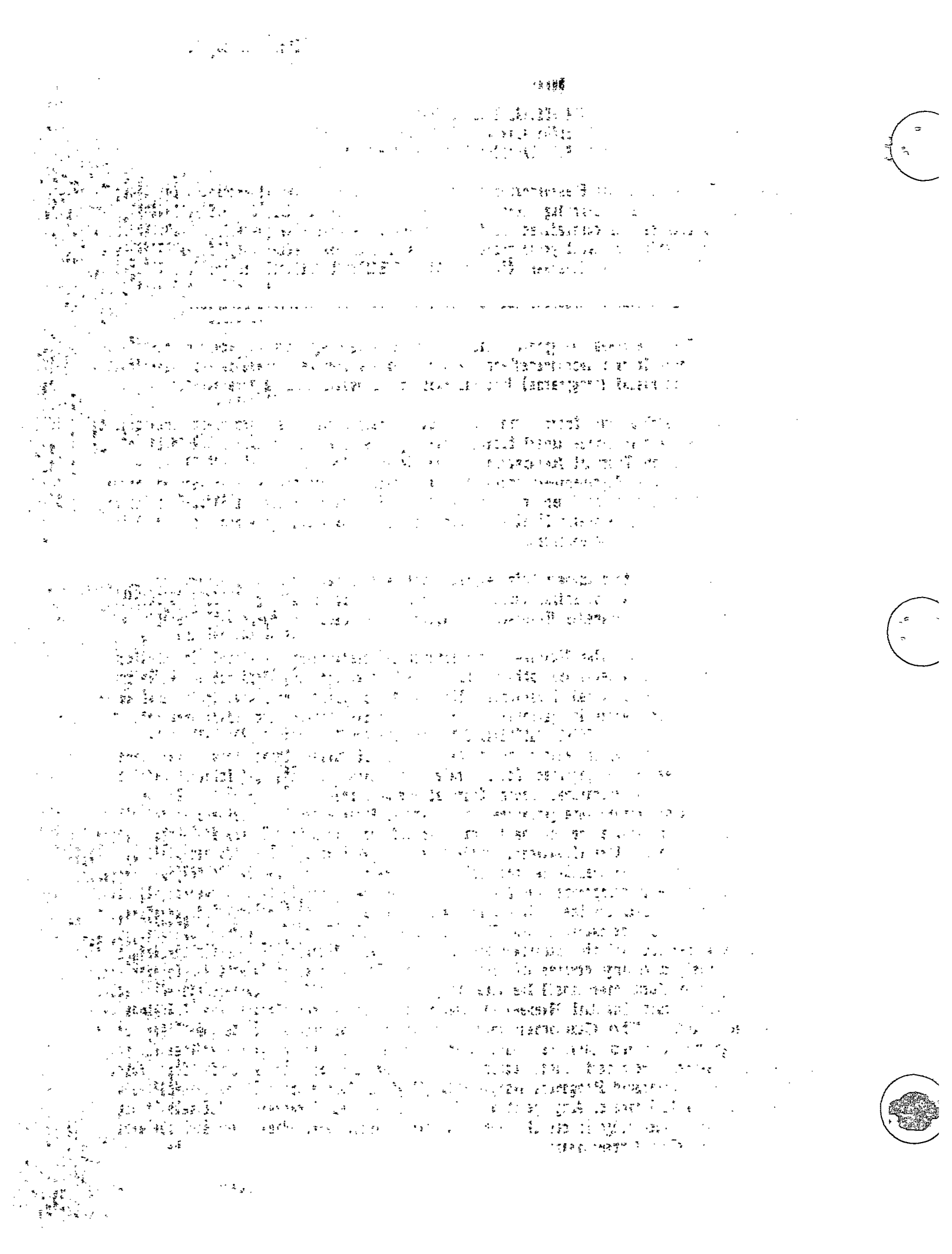
CP/M USER'S
MANUAL

MAGNOLIA MICROSYSTEMS CP/M V2.2 ON HEATH H8

BY

DG ELECTRONIC DEVELOPMENTS CO.
P. O. BOX 1124
DENISON, TEXAS 75020
(214) 465-7805

D·G ELECTRONIC DEVELOPMENTS CO.



DIGITAL RESEARCH
Box 579 Pacific Grove, California, 93950
SOFTWARE LICENSE AGREEMENT

IMPORTANT: All Digital Research programs are sold only on the condition that the purchaser agrees to the following license. READ THIS LICENSE CAREFULLY. If you do not agree to the terms contained in this license, return the packaged diskette UNOPENED to your distributor and your purchase price will be refunded. If you agree to the terms contained in this license, fill out the REGISTRATION information and RETURN by mail.

DIGITAL RESEARCH agrees to grant and the Customer agrees to accept on the following terms and conditions nontransferable and nonexclusive licenses to use the software program(s) (Licensed Programs) herein delivered with this agreement.

TERM:

This agreement is effective from the date of receipt of the above-referenced program(s) and shall remain in force until terminated by the Customer upon one month's prior written notice, or by Digital Research as provided below.

Any license under this Agreement may be discontinued by the Customer at any time upon one month's prior written notice. Digital Research may discontinue any license or terminate this Agreement if the Customer fails to comply with any of the terms and conditions of this Agreement.

LICENSE:

Each program license granted under this Agreement authorizes the Customer to use the Licensed Program in any machine readable form on any single computer system (referred to as System). A separate license is required for each System on which the Licensed Program will be used.

This Agreement and any of the licenses, programs or materials to which it applies may not be assigned, sublicensed or otherwise transferred by the Customer without prior written consent from Digital Research. No right to print or copy, in whole or in part, the Licensed Programs is granted except as hereinafter expressly provided.

PERMISSION TO COPY OR MODIFY LICENSED PROGRAMS:

The customer shall not copy, in whole or in part, any Licensed Programs which are provided by Digital Research in printed form under this Agreement. Additional copies of printed materials may be acquired from Digital Research.

Any Licensed Programs which are provided by Digital Research in machine readable form may be copied, in whole or in part, in printed or machine readable form in sufficient number for use by the Customer with the designated System, to understand the contents of such machine readable material, to modify the Licensed Program as provided below, for back-up purposes, or for archive purposes, provided, however, that no more than five (5) printed copies will be in existence under any license at any one time without prior written consent from Digital Research. The Customer agrees to maintain appropriate records of the number and location of all such copies of Licensed Programs. The original, and any copies of the Licensed Programs, in whole or in part, which are made by the Customer shall be the property of Digital Research. This does not imply, of course, that Digital Research owns the media on which the Licensed Programs are recorded. The Customer may modify any machine readable form of the Licensed Programs for his own use and merge it into other program material to form an updated work, provided that, upon discontinuance of the license for such Licensed Program, the Licensed Program supplied by Digital Research will be completely removed from the updated work. Any portion of the Licensed Program included in an updated work shall be used only if on the designated System and shall remain subject to all other terms of this Agreement.

(over)

The Customer agrees to reproduce and include the copyright notice of Digital Research on all copies, in whole or in part, in any form, including partial copies of modifications, of Licensed Programs made hereunder.

PROTECTION AND SECURITY:

The customer agrees not to provide or otherwise make available any Licensed Program including but not limited to program listings, object code and source code, in any form, to any person other than Customer or Digital Research employees, without prior written consent from Digital Research, except with the Customer's permission for purposes specifically related to the Customer's use of the Licensed Program.

DISCONTINUANCE:

Within one month after the date of discontinuance of any license under this Agreement, the Customer will furnish Digital Research a certificate certifying the through his best effort, and to the best of his knowledge, the original and all copies, in whole or in part, in any form, including partial copies in modifications, of the Licensed Program received from Digital Research or made in connection with such license have been destroyed, except that, upon prior written authorization from Digital Research, the Customer may retain a copy for archive purposes.

DISCLAIMER OF WARRANTY:

Digital Research makes no warranties with respect to the Licensed Programs. The sole obligation of Digital Research shall be to make available all published modifications or updates made by Digital Research to Licensed Programs which are published within one (1) year from date of purchase, provided Customer has returned the Registration Card delivered with the Licensed Program.

LIMITATION OF LIABILITY:

THE FOREGOING WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT WILL DIGITAL RESEARCH BE LIABLE FOR CONSEQUENTIAL DAMAGES EVEN IF DIGITAL RESEARCH HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

GENERAL

If any of the provisions, or portions thereof, of this Agreement are invalid under any applicable statute or rule of law, they are to that extent to be deemed omitted.

TABLE OF CONTENTS

USER'S MANUAL
Magnolia Microsystems CP/M V2.2 on Heath H8

By

D-G Electronic Developments Company
1827 South Armstrong
Denison, Texas 75Ø2Ø
(214) 465-78Ø5

WARRANTY

No warranty expressed or implied is associated with this product except for the warranty that the goods are produced in a professional manner and in accordance with the specifications supplied. D-G Electronic Developments Company shall not be liable for any injury, loss or damage, direct or consequential arising from the use or inability to use this product.

INTRODUCTION

The CP/M (Control Program for Microprocessors) operating system is a collection of inter-related programs designed to provide the microcomputer user convenient access to all of the hardware resources of his computer. Functions of the operating system include (but are not limited to!) storage and retrieval of programs and data on mass storage devices (such as floppy diskettes), management of the computer's memory space and software interface to the user I/O devices such as the console, printer, etc... CP/M is operational on hardware systems using either the 8Ø8Ø or Z8Ø microprocessor and in general is not dependent on the computer or mass storage device design. For this reason CP/M has become a very popular operating system and many high level languages and application software packages have been designed to run under its control.

CP/M as distributed by D-G Electronic Developments Company allows the Heath H8 / DG-8Ø owner access to a wide variety of existing CP/M based software. Several software vendors now make available CP/M based software on Heath format 5.25" floppy diskettes.

It is strongly recommended that the user read this manual in its entirety before attempting to boot his CP/M system. If you are intending to run existing applications packages under CP/M, you should also read the Digital Research manual entitled "AN INTRODUCTION TO CP/M FEATURES AND FACILITIES". It will probably not be necessary to read the other Digital Research manuals to utilize existing applications software. However, the more advanced user of CP/M will find it beneficial to spend time studying all of the CP/M manuals.

"CP/M INTERFACE GUIDE"
"CP/M SYSTEM ALTERATION GUIDE"
"ED: A CONTEXT EDITOR FOR THE CP/M DISK SYSTEM"
"CP/M ASSEMBLER (ASM)"
"CP/M DYNAMIC DEBUGGING TOOL (DDT)"

These manuals will aid the user in utilizing the available features of the system properly and efficiently.

NOTE: Your H8 system must consist of the following components in order to use the D-G version of CP/M:

1) H8 Computer with at least 32K of RAM beginning at address Ø
2) DG-8Ø Z8Ø CPU
3) D-G FPM/8Ø Monitor Package
4) D-G CMD-1 ROM-Disable Port or the DG-64D Memory Board with on-board ROM-disable port or equivalent.

BOOT PROCEDURE

The following procedure may be used to boot your CP/M. Remember, you must have an H8 computer with the DG-8Ø CPU, the DG FPM/8Ø firmware package and at least 32K of RAM as well as the Heath H17 disk system to use the DG version of CP/M. The system clock frequency will be determined during the boot procedure and may be either 2 or 4 MHz.

> Note: Throughout this manual, (cr) means to press the RETURN key on the console keyboard. Most CP/M programs require a (cr) after characters are entered from the keyboard to inform the program that operator input is complete. For clarity, all operator inputs from the keyboard are underlined in the following examples.

Make sure there are no diskettes in any drives and then power-up your H8 system. The front panel of the H8 should display ØØ4 365 Pc. Insert your CP/M diskette (with the label facing up) in the left-hand drive and close the disk drive door. Press the GO (4) key on the H8 front panel. The sign-on message should appear on the console as follows:

```
32K MAGNOLIA MICROSYSTEMS CP/M ON HEATH H8
BY: D-G ELECTRONIC DEVELOPMENTS CO.
VERSION 2.21  [ 2 MHZ ]

A>
```

Your CP/M system is now up and running. If this is your first use of the system, back up the distribution diskette as soon as possible and place the distribution diskette in a safe place with the write-protect notch covered.

BACKUP PROCEDURE

This procedure may be used to make a copy of the original CP/M distribution diskette. You will use the FORMAT program to properly format a blank diskette and then use the ONECOPY program to copy the distribution disk software onto it.

Boot up your CP/M diskette as previously described. At the "A>" prompt, type:

```
A>FORMAT A:(cr)
DG FORMAT, VERSION 2.2
INSERT BLANK DISK IN DRIVE A:  AND PUSH RETURN >
```

The console will respond as above. At this point, remove the distribution CP/M diskette from drive A: (the left-hand drive in a two drive system), insert a blank diskette into it and press the RETURN key. The program will format the diskette and read each sector to verify that it has been properly formatted. It then prompts to allow you to format another diskette if desired. If any errors occurred, the program will display "FORMAT ERROR: . . . ". If this occurs, try another diskette. When the format program has successfully formatted the diskette, it will respond on the console:

```
INSERT BLANK DISK IN DRIVE A:  AND PUSH RETURN>
```

Press the CONTROL and C keys simultaneously (hereafter shown as ↑C) to return to CP/M.

Now re-insert your CP/M distribution diskette in drive A: and copy it onto your newly formatted diskette by typing:

```
A>ONECOPY(cr)
DG ONECOPY VERS 2.2

INSERT SOURCE DISK, PUSH RETURN >(insert distribution diskette)(cr)
INSERT DESTINATION DISK, PUSH RETURN >(insert newly formatted diskette)(cr)

INSERT SOURCE DISK, PUSH RETURN >(insert distribution diskette)(cr)
INSERT DESTINATION DISK, PUSH RETURN >(insert newly formatted diskette)(cr)

INSERT SOURCE DISK, PUSH RETURN >(insert distribution diskette)(cr)
INSERT DESTINATION DISK, PUSH RETURN >(insert newly formatted diskette)(cr)

INSERT SOURCE DISK, PUSH RETURN >(insert distribution diskette)(cr)
INSERT DESTINATION DISK, PUSH RETURN >(insert newly formatted diskette)(cr)

INSERT SOURCE DISK, PUSH RETURN >(insert distribution diskette)(cr)
INSERT DESTINATION DISK, PUSH RETURN >(insert newly formatted diskette)(cr)

INSERT SYSTEM DISK, PUSH RETURN >(leave new copy in drive)(cr)
A>
```

You now have a copy of your distribution diskette.

If you have a two drive disk system, you may format the new diskette as above, and use the following alternate procedure for copying the distribution diskette:

```
A>COPY ALL(cr)

+COPY VERS 2.2
+SOURCE ON DRIVE A:  (insert the distribution diskette in the left-hand drive)
+BLANK ON DRIVE B:  (insert the newly formatted diskette in the right-hand drive)
+<RET>TO COPY, ↑C TO EXIT (cr)
```

The copy procedure will take approximately 1.5 minutes and then display on the console:

```
+COPY ALL
+SOURCE ON DRIVE A:
+BLANK ON DRIVE B:
<RET> TO COPY, ↑C TO EXIT >↑C
A>
```

You should now put the original distribution diskette in a safe place and use it only for backup purposes. NEVER REMOVE THE WRITE-PROTECT TAB FROM YOUR DISTRIBUTION DISKETTE AND NEVER ATTEMPT TO WRITE TO THE DISKETTE!!!

You should mark your new system diskette as follows:

```
"32K MMS/DG CP/M for Heath H8 V2.2Ø"
"S/N 2-237-XXXXX"
" © DIGITAL RESEARCH"
" © D-G ELECTRONIC DEVELOPMENTS CO."
```

where XXXXX is the serial number from your original distribution diskette.

INCREASING SYSTEM SIZE

MMS CP/M VERSION 2.2 as distributed by D-G is set up for use with 32K of system RAM. If you have more RAM in your system, you may use MOVCPM.COM to increase the operating system size of your CP/M diskette. For additional information, see page 30, section 6.9 in the "INTRODUCTION TO CP/M FEATURES AND FACILITIES" manual.

WARNING: DO NOT ATTEMPT THIS OPERATION ON YOUR CP/M DISTRIBUTION DISKETTE!!!

For example, a 48K CP/M system could be obtained by typing:

```
A>MOVCPM 48 * (cr)

CONSTRUCTING 48K Magnolia Microsystems CP/M on Heath H8
READY FOR "SYSGEN" OR
"SAVE 41 CPM48.COM"
A>SYSGEN (cr)
DG SYSGEN, VERSION 2.Ø
SOURCE DRIVE NAME (OR RETURN TO SKIP)(cr)(system is in memory from MOVCPM)
DESTINATION DRIVE NAME (OR RETURN TO REBOOT)A
DESTINATION ON A, THEN TYPE RETURN(cr) (48K CP/M system is written to disk)
FUNCTION COMPLETE
DESTINATION DRIVE NAME (OR RETURN TO REBOOT)
```

At this point, DO NOT press return. Wait for the busy light on the disk drive to go out then press RST/Ø and Ø simultaneously on the H8 front panel. Press the GO (4) key on the H8 front panel to boot the 48K CP/M system.

```
48K MAGNOLIA MICROSYSTEMS CP/M ON HEATH H8
BY: D-G ELECTRONIC DEVELOPMENTS CO.
VERSION 2.21 [ 2 MHz ]

A>
```

You now have a working copy of 48K CP/M. Mark your disk "48K", and make a back-up copy of this 48K system diskette for safety.

CREATING A WORKING COPY OF AN APPLICATION DISKETTE

This procedure will allow you to creat a "bootable" working copy of any additional distribution diskettes that you purchase. Remember that you should always keep distribution diskettes WRITE PROTECTED, so that you have a usable backup in case of error.

You should first make a working copy of your new distribution diskette using "ONECOPY" or "COPY ALL" as described previously. Always place the required copyright notices on all copies and only make copies for your own use. Return the distribution copy to a safe place.

Now use SYSGEN to place a copy of your CP/M system on the working diskette:

```
A>SYSGEN(cr)
DG SYSGEN, VERSION 2.Ø
SOURCE DRIVE NAME (OR RETURN TO SKIP)>A
SOURCE ON A THEN PRESS RETURN>(insert working CP/M diskette in A:)(cr)
FUNCTION COMPLETE (CP/M system is read into memory from A:)
DESTINATION DRIVE NAME (OR RETURN TO REBOOT)A
DESTINATION ON A THEN TYPE RETURN>(insert new diskette in A:)(cr)
FUNCTION COMPLETE (CP/M system has been placed on new diskette)
DESTINATION DRIVE NAME (OR RETURN TO REBOOT)(cr)
A>
```

You should now use "FILECOPY" (or "PIP" if you have more than one drive) to place the CP/M utilities you need on your new diskette. These may include:

STAT.COM
FORMAT.COM
FILECOPY.COM and/or PIP.COM
ONECOPY.COM and/or COPY.COM

Instructions for using these utilities are given in elsewhere in this manual, except in the case of "PIP" which is described in the Digital Research manual "INTRODUCTION TO CP/M FEATURES AND FACILITIES", Section 6.4, page 18.

NOTES ON MAGNOLIA MICROSYSTEM'S CP/M ON HEATH H8
by D-G ELECTRONIC DEVELOPMENTS CO.

This version of CP/M should run any "CP/M compatible" software without modification. However, the following should be kept in mind:

Z8Ø Interrupt Mode Ø (8Ø8Ø mode) must be selected if the disk system is to be used.

In addition to the WARM and BDOS vectors at Ø and 5, there is a JMP at 8 (RST 1) used for disk timing.

The disk system uses a delayed write method to speed disk access. A write-sector operation is delayed until either a READ sector, WRITE to a different (256 byte) sector, or the drive select times out. DO NOT REMOVE A DISKETTE UNTIL THE DRIVE SELECT LED IS OFF!

The MODEM port (ALTERNATE TERMINAL) is currently initialized to 3ØØ baud.

The LP port is initialized to 48ØØ baud and configured for an H14 printer.

The CRT port is initialized to 96ØØ baud.

The I/O section of the BIOS (USER AREA) is a file on the diskette that is loaded during cold boot. The file is stored under USER# 15 (USER.SYS).

The BIOS requires 3.25K (13 pages) so in a 64K system (top of RAM at FFFF) the BIOS begins at F2ØØ, the BDOS at E4ØØ (entry at E406) and the CCP at DCOO. USER begins at F98Ø.

The BDOS skews the sectors (tracks 3-39) in the following order: 1,2,9,1Ø,17,18,5,6,13,14,3,4,11,12,19,2Ø,7,8,15,16

The FPM/8Ø monitor is not available during operation of the system under CP/M.

Whenever ordering software for use under this Standard CP/M Operating System make sure that your software vendor knows and understands that you want the Standard version of the software (i.e. ORG = Ø1ØØH) and NOT the special modified version (ORG = 42ØØH).

The Lifeboat Associates Media Format Ordering Code for this CP/M is P7. Please be sure to specify this code when ordering software from them.

UTILITIES NOT DESCRIBED IN CP/M MANUALS

The following utilities are included on the distribution diskette but are not described in the DIGITAL RESEARCH CP/M manuals.

FORMAT.COM Formats (or erases) diskettes.

This utility formats a diskette and then reads each sector to verify that it has been properly formatted.

```
A>FORMAT B:(cr)
DG FORMAT VERS 2.2
INSERT BLANK DISK IN DRIVE B: AND PUSH RETURN >
```

At this point, insert a new diskette (or the diskette to be erased) into drive B: and push the RETURN key. Any errors that are detected after formatting will be reported as follows:

FORMAT ERROR TRACK xx SECTOR yy STATUS zz

Where xx and yy are the track and sector numbers in HEXADECIMAL and zz is the status in HEX coded as follows:

BIT:	7	6	5	4	3	2	1	Ø
STATUS:	-	-	-	-	fm	tØ	wp	ry

These status codes have the following meaning:

ry --- DRIVE READY if ry = "1"
wp --- Disk is WRITE PROTECTED if wp = "1"
tØ --- RECALIBRATE (SEEK TRACK Ø) failed if tØ = "1"
fm --- READ/WRITE operation was unsuccessful if fm = "1"

For example, "STATUS Ø9" would represent fm = "1", tØ = "Ø", wp = "Ø" and ry = "1". This would indicate a format error on the diskette.

If any errors occur, the program reports "DISK DID NOT FORMAT!" before prompting for another diskette. Push ↑C to return to CP/M (without rebooting).

WARNING: FORMAT will destroy any data on the diskette. Be sure you do not attempt to initialize a diskette whose data you wish to keep!

FILECOPY.COM Single drive file copier.

This utility copies a file using only one drive (A:). The program will prompt the user to alternately insert the SOURCE and DESTINATION diskettes so that data may be copied first from the source diskette into the computer memory and then from the computer memory to the destination diskette. Since the storage capacity of the diskette is much larger than that of the computer, several "exchanges" of the SOURCE and DESTINATION diskettes may be required. Therefore the user should be careful to keep track of which diskette is the SOURCE and which is the DESTINATION. When the file has been transferred, the program will prompt "INSERT SYSTEM DISK" at which time the user inserts the diskette with the CP/M system on it into the drive.

A>FILECOPY filename.type(cr)

DG FILECOPY VERS 2.2

INSERT SOURCE DISK, PUSH RETURN >(cr)
INSERT DESTINATION DISK, PUSH RETURN >(cr)

INSERT SYSTEM DISK, PUSH RETURN >(cr)
A>

ONECOPY.COM Single drive whole-disk copier

This utility copies the entire contents of one diskette using only one drive. Operation of this utility is similar to that of FILECOPY except that no filename.type is entered.

A>ONECOPY(cr)

DG ONECOPY VERS 2.2

INSERT SOURCE DISK, PUSH RETURN >(cr)

(etc.)

NOTE: The destination diskette must have been initialized (using FORMAT) at least once in order to use ONECOPY.

COPY.COM Two drive repeating diskette copier

This utility is adapted from DIGITAL RESEARCH'S "COPY". The following "entry parameters" are used:

```
"ALL"    --- Tracks Ø-39 will be copied
"DATA"   --- Only tracks 3-39 will be copied
"SYSTEM" --- Only tracks Ø-2 will be copied
```

NOTE: COPY SYSTEM will not copy the USER area of a diskette and therefore may not be used to 'SYSGEN" a diskette.

For example:

```
A>COPY SYSTEM(cr)

+COPY VERS 2.2
+SOURCE ON DRIVE A:
+BLANK ON DRIVE B:
+<RET> TO COPY, ↑C TO EXIT >↑C
A>
```

The program will report any "SOURCE" or "DESTINATION" errors and compares each track after write and reports any "COMPARE" errors. An error will abort the copy and prompt for new diskettes. The user should press <RET> to continue copying or ↑C to return to CP/M.

STAT.COM Logical/Physical I/O Assignments (IOBYTE)

The logical/physical I/O assignments are distributed are as follows:

```
CON: = TTY:   Modem Port                LST: = TTY:   Modem Port
       CRT: * H8 Console                       CRT:   H8 Console
       BAT:   Input=RDR:/Output=LST:           LPT: * LP Port
       UC1:   LP: Port                         UL1:   Null Device

RDR: = TTY: * Modem Port                PUN: = TTY: * Modem Port
       PTR:   Null Device                       PTP:   Null Device
       UR1:   H8 Console                        UP1:   H8 Console
       UR2:   LP Port                           UP2:   LP Port
```

The default assignments (marked by * above) may be changed by using STAT.COM as described in "INTRODUCTIN TO CP/M FEATURES AND FACILITIES" section 6.1, page 13.

IOBYTE may be found in MOVCPM at address 2167H or on the diskette at Track 2, Sector 8, Byte 67H and may be permanently altered if so desired. For example, to permanently set the console (CON:) to the LPT: device the user would type at the A> prompt:

```
A>DDT MOVCPM.COM(cr)
DDT VERS 2.2
NEXT PC
2AØØ Ø1ØØ
-S2167(cr)
2167 81 83(cr)
2168 32 .
-GØ
A>SAVE 46 MOVCPM.COM
```

This change will not become effective until a MOVCPM and SYSGEN are performed. Note that this modification of IOBYTE may also be performed directly on the diskette by using the P/DUMP utility described elsewhere in this manual. DO NOT MAKE MODIFICATIONS ON YOUR DISTRIBUTION DISKETTE USING P/DUMP!

P/DUMP

P/DUMP may be used to dump any CP/M file to the console in a format similar to that used by the DDT DUMP command. In addition, any sector or group of sectors may be dumped in the same format and editted.

The program may be called by typing either P/DUMP followed by the file name or the track and sector(s) to be dumped or may be called by simply typing P/DUMP. In the first case, a file may be dumped by typing:

```
P/DUMP FILE.TYPE(cr)
P/DUMP A: FILE.TYPE(cr)
P/DUMP B: FILE.TYPE(cr)
```

while in the second case, typing P/DUMP will cause the program to type a heading followed by the prompt character '*" :

```
P/DUMP(cr)

CP/M DUMP UTILITY VERS 1.3

*
```

at which time the user may respond with the file to be dumped as follows:

```
*FILE.NAME(cr)
*A:FILE.NAME(cr)
*B:FILE.NAME(cr)
```

P/DUMP may also be used to dump disk sectors directly, dump any CP/M eight sector group, a map of the group allocations for the entire diskette or the directory sorted alphabetically:

```
P/DUMP TRACK 5 SECTOR 4(cr)
P/DUMP TRACK 5 SECTOR 2-5(cr)
P/DUMP TRACK 5(cr)          (Dumps all sectors on TRACK 5)
P/DUMP GROUP 19(cr)
P/DUMP MAP(cr)
P/DUMP DIR(cr)              (Dumps Directory)
```

The following abbreviations may be used for TRACK, SECTOR and GROUP:

```
P/DUMP T 5 S 4(cr)
P/DUMP T 5 S 2-5(cr)
P/DUMP G 19
```

Note that the only required spaces occur after the words TRACK AND SECTOR or T and S and after the word P/DUMP. Additional spaces will usually be ignored.

The limited editing feature of P/DUMP allows changing of data on a diskette and works as follows. Any single sector on either drive may be edited by requesting display of the sector followed by the word EDIT:

P/DUMP B:TRACK 4 SECTOR 2 EDIT(cr)

The requested sector will now be displayed followed by an EDIT prompt:

EDIT-

Enter the address of the first byte to be changed. The program will respond by displaying the address and the current contents of that address in a format similar to the 'S' entry feature of DDT. The contents of the address may be changed by typing the new byte (in HEX) followed by a carriage return. The program will then display the next address and its contents. If no change is to be made at an address, type only a carriage return. When the required changes have been made, type a period and the program will redisplay the sector showing the changes made (but will not write the sector back to the diskette).

When editing is complete, type a period to redisplay the sector and in response to the EDIT- prompt type:

WRITE (Writes the modified sector back to the diskette)

or

STOP (Stops editing without writing back to the diskette)

Remember that all EDIT entries must be made in hexadecimal. In addition, the permissable address range is ØØØØ to ØØ7F and larger address values will give an error message. When entering a group of bytes, the addresses are computed modulo 128 so that the next address after ØØ7F is ØØØØ.

WARNING: Care must be exercised when using the EDIT feature of P/DUMP as it is possible to render a file inoperative if the wrong changes are made.

An additional feature of P/DUMP is the ability to "validate" a diskette:

P/DUMP VALIDATE(cr)
P/DUMP A:VALIDATE(cr)
P/DUMP B:VALIDATE(cr)

The VALIDATE command causes the entire diskette to be read one sector at a time and reports the sector number of any sector causing a read error.

MODIFYING SYSTEM CONFIGURATION

NOTICE: ANY CHANGES MADE IN "MOVCPM.COM" WILL NOT BE EFFECTIVE UNTIL A NEW SYSTEM IS CREATED AND SYSGEN'D. REFER TO THE DIGITAL RESEARCH MANUAL "INTRODUCTION TO CP/M FEATURES AND FACILITIES", SECTION 6.9 FOR DETAILS.

CHANGING DEVICE DRIVERS

A 64Ø byte portion of the BIOS called the "USER AREA" contains all Logical and Physical device drivers and may be entered via a jump table. The source code for the User Area may be found on the distribution diskette as "USER.ASM".

The device drivers in the USER AREA may be changed by editing the file "USER.ASM" and assembling it for a specific memory size. Note that the resulting code may not take over 64Ø bytes. Following assembly, generate (using "MOVCPM") an image of CP/M for that memory size and save it as CPMxx.COM (where xx is the memory size). Finally, load the image under DDT and overlay your user code using the BIAS given in the assembler listing.

The following example assumes that the above procedure has been completed:

```
A>DDT CPM32.COM(cr)
DDT VERS 2.2
NEXT  PC
2AØØ Ø1ØØ
-IUSER.HEX(cr)
-Rxxxx(cr) (The address xxxx is obtained from the USER area assembly listing.)
NEXT  PC
29ØØ ØØØØ
- ↑C

A>SYSGEN(cr)
SYSGEN VER 2.Ø
SOURCE DRIVE NAME (OR RETURN TO SKIP)(cr) (skip, system already in memory)
DESTINATION DRIVE NAME (OR RETURN TO REBOOT)A(cr)
DESTINATION ON A THEN TYPE RETURN(cr)
FUNCTION COMPLETE (new system has been placed on diskette)
DESTINATION ON A: THEN TYPE RETURN (do NOT type RETURN!)
```

At this point, wait for the LED on the disk drive door to go out and then simultaneously press the "Ø" and "RST Ø" keys on the H8 front panel. Now press the "GO" (4) key on the front panel and the system should boot and display the usual sign-on message:

```
32K MAGNOLIA MICROSYSTEMS CP/M ON HEATH H8
BY: D-G ELECTRONIC DEVELOPMENTS CO.
VERSION 2.21

A>
```

Your reconfigured system is now up and running.

CHANGING SYSTEM DEFAULT BAUD RATES

The devices supported by this version of CP/M and the default baud rates for these devices are as follows:

DEVICE	PORT	BAUD RATE
CRT:	35ØQ (E8H)	96ØØ
LPT:	34ØQ (EQH)	48ØØ
TTY:	33ØQ (D8H)	3ØØ
NULL DEV	N/A	N/A

These baud rates may be changed by the following procedure:

A>DDT MOVCPM.COM(cr)
DDT VERS 2.2
NEXT PC
2FØØ Ø1ØØ
-Saaaa(cr) (Where aaaa is the appropriate address from Table 1)
aaaa xx yy(cr) (where yy and zz are the 1st and 2nd bytes for the desired
aaab xx zz(cr) baud rate from Table 2 and zz represents the original values
aaac xx .(cr) at the locations aaaa, aaab, etc.
-↑C
A>SAVE 46 MOVCPM.COM(cr) (Save new version)
A>MOVCPM nn * (Where "nn" represents the memory space of your system)

CONSTRUCTING nnK MAGNOLIA MICROSYSTEMS CP/M ON HEATH H8
READY FOR "SYSGEN" OR
"SAVE 41 CPM32.COM"
A>SYSGEN(cr)
DG SYSGEN, VERSION 2.Ø
SOURCE DRIVE NAME (OR RETURN TO SKIP)(cr) (System already in memory)
DESTINATION DRIVE NAME (OR RETURN TO REBOOT)A(cr)
DESTINATION ON A, THEN TYPE RETURN(cr)
FUNCTION COMPLETE
DESTINATION DRIVE NAME (OR RETURN TO REBOOT) (Do NOT type RETURN)

At this point, wait for the LED on the disk drive door to go out and then simultaneously press the "Ø" and "RST/Ø" keys on the H8 front panel. Now press the "GO" (4) key on the front panel. The system should boot and display the usual sign-on message on the console.

Your baud rate change has now been implemented.

TABLE 1:

DEVICE	ADDR (aaaa)
CRT:	279B
LPT:	279D
TTY:	279F

TABLE 2:

BAUD RATE	1ST BYTE	2ND BYTE
3ØØ	8Ø	Ø1
6ØØ	CØ	ØØ
12ØØ	6Ø	ØØ
24ØØ	3Ø	ØØ
48ØØ	18	ØØ
96ØØ	ØC	ØØ
192ØØ	Ø6	ØØ
38400	Ø3	ØØ

DISK DRIVE STEP RATE

This version of CP/M is distributed with the disk drive step rate set to 3Ø ms. If the user determines (using the HDOS utility "TEST" or by some other means) that his drives will step faster than this, he may change the step rate using DDT as follows:

```
A>DDT MOVCPM.COM(cr)
DDT VERS 2.2
NEXT  PC
2FØØ Ø1ØØ
-S2Ø34(cr)
2Ø34 ØF xx (Where xx is the appropriate value from Table 3 below)
2Ø35 ØØ .
-↑C
A>SAVE 46 MOVCPM.COM(cr)
A>MOVCPM 32 *

CONSTRUCTING 32K MAGNOLIA MICROSYSTEMS CP/M ON HEATH H8
READY FOR "SYSGEN" OR
"SAVE 41 CPM32.COM"
A>SYSGEN
DG SYSGEN, VERSION 2.Ø
SOURCE DRIVE NAME (OR RETURN TO SKIP)(cr) (skip, system already in memory)
DESTINATION DRIVE NAME (OR RETURN TO REBOOT)A(cr)
DESTINATION ON A, THEN TYPE RETURN(cr)
FUNCTION COMPLETE (new system has been placed on diskette)
DESTINATION DRIVE NAME (OR RETURN TO REBOOT) (Do NOT type return)
```

At this point, wait for the LED on the disk drive door to go out and then simultaneously press the "Ø" and "RST/Ø" keys on the H8 front panel. Now press the "GO" (4) key on the front panel. The system should boot and display the usual sign-on message on the console.

TABLE 3: PATCH VALUES FOR VARIOUS STEP RATES

STEP RATE (MS)	VALUE	STEP RATE (MS)	VALUE
4	Ø2	18	Ø9
6	Ø3	2Ø	ØA
8	Ø4	22	ØB
1Ø	Ø5	24	ØC
12	Ø6	26	ØD
14	Ø7	28	ØE
16	Ø8	3Ø	ØF

CHANGING THE DISTRIBUTION BAUD RATE

The D-G version of CP/M is distributed with the console terminal baud rate set to 96ØØ baud. If your console terminal is not capable of operation at 96ØØ baud, this procedure may be used to patch your diskette from the front-panel before booting the diskette. It is strongly recommended that you make a copy of your distribution diskette using one of the HDOS compatible copying routines such as FTCOPY, DUP, COPYER or equivalent and then apply this front-panel patch to the copy. If at all possible, do not apply this front-panel patch to your distribution diskette. If you must patch your distribution diskette, CAREFULLY perform the following procedure and double-check each step BEFORE and AFTER it is performed.

Enter the following program using the front-panel keypad (FPM/8Ø):

MEMORY ADDRESS	CONTENTS	MEMORY ADDRESS	CONTENTS
Ø42 2ØØ	Ø76	Ø42 24Ø	Ø43
Ø42 2Ø1	311	Ø42 241	373
Ø42 2Ø2	Ø62	Ø42 242	166
Ø42 2Ø3	1Ø7	Ø42 243	Ø42
Ø42 2Ø4	Ø37	Ø42 244	Ø33
Ø42 2Ø5	315	Ø42 245	Ø43
Ø42 2Ø6	Ø2Ø	Ø42 246	361
Ø42 2Ø7	Ø37	Ø42 247	Ø62
Ø42 21Ø	Ø21	Ø42 25Ø	Ø1Ø
Ø42 211	ØØØ	Ø42 251	Ø4Ø
Ø42 212	Ø43	Ø42 252	Ø21
Ø42 213	ØØ1	Ø42 253	ØØØ
Ø42 214	ØØØ	Ø42 254	Ø43
Ø42 215	ØØ1	Ø42 255	ØØ1
Ø42 216	Ø41	Ø42 256	ØØØ
Ø42 217	125	Ø42 257	ØØ1
Ø42 22Ø	ØØØ	Ø42 26Ø	Ø41
Ø42 221	257	Ø42 261	125
Ø42 222	315	Ø42 262	ØØØ
Ø42 223	316	Ø42 263	Ø76
Ø42 224	Ø33	Ø42 264	ØØ1
Ø42 225	363	Ø42 265	315
Ø42 226	Ø72	Ø42 266	316
Ø42 227	Ø1Ø	Ø42 267	Ø33
Ø42 23Ø	Ø4Ø	Ø42 27Ø	363
Ø42 231	365	Ø42 271	257
Ø42 232	257	Ø42 272	Ø62
Ø42 233	Ø62	Ø42 273	Ø1Ø
Ø42 234	Ø1Ø	Ø42 274	Ø4Ø
Ø42 235	Ø4Ø	Ø42 275	373
Ø42 236	Ø52	Ø42 276	166
Ø42 237	Ø33		

NOW GO BACK AND DOUBLE CHECK THE ENTRY OF THE ABOVE PROGRAM!!!

Set the program counter register (Pc) on the front-panel to'Ø42 2ØØ' and then set the front-panel to display the 'HL' register-pair.

Insert your COPY of the distribution diskette (or the distribution diskette if and only if you do not have access to a 'whole-disk' copying routine) into SYØ: (Drive A:) and press the 'GO' (4) key on the front-panel.

At this point, the program will read the appropriate portion of the USER area on the diskette, load the 'HL' register pair with the baud rate constants for the console-terminal and HALT.

You must now refer to the table below and choose the baud rate constants for the baud rate required by your console-terminal. Enter these values into the 'HL' register-pair using the front-panel.

Double-check the baud rate constants entered into the 'HL' register-pair and when you are sure they are correct, press the 'GO' (4) key on the front-panel.

The program will now patch your chosen baud rate constants onto the copy of your distribution diskette and HALT.

You should now remove your diskette from the drive and procede to the "BOOT PROCEDURE" section of this manual.

TABLE 4: BAUD RATE CONSTANTS

BAUD RATE	H	L
3ØØ	ØØ1	2ØØ
6ØØ	ØØØ	3ØØ
12ØØ	ØØØ	14Ø
24ØØ	ØØØ	Ø6Ø
48ØØ	ØØØ	Ø3Ø
96ØØ	ØØØ	Ø14
192ØØ	ØØØ	ØØ6

NOTE: This procedure should only be used with the D-G FPM/8Ø monitor package or equivalent.

PRINTER INTERFACING

The standard CP/M physical I/O routines (see USER.ASM on the distribution diskette) are designed to utilize hardware handshaking with peripherals. When data is to be written to the printer, the MODEM Status Register of the 825Ø ACE (H8-4 Serial Interface Card) is checked by CTLST to determine when the data may be transmitted. This is accomplished by 'ANDING' the MODEM Status Register byte with the 2nd byte of LPTCTL and then comparing the result with the 1st byte. LPTCTL may be altered and the USER source reassembled for compatibility with various printers. The following printers may be used with this version of CP/M using the "standard" cables available from Heath:

H14	LPTCTL:	1st Byte (Compare)	6ØH
		2nd Byte (And)	7ØH
TI81Ø	LPTCTL:	1st Byte (Compare)	6ØH
		2nd Byte (And)	7ØH
LA34, LA36	LPTCTL:	1st Byte (Compare)	ØØH
		2nd Byte (And)	ØØH
TI82Ø	LPTCTL:	1st Byte (Compare)	4ØH
		2nd Byte (And)	5ØH

For other printers, refer to the manufacturer's operation manual and the Heath H8-4/WH8-4 manual for required cable and software modification.

NOTE: As distributed, this version of CP/M is set up for use with the Heath H14 or TI81Ø printer.

2 Ms CLOCK

The 2 MS clock (TICCNT) may be accessed using the following routine:

```
LHLD    1
LXI     D,Ø6E6H
DAD     D
MOV     A,M
INX     H
MOV     H,M
MOV     L,A
```

At the completion of this code, the (HL) register will contain the value held in TICCNT. The TICCNT area is located Ø6E9H bytes from the beginning of the BIOS. This is the only manner in which the user should access TICCNT. There is currently no facility for user processing of clock interrupts and the user is warned that overlaying of the clock vector at ØØØ8H will cause CP/M to crash if any disk access is attempted.

DISK TRACK/SECTOR ALLOCATION TABLE

Track#	Sector#	Memory Address	CP/M Module Name
Ø2	Ø1	228Ø	Cold Start Loader
ØØ	Ø2	1DØØ+b	CCP
ØØ	Ø3	1D8Ø+b	"
ØØ	Ø4	1EØØ+b	"
ØØ	Ø5	1E8Ø+b	"
ØØ	Ø6	1FØØ+b	"
ØØ	Ø7	1F8Ø+b	"
ØØ	Ø8	2ØØØ+b	"
ØØ	Ø9	2Ø8Ø+b	"
ØØ	1Ø	21ØØ+b	"
ØØ	11	218Ø+b	"
ØØ	12	22ØØ+b	"
ØØ	13	228Ø+b	"
ØØ	14	23ØØ+b	"
ØØ	15	238Ø+b	"
ØØ	16	24ØØ+b	"
ØØ	17	248Ø+b	"
ØØ	18	25ØØ+b	"
ØØ	19	258Ø+b	BDOS
ØØ	2Ø	26ØØ+b	"
Ø1	Ø1	268Ø+b	BDOS
Ø1	Ø2	27ØØ+b	"
Ø1	Ø3	278Ø+b	"
Ø1	Ø4	28ØØ+b	"
Ø1	Ø5	288Ø+b	"
Ø1	Ø6	29ØØ+b	"
Ø1	Ø7	298Ø+b	"
Ø1	Ø8	2AØØ+b	"
Ø1	Ø9	2A8Ø+b	"
Ø1	1Ø	2BØØ+b	"
Ø1	11	2B8Ø+b	"
Ø1	12	2CØØ+b	"
Ø1	13	2C8Ø+b	"
Ø1	14	2DØØ+b	"
Ø1	15	2D8Ø+b	"
Ø1	16	2EØØ+b	"
Ø1	17	2E8Ø+b	"
Ø1	18	2FØØ+b	"
Ø1	19	2F8Ø+b	"
Ø1	2Ø	3ØØØ+b	"

Track#	Sector#	Memory Address	CP/M Module Name
Ø2	Ø1	3Ø8Ø+b	BDOS
Ø2	Ø2	31ØØ+b	"
Ø2	Ø3	318Ø+b	"
Ø2	Ø4	32ØØ+b	"
Ø2	Ø5	328Ø+b	"
Ø2	Ø6	33ØØ+b	BDOS
Ø2	Ø7	338Ø+b	BIOS
Ø2	Ø8	34ØØ+b	"
Ø2	Ø9	348Ø+b	"
Ø2	1Ø	35ØØ+b	"
Ø2	11	358Ø+b	"
Ø2	12	36ØØ+b	"
Ø2	13	368Ø+b	"
Ø2	14	37ØØ+b	"
Ø2	15	378Ø+b	"
Ø2	16	38ØØ+b	"
Ø2	17	388Ø+b	"
Ø2	18	39ØØ+b	"
Ø2	19	398Ø+b	"
Ø2	2Ø	3AØØ+b	"
Ø3	1-16		Directory*
Ø3	17-2Ø		Data*
Ø4	1-2Ø		"
'	'		"
'	'		"
39	1-2Ø		Data

* The system I/O portion of the BIOS (USER AREA) is contained on the diskette in a file named USER.SYS under USER #15 and loaded during a cold boot into 64Ø bytes immediately following BIOS.

```
**************************************
* FUNCTION 37:  RESET DRIVE          *
*                                    *
**************************************
* Entry Parameters:                  *
*     Register   C:  25H             *
*     Register  DE:  Drive Vector    *
*                                    *
* Returned Value  :                  *
*     Register   A:  ØØH             *
**************************************
```

The RESET DRIVE function allows resetting of specified drive(s). The passed parameter is a 16 bit vector of drives to be reset, the least significant bit is drive A:.

In order to maintain compatibility with MP/M, CP/M returns a zero value.

```
**************************************
* FUNCTION 4Ø:  WRITE RANDOM WITH    *
*                  ZERO FILL         *
**************************************
* Entry Parameters:                  *
*     Register   C:  28H             *
*     Register  DE:  FCB Address     *
* Returned Value:                    *
*     Register   A:  Return Code     *
**************************************
```

The WRITE RANDOM WITH ZERO FILL operation is similar to FUNCTION 34: with the exception that a previously unallocated block is filled with zeros before the data is written.