

# **IN MAV'S FreHD WORKSHOP**

**by Ian Mavric**

## **HOW TO CONVERT TRS-80 MODEL 1 TO FreHD AUTO BOOT**

Over the next few editions of TRS8Bit I'm going to explain, step by step, how to upgrade the TRS-80s internal ROM to the auto-boot EPROM. The EPROM can be produced by downloading the BIN file from the downloads page from my web site, or if you don't have your own EPROM programmer, I can burn and send you the EPROM for a small cost.

As a starting point I chose the Model I, and future instalments will follow the TRS-80 line chronologically, so next time will be the Model III, then the Model 4NGA in the issue after that, then the 4P and finally the Model 4GA/4D. For those people who don't want to wait for future editions, just email me and I'll explain how to upgrade your Model III/4/4P/4D.

Without further ado, the Model I:

System requirements: 16K Level II Model I, with lowercase and attached to a 32K Expansion Interface. You also need a FreHD.

Modification summary: The existing Level II ROMs and/or daughter-board will be removed from the system, a programmed EPROM installed in Z33, 5 wires soldered to various points on the motherboard, and a toggle switch installed on the case to change between standard Level II BASIC and auto-boot FreHD. The modification is reversible because no trace cuts are made. As usual with modifications, make sure you understand each step because I can't be responsible for changes made to your computer if things go wrong.

The following seven steps will upgrade your computer:

1. Check Z3 and make sure all 8 shunts are in place. If they aren't, install a switch block so all 8 shunts connect. (Typically Level II systems with the daughterboard will have all shunts in place, and Level II systems without a daughterboard will have 7 of the 8 shunts in place.)

2. On systems with the daughterboard, you need to locate 3 long wires (out of 4 or 6) and note where they go. Call the orange wire A13, the red wire A12 and the yellow wire A11. We need to refer back to these points later on so mark them and then unsolder the 4 or 6 wires running to the daughter board and remove the whole Level II Rom assembly. Z33 and Z34 should now be empty.

3. On systems without the daughter board, just remove the two chips in Z33 and 34. Referring to the picture below, make a note on your PCB where the orange, red and yellow wires solder to, and mark them as A13, A12 and A11 respectively.

4. Program your 27C256 and prepare it as follows. Bend out pins 20, 23, 26. Clip the pin portions from pins 1,2,27,28, leaving just the tabs left to solder wires to.

Solder a purple wire joining pins 1 and 28, and leave a short 5cm length of purple wire.

Solder a 5cm black wire to pin 20.

Solder a 20cm orange wire to Pin 26.

Solder a 10cm yellow wire to Pin 23.

Solder a 15cm red wire to Pin 2.

Solder a 30cm grey wire to Pin 27.

5. Insert the prepared 27C256 into Z33 with pins 1,2,27,28 overhanging at the front of the IC. Make sure none of these pins contact anything, or each other. Also confirm that pins 20, 23 and 26 of the Eprom don't go into the holes in Z33's socket.

6. Solder wires to motherboard:

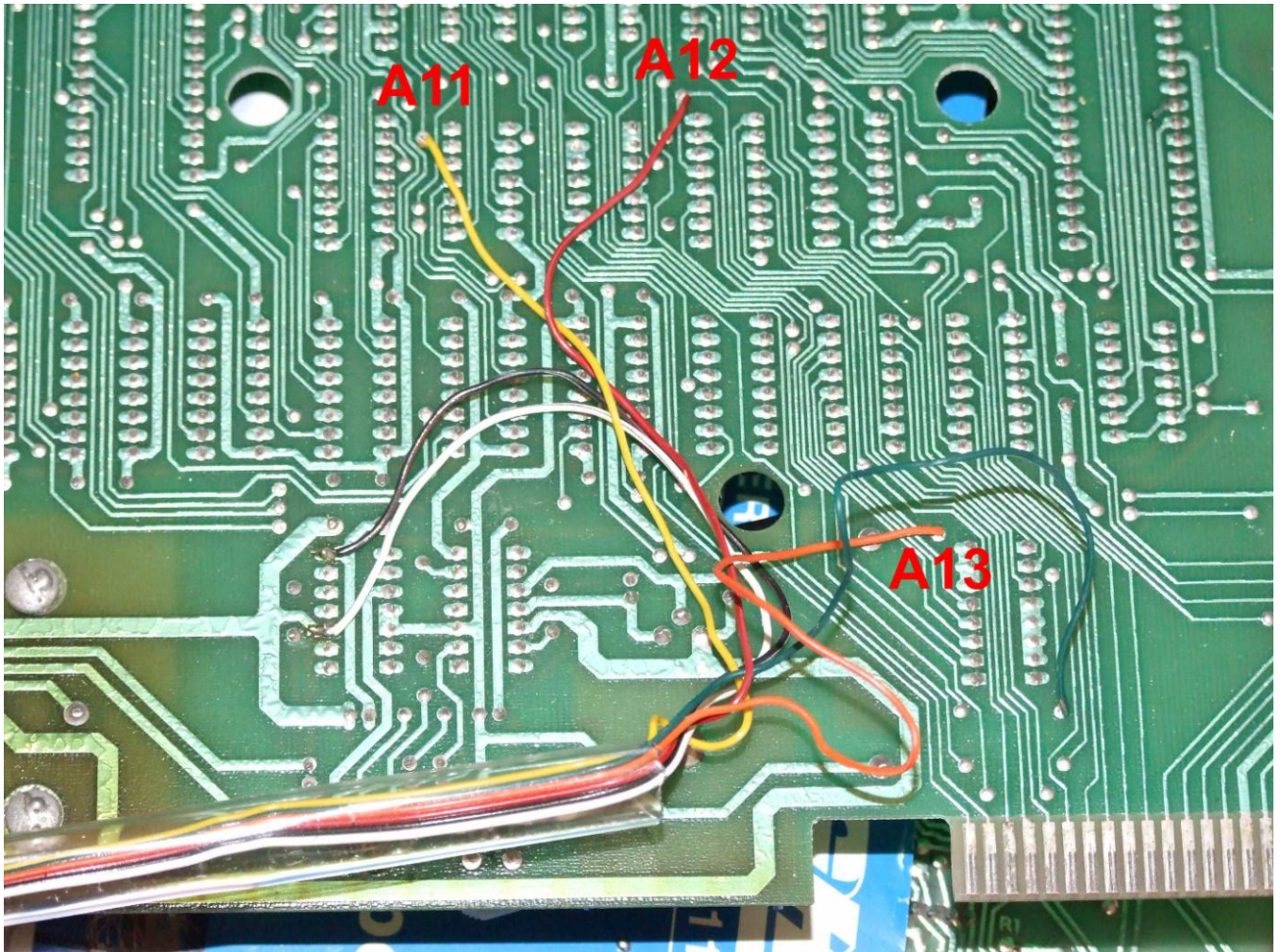
Black wire to a source of GND (thick rail directly below Z33/34)

Purple wire to a source of +5V (solder point directly above Z34 pin 24)

Referring to the notes you took earlier, solder the yellow A11, red A12, and orange A13 wires to the points noted in step 2 or 3. Solder them on the component side of the PCB, confirming you have the correct place with a multimeter.

7. The one wire (grey) you have left over is the A14 line from the Eprom, and when high selects FreHD auto boot, and low selects regular Level II Rom. Mount a toggle switch on your Model I case somewhere, and run the grey wire to the centre pole. Wire the other two poles of the toggle switch to the GND line and the +5V line and the modification is complete.

Power up and test the machine. You may need to turn down the voltage at R5 and R10 (refer to TRS-80 Tech Ref manual 26-2103 page 60) because the single Eprom replaces high-power drawing devices (Z33 and 34 or the daughterboard assembly).



Picture mentioned in Step 3.

If problems crop up they will when you first power the machine up. First power up the computer without the Expansion Interface connected and run test routines to make sure the computer works properly. If the system fails to start check all the wires, that there are no solder-bridges shorting something out. It's possible if the Eprom had a bad burn then they system will not run, so unsolder all wires and go back to the regular Level II Rom set. Confirm the computer still runs and then go over the instructions and burn a new Eprom if needed, and try again. I've upgraded several machines this

way and at least three other people have successfully made the modification as well.

I'd like to thank Dean Bear for all his hard work in coming up with this solution for Model I owners.

Next time: Upgrading the Model III with FreHD auto-boot.

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