

## Using a 2716/2732 as the PROM Option on the North Star ZPB-A CPU Board

The PROM option on the North Star ZPB-A CPU board is designed for a 2708 EPROM. Installation of the PROM option includes +12v and -5v regulators as required for the 2708. The 2716 and 2732, however, are 5v only parts, and of course, offer more storage.

Using a 2716 or 2732 in place of the 2708 on the ZPB-A board is simple. When installed as detailed on the following page, 2K is reserved for the PROM address space (full 2716 or 1/2 of a 2732). When using a 2732, it is simplest to program both the bottom 2K and top the 2K of the part with the same code. The ZPB-A inserts a wait state whenever the PROM is accessed, so EPROM part speed is not critical.

A monitor for the Horizon computer is present in the ROMs subdirectory of the Horizon folder. MON40C.ASM is the Vector Graphic monitor 4.0C ported to run on the Horizon computer. Because of the similarity between the hardware of the VG machines and the Horizon, very little modification of the VG monitor was required. The monitor offers memory examine, modification, breakpoints, an Intel hex file loader, memory test, memory search, and more. The "B"out command has been modified to jump to the North Star boot ROM at E800 instead of the Micropolis boot ROM at F800.

Shown below is the ZPB-A CPU board with a 2732 occupying E000-E7FF (1/2 of the 2732 is used). The board set to auto-jump to E000 on power-on and reset.



## 2716/32 PROM Option Installation

If the 2708 PROM option is already installed, remove the “PROM OPTION” regulator parts at the bottom left corner of the board (Q1, Q2, C25-C28), then start at step 3.

- 1) Cut “PE” (PROM Enable) trace near top of board.
- 2) Install the sockets for the PROM option. Do NOT install any of the power related parts for the PROM option (e.g., the two regulators and capacitors at the bottom left of the board). You do NOT have to install R4 or the resistor network RN3, however, resistor R10 IS required.
- 3) Wire IC 5D-P4 to 4E-P19. This puts A10 on pin 19 of the EPROM socket (A10 on the 2716 and 2732).
- 4) Wire IC 4E-P24 to 4E-P21. This puts +5v on pin 21 of the EPROM socket (Vpp on 2716, A11 on 2732).
- 5) Wire the PROM address header as required for the desired EPROM address. E000 requires 13, 12, and 11 to 6 or 7, and 10, 9 to 1 or 2.
- 6) Wire the auto-jump header as required for EPROM entry. E000 requires 16, 15, 14 to 3 or 4, and 13-9 to 7 or 8.
- 7) Install IC’s in sockets, lifting pin 6 of IC 5D out of the socket during insertion. This prevents A10 from affecting the PROM selection signal.

**Note:** The photograph on the previous page shows R4 and the resistor pack RN3 installed. These are not necessary with a 2716 or 2732 EPROM. These pull-up resistors were required to ensure the input voltage for a data “1” exceeded the 2708’s minimum threshold of 2.4v. This input spec is not fully TTL compatible. The 2716 and 2732 have a voltage threshold of 2.0v for a data “1.” This threshold meets the TTL spec and the pull-up resistors are not required.