

## CP/M for Poly-88 with a North Star Double Density 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 about Polex and the BootMod PROM (below).

### 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, Tarbell, Micropolis, and both the single density and double density North Star controllers.

Using the "EX E800" command to jump to the boot PROM on the disk controller does not work since interrupts must be disabled for disk I/O and the North Star boot PROM does not explicitly disable interrupts. Without the BootMod PROM, Polex can be used to boot a disk by executing a DI instruction and then jumping to the controller's boot PROM as follows:

```
>EN E000
E000: F3 C3 00 E8
>EX E000
```

The code at E000 will not typically be over-written by normal computer operation. You may be able to boot again by simply jumping to E000 in the future.

### North Star Double Density Floppy Disk Controller

The disk controller should be addressed at its default address of E800h for use in the Poly-88.

### Disk Image Files

**CPM 223DQ-56K-SSDD.NSI** is a single sided, double density image of Lifeboat CP/M 2.23DQ for a Poly-88 running a North Star DD disk controller. 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.

**CPM 223DQ-56K-DSDD.NSI** is a double sided, double density disk version of C/PM 2.23DQ.

### Single Sided vs Double Sided Operation

This version of CP/M automatically detects and works with SSSD, SSDD, and DSDD disks. Disks written with older software running on the original single density controller may not properly auto-detect if the original software did not write disk type information in sector zero.

MOVCPM on these disks has been modified to configure all drives as double-sided with slow seek times. This allows any diskette/drive combination to boot without patching. With the original MOVCPM, the drives were configured as single sided with slow seek time. In this case, a double sided disk would boot, but CP/M could not access the entire file system. Note that configuring a *drive* as double sided does not require that *diskettes* be read/written as double sided.

The SETCPM utility (included on the disk image) can be used to permanently change the sides/step rate setting on a boot disk.

## IOBYTE

The Poly-88 implementation of North Star CP/M provides full IOBYTE support. The IOBYTE allows re-direction 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 271Dh 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.

Console and serial I/O specific to the Poly-88 can be seen in the file USERPOLY.ASM. The code from this file is part of the customized MOVCPM for this version of CP/M.