ALTAIR PROMs and IMPROVEMENTS

Martin Eberhard 5 July 2014

The Altair 8800b Turnkey Module has four PROM sockets, each of which takes a 256-byte 1702A EPROM or equivalent. MITS software expects these PROM sockets to be addressed at the last 1K of the Altair's memory space, starting at 176000 octal.

The Altair 88-PMC PROM card has eight PROM sockets, each of which takes a 256-byte 1702A EPROM or equivalent. To use this board for MITS loader PROMS, it must be addressed at the last 2K of the Altair's memory space, starting at 174000 octal.

MITS created several boot PROMs that reside in the last 1K of the Altair's memory space, intended to be installed in one of the above boards:

PROM Address	Turnkey Socket	88-PMC Socket	Monitor Program	Cassette tape or paper tape	88-DCDD 8" disk	88-MDS Minidisk	88-HDSK Hard Disk
176000_8	L1	E					HDLDR
176400_8	K1	F	TURMON				(2 PROMS)
177000_8	J1	G		MBL			
177400_8	H1	H			DBL	MDBL	

Each of these PROMS is a stand-alone program that begins at its first PROM address. To run any of the loaders from TURMON, you must jump to the correct address with the "J" command.

The HDLDR PROMs contain another monitor program, similar to TURMON, except that (unlike everything else MITS did), it operates in hexadecimal. This will require you to translate most of their program listings from octal to hexadecimal when examining any Altair software with the HDLDR monitor.

All of my loader programs are also stand-alone programs that are each completely interchangeable with their MITS equivalents. With these PROMs, you can have any combination of Altair boot devices with the same PROM set:

PROM Address	Turnkey Socket	88-PMC Socket	Monitor Program	Cassette tape or paper tape	88-DCDD 8" disk	88-MDS Minidisk	88-HDSK Hard Disk
176000_8	L1	E					HDBL
176400_8	K1	F	UBMON				
177000_8	J1	G		MBLe			
177400_8	H1	H			CDBL	CDBL	

UBMON

UBMON functions exactly like TURMON, except that it fixes a few bugs and adds three commands:

- "B" boots from floppy disk (either an 88-DCDD or an 88-MDS) by jumping to CDBL, DBL, or MDBL, whichever you have installed. If no PROM is installed at 176400 octal, then this command is ignored.
- "L" boots from a hard disk by jumping to HDBL or HDLDR, whichever you have installed. (This is the same command to boot from hard disk in the HDLDR PROM set.) If no PROM is installed at 176000 octal, then this command is ignored.
- "T" boots from tape – paper tape or cassette tape – by jumping to MBL or MBLe, whichever you have installed. If no PROM is installed at 177400 octal, then this command is ignored.

UBMON also cleans up the leader and inserts a trailer around the "MITS Absolute Binary Tape Format" file that is created by the "D" command.

MBLe

MBLe is a tweak on MITS's MBL PROM, replacing the 88-HSR (high-speed tape reader) load option with an option to load from the 88-2SIO's port B. It also ignores sense switch A11, so that this switch may be used by HDBL to select the boot platter.

MBLe also does an initial read from the parallel ports, to clear the data-ready flip-flops in devices such as the OP-80 paper tape reader. This makes loading from such devices work correctly.

MITS's MBL PROM loads files from tape by first ignoring whatever checksum loader is on the tape, and then loading the subsequent "MITS Absolute Binary Tape Format" file. However, if the tape does not contain a checksum loader, then MBL will fail.

The "D" command in TURMON or UBMON creates a "MITS Absolute Binary Tape Format" file without a checksum loader, which is unfortunately not loadable with MITS's MBL. MBLe corrects this, by allowing loading of tapes that do not include a checksum loader, such as tapes created by TURMON or UBMON.

CDBL

CDBL is a combined boot loader, allowing the same PROM to boot either an 88-DCDD 8" disk or an 88-MDS minidisk. It functions the same as both DBL and MDBL from MITS.

HDBL

HDBL is a single-PROM hard disk boot loader for the 88-HDSK. You can select from which disk to boot with sense switch 3 (labeled A11 on the Altair front panel).