

## CP/M for Poly-88 with a Micropolis Floppy Disk Controller

### Polex PROM

CP/M for the Poly-88 requires the Polex PROM (Poly-88 Extension) to be installed in the 2nd PROM socket on the Poly-88 CPU board. Polex handles run-time swapping of PROM and RAM in the lower 4K of address space and provides console and serial I/O for CP/M. See the Polex folder for more information.

### BootMod PROM

BootMod is an extension module PROM for Polex. The PROM installs in the 3rd PROM socket on the Poly-88 CPU board. It provides a single boot command (BO) for a variety of floppy controllers including Altair, Micropolis, Tarbell, and both the single density and double density North Star controllers. The PROM is not required to boot Micropolis CP/M as booting is handled by the boot PROM on the Micropolis controller. Without BootMod, CP/M can be booted with the Polex command, EX FC00. BootMod is located in the Polex folder.

### MicMod PROM

MicMod is an alternate extension module PROM for Polex when using a Micropolis disk controller. The PROM installs in the 3rd PROM socket on the Poly-88 CPU board. It adds numerous commands to Polex to support booting and testing of a Micropolis controller and drives. The PROM is not required to boot Micropolis CP/M as booting is handled by the boot PROM on the Micropolis controller. Without MicMod, CP/M can be booted with the Polex command, EX FC00. MicMod is in the Polex folder.

### Micropolis Floppy Disk Controller

The disk controller must be addressed at FC00h to work with the Poly-88 and this version of CP/M. The 2 mhz/4 mhz jumper near the top left of the controller should be removed (2 mhz selected).

### Disk Image Files

**CPM22B13-56K-35T.DSK** is Lifeboat CP/M 2.2B for a Poly-88 running on a Micropolis disk controller with 35 (or 40) track drives. The CP/M boot image is sized for 56K of RAM. A customized MOVCPM is included to size CP/M for different amounts of RAM (run MOVCPM followed by SYSGEN). The disk image includes typical CP/M programs as well as file and disk image transfer utilities to exchange data with a PC.

**CPM22B13-56K-77T.DSK** is Lifeboat CP/M 2.2B for a Poly-88 running on a Micropolis disk controller with 77 track drives. The CP/M boot image is sized for 56K of RAM. A customized MOVCPM is included to size CP/M for different amounts of RAM (run MOVCPM followed by SYSGEN). The disk image includes typical CP/M programs as well as file and disk image transfer utilities to exchange data with a PC.

### IOBYTE

The Poly-88 implementation of Micropolis CP/M provides full IOBYTE support. The IOBYTE allows redirection of logical CP/M devices to different physical devices. IOBYTE implementation is required by some programs (e.g., Kermit) for proper operation. The possible logical-to-physical device assignments are shown in the table below:

<b>CON</b> device (bits 1,0): 00 - TTY uses serial port 01 - CRT uses keyboard/video* 10 - BAT indirect through RDR and LST logical device 11 - UC1 uses serial port	<b>PUN</b> device (bits 5,4): 00 - TTY uses serial port 01 - PTR uses serial port* 10 - UR1 uses serial port 11 - UR2 uses keyboard/video
<b>RDR</b> device (bits 3,2): 00 - TTY uses serial port 01 - PTP uses serial port* 10 - UP1 uses serial port 11 - UP2 uses keyboard/video	<b>LST</b> device (bits 7,6): 00 - TTY uses serial port 01 - CRT uses keyboard/video 10 - LPT uses serial port* 11 - UL1 uses serial port

\* = Default IOBYTE

The STAT utility in CP/M is typically used to change device assignments. These assignments are temporary and the defaults shown above are restored whenever CP/M is cold started. To permanently modify the IOBYTE, use DDT to patch location 261Dh of a CP/M SYSGEN image while the image is in memory. After exiting DDT, immediately run SYSGEN to write the patched CP/M image to the boot tracks, or save the memory image to a CPMxx.COM file.

### Creation of Poly-88 CP/M for Micropolis

Vector Graphic computers use the Micropolis FDC and drives, so CP/M for the Vector Graphic MZ computer was used as the starting point for creating Micropolis CP/M for the Poly-88. The Lifeboat version of CP/M for the Vector uses only 8080 opcodes and is therefore compatible with the Poly-88 computer. The Vector Graphic branded CP/M for Micropolis uses Z80 opcodes in its BIOS, so it cannot be used with the Poly-88.

The primary modification required to make Lifeboat CP/M for Vector run on the Poly-88 is to modify the console and serial I/O routines to work with the Poly-88. The "User Area" in Lifeboat CP/M allows the end user to customize this I/O without having to modify the BIOS itself. The file POLYIO.ASM is a user area driver to provide console and serial I/O for the Poly-88.

The following equates should be set in the file POLYIO.ASM

- MSIZE – Memory size. Set to match the memory size specified for MOVCPM.
- MAXTRK – Maximum track number. Set to 34 for Mod-I drives, 76 for Mod-II drives.
- FSTEP0, 1 – Enable fast stepping (3ms) for drive 0 and/or 1.

Poly-88 keyboard and serial I/O require the use of interrupts. Therefore, the CP/M BIOS must re-enable interrupts after performing disk I/O. Re-enabling of interrupts is controlled by a bit in the MODE byte of the BIOS. POLYIO.ASM patches this byte by setting the 10h bit in the MODE BYTE as follows:

In memory of 56K CP/M	Sysgen Ready In DDT	In Disk Image File	Original Value	New Value
D9FF	25FF	1688	C0	D0

To support Mod-I drives (35 tracks), several additional patches are required to account for the smaller number of tracks and a smaller block and directory size. These patches are automatically applied by POLYIO.ASM based on the MAXTRK equate.

Change the maximum track number for each drive from 76 to 34. This is a Lifeboat specific table used during a cold boot to patch the CP/M Drive Parameter Table.

<b>In memory of 56K CP/M</b>	<b>Sysgen Ready In DDT</b>	<b>In Disk Image File</b>	<b>Original Value</b>	<b>New Value</b>
D9FA	25FA	1683	4C	22
D9FB	25FB	1684	4C	22
D9FC	25FC	1685	4C	22
D9FD	25FD	1686	4C	22

Modify the drive size that the Lifeboat BIOS copies during cold boot from its own table into the CP/M Drive Parameter Table. Original value is 66 blocks of 2048 bytes. Use 132 blocks of 1024 bytes instead.

<b>In memory of 56K CP/M</b>	<b>Sysgen Ready In DDT</b>	<b>In Disk Image File</b>	<b>Original Value</b>	<b>New Value</b>
DC45	2845	1F79	41	83

Patch BSH and BLM for 1024 byte blocks and DRM for 64 directory entries. These values are patched directly into the CP/M Disk Parameter Table as these parameters are not modified by the Lifeboat BIOS during cold start.

<b>In memory of 56K CP/M</b>	<b>Sysgen Ready In DDT</b>	<b>In Disk Image File</b>	<b>Original Value</b>	<b>New Value</b>
DC97	2897	1FCB	04	03
DC98	2898	1FCC	0F	07
DC9C	289C	1FD0	7F	3F