Installabe BIOS (IBIOS)

Software Package

User Reference Manual

MORROW DESIGNS Ω

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User Reference Guide

Table of Contents

List of Figures

List of Tables

1. INSTALLABLE BIOS SOFTWARE PACKAGE

The Installable BIOS (IBIOS) is a software package that allows the installation of one or more of Morrow Designs disk controller products in a foreign S-100 bus environment. This package assumes that the user already has a running S-100 CP/M-based system, and is familiar enough with the CP/M operating system to perform the procedures necessary to add on a Morrow Designs disk system.

The first part of this section demonstrates how to add preconfigured disk system software to the user's existing system. The second part demonstrates how to reconfigure the IBIOS source file to generate a custom disk configuration. The latter procedure requires the MAC Assembler (from Digital Research), not included with the IBIOS package.

The IBIOS can be configured to run with the following devices:

HDCA   hard disk controller for 8 and 14 inch (10, 20 and 26 megabyte) hard disk drives.

HDC/DMA   hard disk controller for 5 1/4 inch (5, 10 or 16 megabyte) hard disk drives.

DJ/DMA   floppy disk controller for 8 and 5 1/4 inch floppy disk drives.

DJ 2D/B   floppy disk controller for 8 inch floppy disk drives.

The steps for configuring a system with the INSTALL program include:

1)   Boot the system and note size in kilobytes (kbytes).

2)   Determine the length of disk driver file to be installed (also in kbytes).

3)   Subtract the length of the driver file from the current system size.

4)   Create a new CP/M system using the size obtained from step 3.

5)   Reboot the system and check that it is running at the new size calculated in step 3.

6)   Determine the first available memory location above new system.

7)   Use the INSTALL.COM program (included with the package) to install the new drivers using the memory location given.

Two tables have been included at the end of this section to help you in these procedures. Table 1-1, Drive Configuration Files, lists several common drive-types with a corresponding driver and the length of the driver file. The length of the file is the subtraction factor used to determine the new size of the system to be configured.

The 1BIOS software is physically relocated above the current CP/M system, but below the end of memory. Thus, the user must provide space (typically 4 kbytes) for the new disk drivers. (See Figure 1-1 for an illustration of this concept.)

Table 1-2, System Sizes and Memory Location Addresses, lists the ending hex address for common CP/M system sizes. Once you have determined your new system size, use this table to determine the address where the new drivers will be installed.

Since the new drivers reside above the existing system drivers, they are only temporarily "patched" into the system and must be installed each time the system is booted. (Often times "AUTO" command line features are included with systems. Users with such systems are encouraged to take advantage of these features so the disk drivers will automatically be installed each time the system is booted.)

1.1. Adding Preconfigured Driver Files

This section demonstrates how to add a preconfigured driver file (file with .PRL extension) to an existing CP/M system.

In this example, we will add a DJDMA controller and four 8 inch floppy disk drives. After checking Table 1-1, we find that we need to use the DJDMA8.PRL driver.

1. Our first step is to determine the present size of the system's CP/M (usually displayed when the system is booted up). Let's say that our current CP/M size is 62k.

2. The length of the DJDMA8.PRL driver we want to use is 4k bytes long. This value was obtained from the Length column in Table 1-1.

3. Next, subtract the length of the .PRL file from the current system size:

$$62 - 4 = 58$$

    The result is the size of the system needed in order to provide room for the new disk drivers, which will be placed above the current system. New system sizes are created by the MOVCPM program.

It is recommended that the new system be copied onto a blank, formatted diskette. Once you are sure your new system size is correct, this diskette can then become the new system diskette.

4. Determine what drive new system is to be copied on, then enter the following to generate a 58k CP/M system

        A>**MOVCPM 58 * [RET]**

and press the RETURN (⌊RET⌋) key. The following is displayed:

        Constructing 58K CP/M
        Ready for "sysgen" or
        "save 48 cpm58.com"

Enter the SYSGEN program to write the new system size onto a diskette by entering

        A>**SYSGEN ⌊RET⌋**

which returns the following prompts:

        SYSGEN Version n.n.
        Source drive name (or <RETURN> if in memory)

MOVCPM placed the new system size in memory (RAM), so press the RETURN key. The next prompt asks:

        Destination drive name (or <RETURN> to warm boot)

Enter the address of the drive to receive the new system size (floppy drive B in this example), which returns:

        Destination on B:, type <RETURN>

        Function complete
        Destination drive name (or <RETURN> to warm boot)

The last prompts offer you a chance to copy the new system onto another drive. Press the RETURN key to warm boot the system and continue with this procedure.

5. Use the diskette you just made to boot your system now.   It should greet you with a header designating your new system size. As an example:

        58K CP/M, Version 2.2

        A>

Be sure to copy your new system onto another diskette to use as a backup.

1.2. Using INSTALL.COM to Integrate the Drivers

INSTALL.COM expects the following command line format:

    INSTALL [flag] FILENAME.PRL ADDRESS

In this application, [flag] is an optional drive designation; unless specified, the drivers are loaded into the highest possible drive locations. The name of the file is entered after this argument, followed by the address where the file will be placed in the system.

For a 58k system size, the first available memory location above the system is e800. This address was determined by checking Table 1-2 at entry 58. This address is entered as part of the command line when using INSTALL.COM to integrate the .PRL file into the operating system (located in RAM).

The following figure illustrates how CP/M will look once INSTALL has integrated the new drivers:
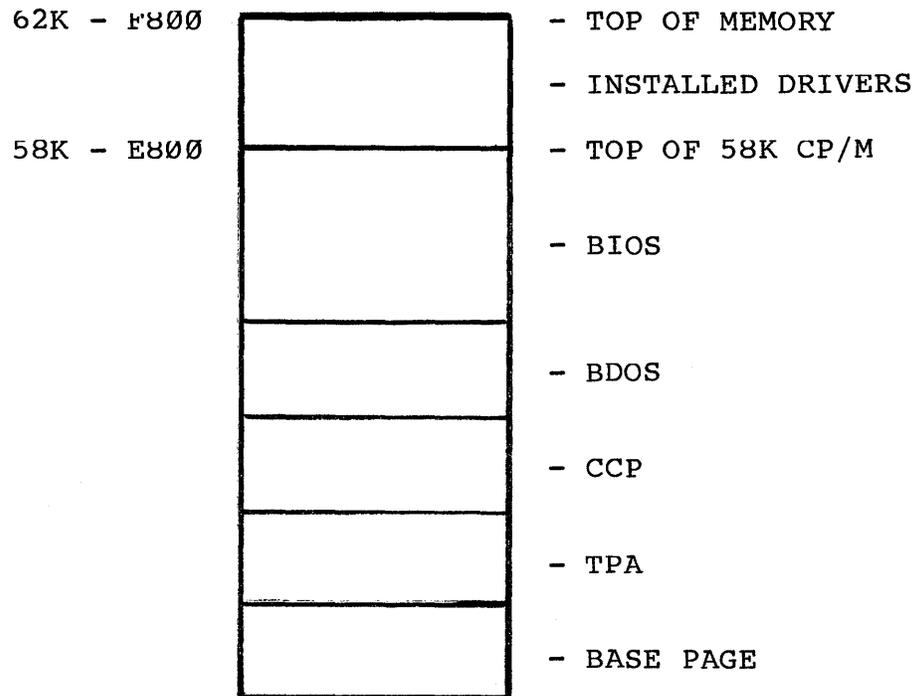
```
62K - F800  ┌──────────────┐  - TOP OF MEMORY
            │              │
            │              │  - INSTALLED DRIVERS
            │              │
58K - E800  ├──────────────┤  - TOP OF 58K CP/M
            │              │
            │              │
            │              │  - BIOS
            │              │
            ├──────────────┤
            │              │
            │              │  - BDOS
            │              │
            ├──────────────┤
            │              │
            │              │  - CCP
            │              │
            ├──────────────┤
            │              │
            │              │  - TPA
            │              │
            ├╌╌╌╌╌╌╌╌╌╌╌╌╌╌┤
            │              │
            │              │  - BASE PAGE
            └──────────────┘
```

Fig. 1-1: Map of RAM with 62K CP/M System and 4K Drivers Installed

The install drivers will print a list of the new drive configuration on the terminal screen when it is installed. To demonstrate, if the DJDMA8.PRL file was installed for drive E:

    A>INSTALL -E DJDMA8.PRL E800 [RET]

the following list would be displayed:

```
A: Host system drive A:
B: Host system drive B:
C: Host system drive C:
D: Host system drive D:
E: DJDMA 8" drive 0
F: DJDMA 8" drive 1
G: DJDMA 8" drive 2
H: DJDMA 8" drive 3
I: Host system drive E:
J: Host system drive F:
K: Host system drive G:
L: Host system drive H:
M: Host system drive I:
N: Host system drive J:
O: Host system drive K:
P: Host system drive L:

A>
```

Fig. 1-2: On-Screen Drive Configuration List

Note that the -E argument given in the INSTALL command line forced the new drives to be addressed starting at drive E:. If this argument had not been given, the drives would have been addressed at the highest possible location. In the case of a four drive program like DJDMA8.PRL, these locations would be drives M:, N:, O:, and P:, with drive P: being the highest drive name that CP/M allows.

Other lines in the list show the location of the user's drives. Note that the newly installed drives were inserted into the user's system drive names and that the user's system has lost the use of drives M:, N:, O:, and P:. When installing a hard disk system, it is often convenient to install the hard disk as drive A:.

1.3. Additional Examples

To install the HDDMA controller with an M5 hard disk into an existing 64K floppy system, the command line would be:

    A>INSTALL -A M5.PRL F000 [RET]

This command line would install the hard disk as drive A: and the user's floppies would be addressed as drives B:, C:, D:, E:, etc.

Once the user has become used to the new drive configuration, the list can be disabled by following the starting drive argument with an X.

5

For example, the two command lines shown previously would now be typed as:

    A>INSTALL -EX DJDMA8.PRL E800 [RET]

to install the floppies at drive E:.

    A>INSTALL -AX M5.PRL F000 [RET]

to install the hard disk as drive A:.

Table 1-1: Drive Configuration Files

The following table lists the drive configurations included on the Morrow Designs' IBIOS diskette and includes a description of the driver files and their length, and the controllers and drive "block address" (AB:,E:, etc.) they address:

Driver	Kbyte Length	System
djdma5.prl	3	For a DJDMA + four 5 1/4" disks ABCD: DJDMA 5 1/4"
djdma8.prl	4	For a DJDMA + four 8" disks ABDC: DJDMA 8"
djdma58.prl	5	For a DJDMA + four 5 1/4" & four 8" disks ABCD: DJDMA 5 1/4", EFGH: DJDMA 8"
djdma85.prl	5	For a DJDMA + four 8" & four 5 1/4" disks ABCD: DJDMA 8", EFGH: DJDMA 5 1/4"
m5.prl	4	For a HDDMA + 1 Seagate ST506 5 mbyte drive A: HDDMA M5
m10.prl	4	For a HDDMA + 1 Seagate ST412 10 mbyte drive AB: HDDMA M10
m16.prl	4	For a HDDMA + 1 CMI CM5619 16 mbyte drive AB: HDDMA M16
(4)m5.prl	4	For a HDDMA + 4 Seagate ST506 drives ABCD: HDDMA (4)M5
(4)m10.prl	5	For a HDDMA + 4 Seagate ST412 drives ABCDEFGH: HDDMA (4)M10
(4)m16.prl	6	For a HDDMA + 4 CMI CM5619 drives ABCDEFGH: HDDMA (4)M16

Table 1-2: System Sizes and Memory Location Addresses

The following table lists some common CP/M system sizes in kilo-bytes and the hexadecimal address of the first memory location available for installing the driver file.

Size	Address	Size	Address	Size	Address	Size	Address
24	6000	35	8c00	57	e400	56	e000
25	6400	36	9000	46	b800	58	e800
26	6800	37	9400	47	bc00	59	ec00
27	6c00	38	9800	48	c000	60	f000
28	7000	39	9c00	49	c400	61	f400
29	7400	40	a000	50	c800	62	f800
30	7800	41	a400	51	cc00	63	fc00
31	7c00	42	a800	52	d000		
32	8000	43	ac00	53	d400		
33	8400	44	b000	54	d800		
34	8800	45	b400	55	dc00		

Table 1-3: IBIOS Files

The following is a list and description of the files found on the IBIOS diskette:

File	Description
formatdj.asm	Source code for FORMATDJ.COM
formatdj.com	Format program for DJDMA controller
formatmw.com	Format program for HDDMA controller
formatmw.doc	Documentation for FORMATMW.COM
ibios.asm	Main install driver source code
install.com	Relocatable BIOS module installer
install.doc	Documentation for INSTALL.COM
makeprl.com	Relocatable module generator
makeprl.doc	Documentation file for MAKEPRL.COM
makeprl.sub	SUBMIT file for creating PRL configurations
notes.doc	Notes on the IBIOS and custom configuration
prl.doc	Documentation about PRL files

2. CUSTOM CONFIGURATIONS

If your desired system configuration is not listed in the driver configuration table, you will need to edit the IBIOS.ASM file and make a custom .PRL file. This requires the MAC Assembler, which is not included on the CP/M system diskette, but may be easily purchased from a software house that sells CP/M programs.

The following table of equates is a sample taken from an IBIOS.ASM file to show you the types of drives that may be used and their logical order within the system.

```
**********************************************************************
*                                                                    *
* The following equates set up the disk systems to be included       *
* along with the types of drives and the logical order of the        *
* drives.                                                            *
*                                                                    *
**********************************************************************

    maxhd   equ     0       ;Set to number of HDC3 hard disk drives
    maxmw   equ     1       ;Set to number of HDDMA hard disks
    maxfd   equ     0       ;Set to number of 2D/B floppies
    maxdm   equ     0       ;Set to number of DJ DMA floppies 8 inch
    maxmf   equ     0       ;Set to number of DJ DMA floppies 5 1/4 inch

    hdorder equ     0       ;Set the order of logical drives ELSE 0 if
    mworder equ     1       ;    not included
    fdorder equ     0
    dmorder equ     0
    mforder equ     0
                            ;HDC3 controller disk drives. Set only one
    M26     equ     0       ;Shugart SA4000
    M20     equ     0       ;Fujitsu M2302B
    M10F    equ     0       ;Fujitsu M2301B
    M10M    equ     0       ;Memorex

                            ;HDDMA controller disk drives. Set only one
    st506   equ     1       ;Seagate ST-506
    st412   equ     0       ;Seagate ST-412
    cm5619  equ     0       ;CMI CM-5619
```

Fig. 2-1: Disk System Equates Table

In this table, the system is configured for one HDC/DMA controller with one Seagate 5 megabyte (ST-506) 5 1/4 inch hard disk drive. To change this configuration for four 8 inch floppy disk drives with a DJDMA controller and replace the Seagate with a 16 megabyte hard disk (CM-5619), we would begin by entering:

        A>PIP CUSTOM.ASM = IBIOS.ASM[V] [RET]

to make a copy of the source file, then edit the CUSTOM.ASM file for the desired configuration.

Three tables of equates are edited in the IBIOS.ASM file - one that sets the amount of drives connected to one controller, one that sets the order of the drives and one that specifies the type of drive being connected. They should look like this when you are done:

Drives per controller:

```
maxhd    equ    0        ;Set to number of HDC3 hard disk drives
maxmw    equ    1        ;Set to number of HDDMA hard disks
maxfd    equ    0        ;Set to number of DJ2D/B floppies
maxdm    equ    4        ;Set to number of DJDMA 8" floppies
maxmf    equ    0        ;Set to number of DJDMA 5 1/4" floppies
```

Drive order:

```
hdorder equ    0        ;Set the order of logical drives ELSE 0
mworder equ    1        ;if not included.
fdorder equ    0
dmorder equ    2
mforder equ    0
```

Drive types:

```
                        ;HDDMA controller disk drives. Set only one
st506    equ    0        ;Seagate ST-506
st412    equ    0        ;Seagate ST-412
cm5619   equ    1        ;CMI CM-5619
```

Any word processing or text editing program may be used. Such programs with global search and replace functions would make this procedure easier. Note that a "0" turns off the functions in this table and that changing a "0" to a number sets the amount, order, etc. for the function desired.

This completes the "customization" phase of this process. Next you need to make the relocatable .PRL module file.

Assemble two copies of the source file, one set at origin 0; the other at 0100h. This procedure requires the MAC Assembler:

```
    A>MAC CUSTOM $PZSZ ⌊RET⌋

    A>REN CUSTOM.HX0 = CUSTOM.HEX [RET⌋

    A>MAC CUSTOM $+RPZSZ [RET⌋

    A>REN CUSTOM.HX1 = CUSTOM.HEX [RET⌋
```

The $PZSZ used with MAC is a flag argument which specifies that no .PRN or .SYM files are to be produced. This conserves disk space and time during compilation. The $+R forces a page offset to be added to the .HEX output file. (This effectively fakes setting the origin to 0100h.)

Make the actual installable image file by typing:

    A>**MAKEPRL CUSTOM [RET]**

The output of MAKEPRL is a relocatable image of the original .ASM
file, now named CUSTOM.PRL. To place this file into the system,
use the INSTALL program, following the procedures for its use
given in Sections 1.1. and 1.2. This time you will use your
CUSTOM.PRL file instead of an existing .PRL file. Also, assign a
value of 6K to this file and use that value as a subtraction
factor when determining the size of your new system.