MAP 80 BIOS INSTRUCTION MANUAL

Enclosed is your MASTER DISK holding CP/M version 2.2 .It contains your license number, together with a BIOS configured to run on your system.

The diskette holds the original files supplied by DRI including MOVCPM.COM. This MOVCPM is, however,the original and has not been configured for use on your machine and should NOT BE USED. Use instead the configured MOVECPM.COM whenever the CP/M manuals refer to MOVCPM.

The system track has been initialised with MOVECPM.COM appropriate to your machine, so all that is necessary is to make any hardware modifications as described below and you will be ready to boot CP/M. Note that VFC systems leave the VFC video RAM at F800H and it is therefore possible to generate a system size of 62k maximum. If you need a full 64k system details are given later.

The diskette also holds files supplied by MAP 80 SYSTEMS LTD. and their use will be described later.

HARDWARE REQUIREMENTS

G811
Link the G811 to power on reset at 0000H (see G811 manual)
Link the VFC to auto boot (see VFC manual)

G813
Remove RP/M 2 from the G813 and replace it with BOOT 813 supplied.
Link the VFC to non-auto boot (see VFC manual)

NASCOM 2
Remove header plug LKS1.
Set the DIL switches 1234 on LSW1 so that your NASCOM power on resets at 0000H
Link the VFC to auto boot
If you wish to use NAS3.COM (see later), the following modifications will be required.
Select a paged EPROM card (if you have one) with your NAS-SYS software to page 2.
Link pin 2 to pin 15 on header plug LKS1. No other pins should be connected. Note the EPROM sockets on board the NASCOM cannot be used.
Bend out pin 10 of IC71 to isolate it and then solder a short wire to connect it to +5v (pin 14).
Bend out pin 11 of IC70 to isolate it and then solder a short wire to connect it to 0v (pin 10).

Having made the modifications above, connect up your system and power up. If all is well the video screen will clear and BOOTING will be displayed, very quickly followed by DISK?. This tells you that there is no disk in the drive. Insert your MASTER DISK in drive A and shut the drive door. A few seconds later the CP/M sign on message will be displayed followed by A> (the CP/M prompt). Before doing anything else make a backup up copy of your MASTER DISK using MU.COM (see notes later) and then store your MASTER DISK in a safe place. Note that it was supplied with a write protected tab fitted. This should NEVER be removed.

BOOTING ERRORS

If you insert a diskette which has not had the system tracks initialised with a valid sytem the message SYSTEM? will appear. Insert a properly initialised diskette and booting will then take place (It may be necessary to RESET your machine).

If the boot routine is unable to read a sector from the system track (most likely due to physical damage to the diskette) then the message ERROR will be displayed. Replace the offender with a properly initialised diskette and press RESET.

THE BIOS

The BIOS provides the low level routines to interface your computer to CP/M. It is basically a sophisticated version of the CBIOS example provided by DRI, but contains some features which make CP/M a little more friendly.

DISK ERROR MESSAGES

A BIOS normally returns an error to the CP/M BDOS if it finds that an error has ocurred, when attempting to read or write a sector. This error could occur, for instance, by inserting a disk the wrong way, attempting to write to disk with a write protect tab fitted, forgetting to close the drive door, forgetting to insert a disk or because of disk damage. The BDOS responds with a unhelpful BDOS ERROR message, the MAP 80 BIOS however traps errors, tells you what has gone wrong and then prompts you for instructions. Pressing Y will cause a re-try, N will return error to the BDOS in which case the BDOS ERROR message will appear or ^C will abort the program you are in and cause a warm boot.

POSSIBLE ERROR MESSAGES

Not Ready:
Occurs if a drive door is open or there is no disk, or an unformatted disk.

Disk Write Protected:
Occurs when an attempt is made to write to a diskette which has a write protect tab fitted.

Write Fault:
This is a fault signal provided by a drive.Drives supplied by MAP 80 do not provide this signal so this fault should never occur.

Record not found:
This fault occurs if the FDC has been unable to find a sectors address header or unable to find a sectors data marker. Retries are unlikely to cure this error; if it should occur copy as much information as possible off the offending diskette and reformat it. If the error persists the diskette will most likely have been subject to physical damage and is best discarded (or returned to your supplier if new).

CRC Error:
This error occurs when a sector has been found and loaded but a checksum shows that it is corrupt. Again retries are unlikely to resolve this but, as it is at least possible to load the sector, it may be possible to edit it with for examle DDT to recover the data.

Wrong system size/ No system:
This occurs when an attempt is made to warm boot from a disk holding the wrong size CP/M or an invalid or uninitialised system track.

ON SCREEN EDITING

Normally an error in a CP/M command line which has been entered (CR has been pressed) will have to be re-typed. The MAP BIOS however provides for the on screen editing and re-entry of any line. Details of VFC video editing can be found in the VFC manual. NAS systems proceed as follows:-

To enter the edit mode press ^@ or ^SHIFT@ to obtain an entry of 00H. This informs the BIOS to enter edit mode 1. In this mode key entries will be echoed to the screen but will not be returned to CP/M. The cursor control and screen edit keys may be used at will. When CR is pressed the entire current cursor line,with some exceptions, is returned to CP/M. Exceptions are:

1) Trailing blank spaces,
2) CP/M utility prompts *,£,-and. when they occur in the first column,
3) The CP/M prompt A> when > occurs in the second column.

After returning the line the BIOS returns to non-edit mode, unless whilst in edit mode 1 the edit key is pressed a second time.Then the BIOS will keep returning to the edit mode until the edit key is pressed again. Note that the entire line is returned which means that the edit mode may be unsuitable within some programs. It should also be noted that some editing features are not available on NASCOM 1 keyboards.

VIRTUAL DISK

On COLD boot the BIOS auto searches for MAP RAM above 64k, if it is found and has not been reserved by yourself (see workspace below), a virtual disk on drive P will be set up and the sign on message will signal its avaiability. Use drive P as you would any other drive.

PRINTERFACING

CENTRONICS

A parallel printer routine is provided via the LIST UL1 option (see the IOBYTE assignments below). Connect the Centronics data inputs of your printer to the B0 thru' B7 outputs of your PIO, connect the Centronics "BUSY" signal to A0 of your PIO and the Centronics "STROBE" to A1 of the PIO.

SERIAL

Serial output is handled via the 8250 UART on the G811 or G813 or via the 6402 UART on the NASCOM. As will be seen later in the configuration section it is possible to select output with or without handshake. With 8250 systems use the CTS line to provide handshake. NASCOM UARTS do have handshake facilities. The CTS line from the printer should therefore be connected to bit 7 of port 0 if handshake is required. NOTE: IF YOUR PRINTER PROVIDES AN RS232 LEVEL SIGNAL FOR HANDSHAKE (CTS), THEN THIS MUST BE CONVERTED TO TTL LEVELS.

BIOS CONFIGURATION

The BIOS has basically 4 ways of communicating with the outside world, and each one of these 4 ways can be assigned to one of 4 devices. The assignment of these devices is controlled by the value of one byte (the IOBYTE). The IOBYTE options available in the MAP 80 BIOS is shown

below together with the assignment supplied.

1. CONSOLE (bits 0 and 1 of the IOBYTE)
This is the main I/O interface, i.e In via your keyboard and out via your CRT.
xxxxxx00 TTY Serial no handshake, receive strips parity
xxxxxx01 CRT Screen, keyboard
xxxxxx10 BAT Serial with handshake, receive strips parity
xxxxxx11 UC1 as TTY
Supplied BIOS assigned to CRT

2. READER (bits 2 and 3 of the IOBYTE)
An input only, traditionally from a tape reader but now more likely used as an input from a modem for example.
xxxx00xx TTY Serial, strips parity
xxxx01xx PTR Serial, does not strip parity
xxxx10xx UR1 as TTY
xxxx11xx UR2 as TTY
Supplied BIOS assigned to PTR

3. PUNCH (bits 4 and 5 of the IOBYTE)
An output only, traditionally to a paper tape punch.
xx00xxxx TTY Serial, Parity Even
xx01xxxx PTP Send all 8 bits
xx10xxxx UP1 as TTY
xx11xxxx UP2 as TTY
Supplied BIOS assigned to PTP

4. LIST (bits 6 and 7 of the IOBYTE)
An output only usually a printer
00xxxxxx TTY Serial no handshake
01xxxxxx CRT To screen
10xxxxxx LPT Serial with handshake
11xxxxxx UL1 Centronics via PIO
Supplied BIOS assigned to UL1

It is possible to change the IOBYTE assignment using the STAT command (see CP/M manual), but this becomes tiresome if you have to make this change every time you wish to use your serial printer . The initial IOBYTE, along with other parameters, has therefore been placed at a specific location within the BIOS and can be easily modified using DDT, obviating the need to re-assemble the BIOS. This workspace area has been placed directly above the BIOS entry jump table and will therefore always be found in either MOVECPM.COM or a CPMnn.COM starting at 2133H. A listing of each byte followed by a description of each follows.

```
2133 D5    IOVAL:  DEFB  IOINIT          ;Stored IOBYTE
2134 4B    MS:     DEFB  UMS             ;Delay count for 1ms
2135 00    CHED:   DEFB  KCHED           ;Screen edit character
2136 03    USET:   DEFB  SETU            ;8250 parameters
2137 0F    UMODE:  DEFB  MODEU           ;RS232/Cassette
2138 0068  UBAUD:  DEFW  BAUDU           ;Baud rate
213A B4    PPORT:  DEFB  PIO             ;PIO base address
213B 00    RESERV: DEFB  VRTRK           ;Reserved 4k tracks in vdisk
213C       INITM:
                   IF ABOOT
213C 06            DEFB  06              ;Auto boot, inverse video
```

```
                        ELSE
                        DEFB  04                ;Non auto boot, inverse video
                        ENDIF
213D            LEAVE:
                        IF    F800
213D F1                 DEFB  0F1H              ;Leave VRAM at F800
                        ELSE
                        DEFB  0                 ;Page out VRAM completely
                        ENDIF
213E            PRGTAB:
                        ;Program graphic P to return PIP B:=A:*.*
                        DEFB  "P"+80H,"PIP B:=A:*.*",CR,0FFH
214D 00                 DEFB  0
214E            PRGEND: DEFS  100-(PRGEND-PRGTAB)      ;Leave 100 byte table
21A2 0800       KLONG:  DEFW  XLONG             ;Initial repeat delay
21A4 00C0       KSHRT:  DEFW  XSHORT            ;Repeat speed
21A6 0280       KBLNK:  DEFW  XBLINK            ;Blink speed
21A8 01         KOPT:   DEFB  XKOPT             ;K option
21A9 06         LSKIP:  DEFB  XLSKIP            ;Perforation lines skipped
21AA 3C         PLPAG:  DEFB  XPLPAG            ;Printed lines per page
21AB 00         PARITY: DEFB  SRLOP             ;Parity
21AC 00         CRRET:  DEFB  CRDEL             ;Printer CR delay
```

IOVAL
Initial IOBYTE assignment. Change this to provide your normal I/O requirements according to the IOBYTE description above.
MS
A counter, in milliseconds, within the BIOS is used for timing purposes. The value here is set for a computer running at 4 Mhz without wait states. Set this to 60 for 4Mhz with wait states or 38 for 2 Mhz.
CHED
This is the character used to initiate the edit mode. It is only valid for sytems which assign CON keyboard to an input other than the VFC keyboard input.

USET
This sets the line control parameters of the 8250 UART used on the G811 and G813 CPU boards, (see appropriate manuals). The value supplied sets the UART for 8 bits, 1 stop bit and no parity. 8250 systems should use this to set parity not PARITY below.
UMODE
This sets the control byte for the 8150 UART used on the G811 and G813 CPU boards, (see appropriate manuals).

UBAUD
This word sets the 8250 baud rate (see appropriate CPU manual).

PPORT
This byte, when set non-zero enables your PIO for Centronics output. If you wish to use your PIO for another purpose insert 00 here and the PIO setup routine will be skipped.

RESERV
Enter the number of 4k blocks of MAP RAM you wish to reserve for yourself. Reservation will start from page 1, and will obviously have no affect on systems not using MAP RAM above 64k. Note if excercise the VBOOT option the first two 4k blocks will be used to store the

BDOS and CCP.

INITM
This byte defines the normal operating mode of the VFC. Bits 0 and 1 should switch VRAM and VSOFT off, bits 2 and 3 should select your character generator requirements, bits 4,5,6 and 7 should all be reset (see VFC manual for full details).

LEAVE
As supplied your BIOS leaves the VFC video RAM at F800H when VSOFT isn't being used.This means that you can only generate a maximum system of 62k, but it leaves the video RAM as a chunk of memory mapped RAM to be used easily by, for instance, Wordstar. To leave VRAM in the memory map set bit 0 of this byte, and use bits 4,5,6 and 7 to address the 4k block to wherever you want to leave it.To run a full 64k system reset this byte to 00

PRGTAB
This is a 100 byte programmable key table for use with the VFC. This table is pointed to after any Cold or WARM boot(see the VFC manual for table format). Note this is only available on VFC systems using a VFC keyboard.

KLONG
First delay speed for keyboard repeat of non-VFC keyboard systems.

KSHRT
Subsequent delay speed for keyboard repeat of non-VFC keyboard systems.

KBLNK
Blink speed for cursor of NASCOM video systems.

KOPT
Selects upper/lower case as unshifted on NASCOM keyboards, 0=upper, 1=lower.

LSKIP and PLPAG
These provide automatic paging for printers. LSKIP defines the page margin lines and PLPAG the printed lines per page. If you do not want auto paging reset PLPAG to 00.

PARITY
This byte is used to originate parity for the serial LIST routines. Insert 3 for EVEN parity, 1 for ODD parity or 0 for no parity. Systems using the 8250 UART should reset this byte to 0 and select parity by the USET byte above.

CRRET
This byte causes a delay after a CR has been sent to a non-handshaking printer. The byte delays in 10s of millisecs e.g insert 0FH for 150ms delay. If reset to 0 no delay takes place.

VFC WORKSPACE
After the user changeable workspace comes the VFC workspace, this is put here so as to be at a known location relative to the base of the BIOS and therefore accessable in order to read the cursor position and the PIXEL test returned value. The cursor position is stored in the 16

bit word at BIOS+0B0H, and the pixel test value in the 8 bit byte at BIOS+0C3H. Note that the cursor address is an absolute address depending on where the VFC was brought in when VSOFT was used, to obtain a cursor location relative to the top left of the screen you will need to strip the 5 most significant bits. The base of the BIOS can be found in the usual way by subtracting 3 from the address at 0001H.

Modifying the user changeable workspace is quite straight forward. For example, to reassisgn the initial IOBYTE LIST device to TTY proceed as follows:-

```
DDT MOVECPM.COM
NEXT  PC  END
3700 0100 B9FF
£S2133
2133 D5 15
2134 4B .
£G0
SAVE 54 MOVECPM.COM
```

The modifications above can provide for most requirements, but the more experienced programmer can make comprehensive BIOS modifications due to the unique files provided by MAP 80. The BIOS source code is in two parts; EQU.MAC holds equates and options and BIOS.MAC which is the main BIOS source, make changes to these files according to your needs and then uses the SUB file CPM.SUB to produce a new MOVECPM.COM. You will require:-

M80.COM The MICROSOFT assembler
L80.COM The MICROSOFT linker
ZSID.COM Z80 version of DDT.COM (DDT would probably work)
(The above software is available at competetive rates from MAP 80)

CPM.SUB uses M80 to assemble BIOS.MAC, (BIOS.MAC INCLUDEs EQU.MAC) it then uses L80 to produce two HEX files organised at different locations, next it loads CPM.SYS. This is a bare CP/M with its re-locating bit map and NO BIOS. It also contains a MAP 80 MOVECPM configuration routine. The HEX files are then loaded and the configuration routine is executed, MOVECPM is configured, the BIOS is inserted and a bit map produced. The new MOVECPM.COM is then saved on disk. Note that the SUB files are the working files used by MAP 80 and they expect to find the MAC files on drive P, and that the INCLUDE statement in BIOS.MAC expects to find EQU.MAC on drive P, also note in the L80 command lines "L80 /P: etc" that the /P: does NOT refer to drive P.

THE MAP 80 MULTI-UTILITY PROGRAM

On your MASTER DISK you will find a file called MU.COM. This program enables you to FORMAT, COPY and VERIFY a diskette. Run the program by entering:-

MU<CR>

You will be greeted by the command prompt. Enter one, two or all the commands in any order according to your requirements..F C V. Commands will be executed in the order FORMAT COPY VERIFY regardless of the order in which they are entered. Having selected the commands you require press CR to continue.

If you selected F you will now be prompted for a sector skew. To optimise disk access time sectors are laid down on the disk' in a

staggered sequence. For a general purpose disk use a skew of 2. A CR is not required.
If you selected C you will be prompted for the drive which will hold the disk which is to be copied. A CR is not required.
You will then be prompted for the drive or drives to be FORMATTED and/or COPIED TO and/or VERIFIED. Enter the the line followed by CR.

You will then be prompted to insert the appropriate disks into the appropriate drives.

Where a single drive system is being used it is possible to copy a disk in drive A to another disk in drive A. In this case the copy routine will halt and prompt you when it is necessary to change disks. It would be advisable to put a write protect tab on the disk to be copied to avoid possible mix ups.

NAS-SYS

With a Nascom system a file NAS3.COM is supplied which is run by entering:-
NAS3<CR>
This loads and runs NAS-SYS3. This is an original unmodified NAS-SYS using a NASCOM screen at 0800H and you will need to have made the additional mods listed in the hardware requirements section earlier.
It is also possible to COLD boot into NAS-SYS as it is possible to put NAS-SYS onto the system tracks of a CP/M disk using SYSGEN.COM. Enter:-
SYSGEN NAS3.COM<CR>