave the value unchanged. If something is different in a particular location, change it to correspond to the value given in this table. Exit the sequence by typing a period (".") which will return you to the "-" prompt. Change contents of the following memory locations as required:

```
2CC1 11
2CC2 00
2CC3 00
2CC4 1B
2CC5 7A
2CC6 B3
2CC7 DB
2CC8 3C
2CC9 07
2CCA D0
2CCB E3
2CCC E3
2CCD 00
2CCE 20
2CCF F4
```
(After the next address enter " . " to return to the "-" prompt.)

( ) Use the "L" command to verify the patches by typing:

L2CC1 <cr>

Your computer will respond with:

```
2CC1 LXI D,0
2CC4 DCX D
2CC5 MOV A,D
2CC6 ORA E
2CC7 IN 3C          (You will have to use the
2CC9 RLC            "L" command twice to ob-
2CCA RNC            tain a full listing of
2CCB XTHL           these values.)
2CCC XTHL
2CCD NOP
2CCE ??= 20
2CCF CP (7EC9)
```

( ) Exit DDT by typing:

GO <cr>

and you will return to the CP/M prompt.

( ) Save the MOVCPM.COM image from memory back to disk using the SAVE command as in PART IV of the previous patches. Use either the value for the length of file you used in PART IV, or calculate the length of the file from the NEXT and PC values you recorded at the beginning of this section. This completes the additional patches to the Magnolia CP/M for the 8 inch thin line drives.

ACKNOWLEDGMENTS:

In addition to the original author of the patches (these patches are still intact in the "Brief Installation" section), Dean Gibson of Ultimeth, and the original author of the 8 inch thin line patches, Henry Fale of H-Scoop and Quikdata, we would like to thank Rev. Sidney Conner of Lyons, Colorado for his contributions towards the rewriting and reformatting of these sections.