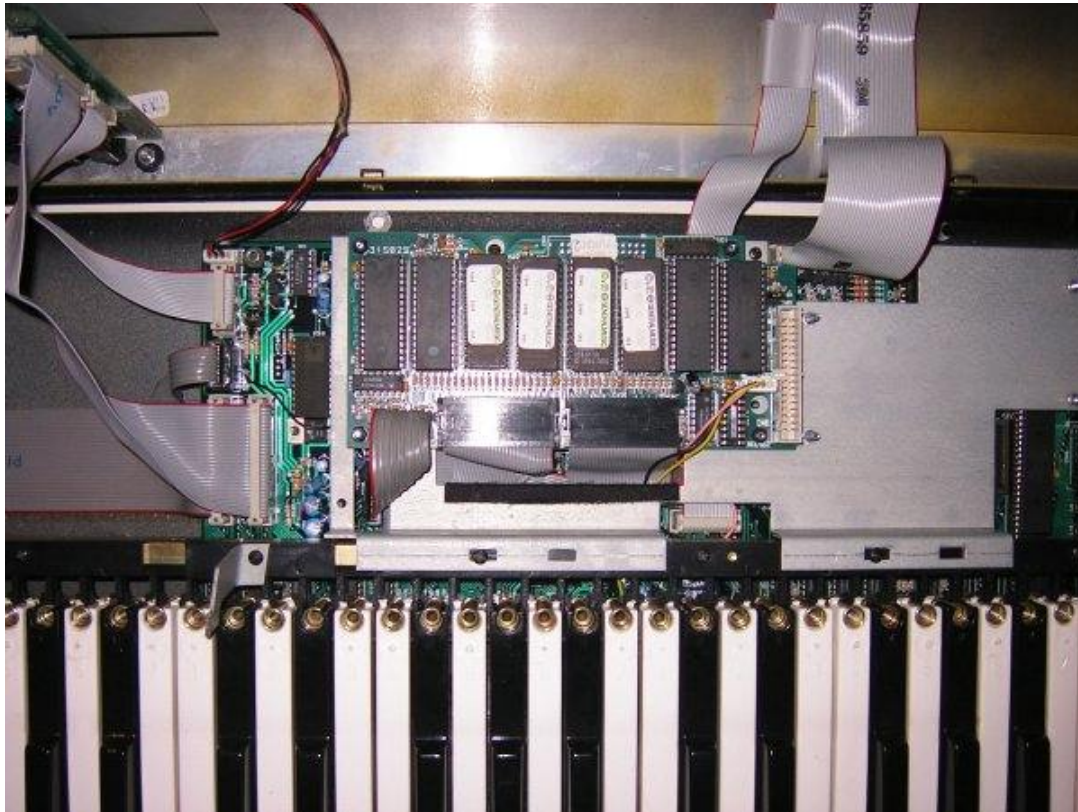# GEM S2/S3 turbokit installation notes

Starting point: S2 with factory-installed turbokit (and optional RAM disk chips)


One interesting thing I noted was that the ROMs in my new turbokit were of a later date than those in my S2. On my S2 I had already found that turning midi clock off would not actually turn it off. This appears to be fixed in the newer ROMs. The S2/3 appears to flash a version number in the display right before showing the logo but it disappears to fast to be able to read it.

Changes to the S3 CPU board

The turbokit comes with four short pieces of wire cut to size in a black plastic tube. Connect one side (where these are all the same length) to the connector. Cut two connections on the board (marked by red crosses below). The wire colours are somewhat difficult to see in this picture, but they are (top-to-bottom): gray, yellow, orange and pink. The rectangular piece of foam just sits on the board next to it.

At first I overlooked the two cuts on my original S2 board. That's why the cuts I made are not in the picture.
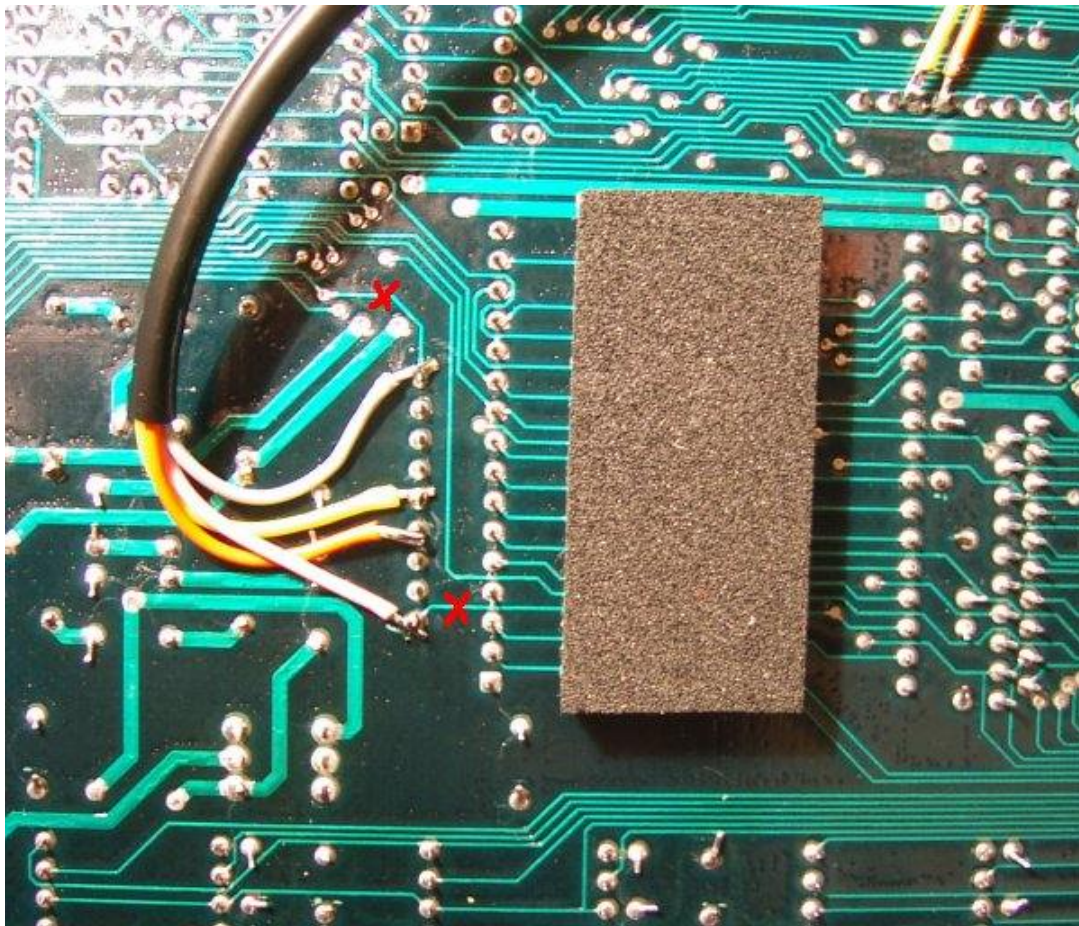
Connect the other (longer) sides of the yellow, orange and pink wires as shown below. You might want to do a better job at the yellow wire than I did… In case of confusion, it's connected to the third (and only the third) pin from the left.
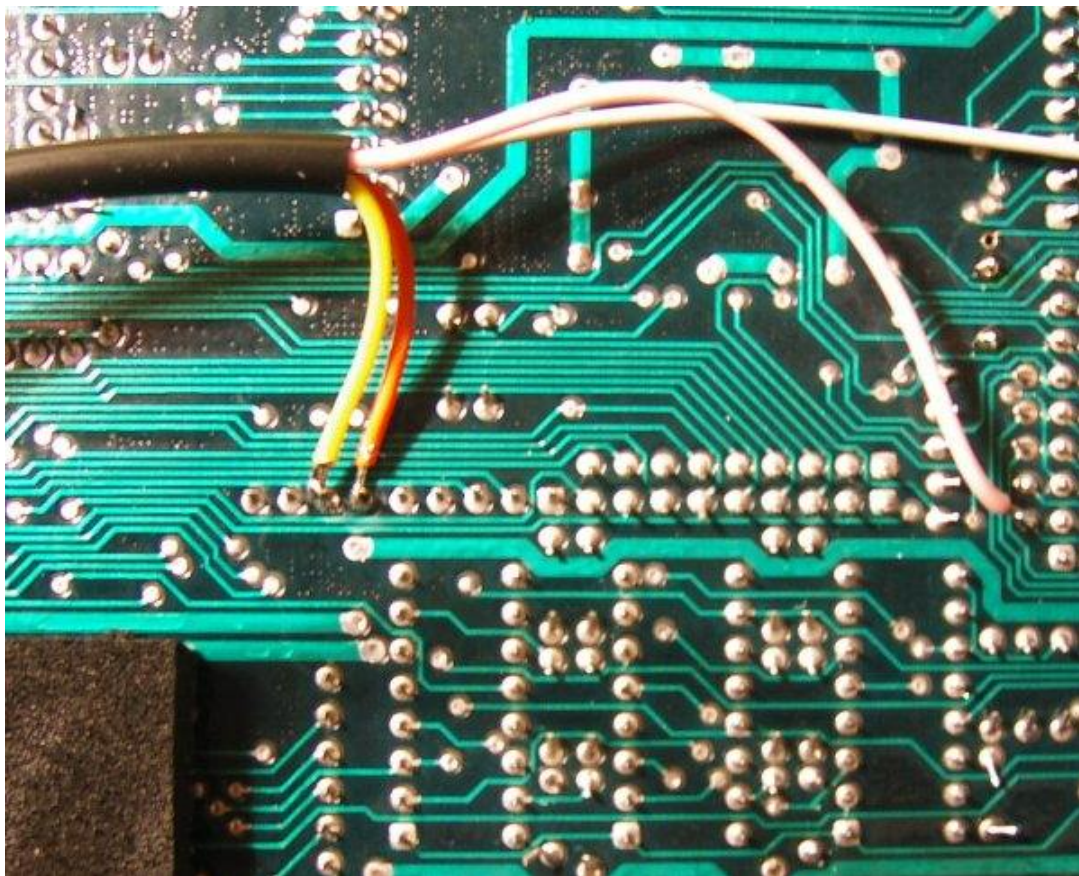

The remaining gray wire connects further along on the board (sorry for the blurry pic).
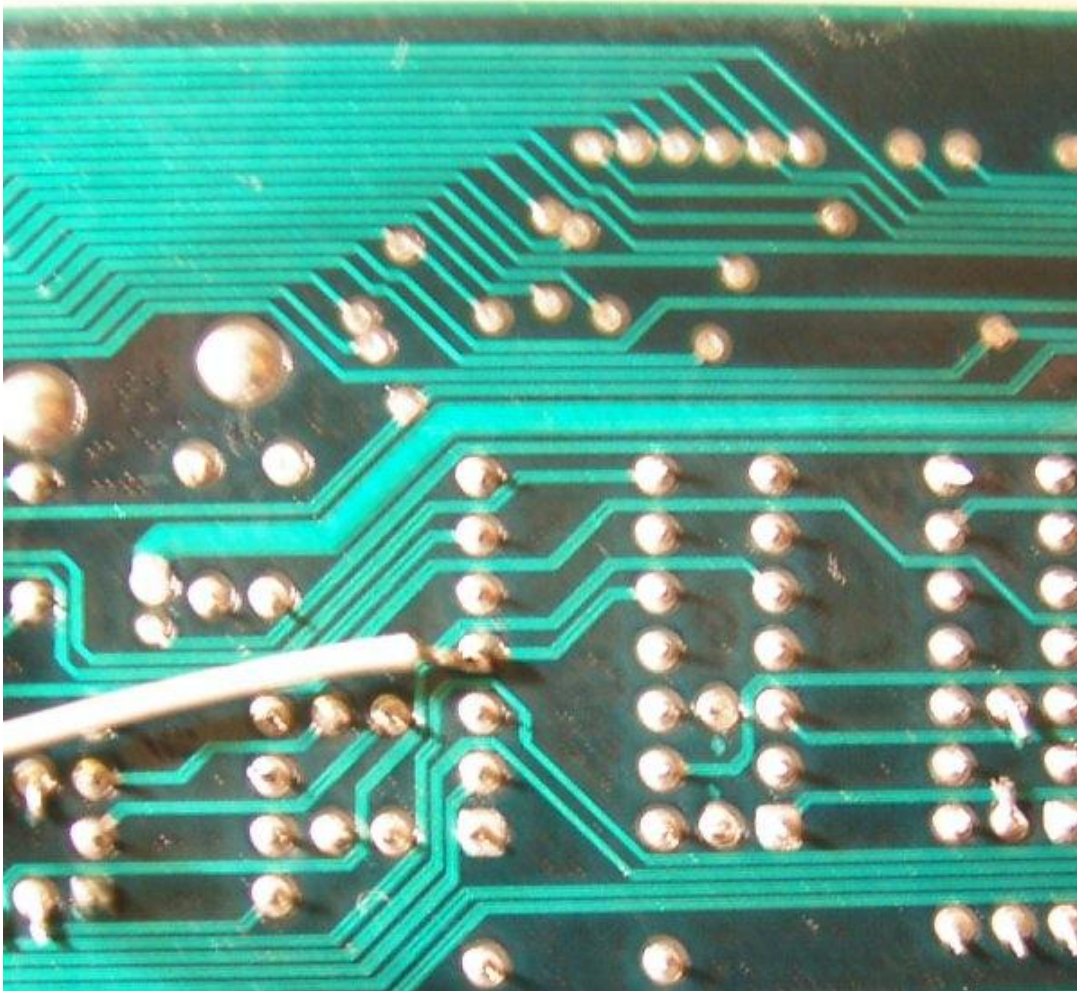
Replace the lithium-ion battery with the supplied NiCd rechargeable battery. Replace diode D2 with the 3.3 ohm resistor (orange-orange-gold marking). This is to enable the battery to be recharged. [Note 2006/06/06: Replace R186 with a 220 ohm resistor. My S3 already had one fitted.]

The kit contains a set of three wires, connected to a white plug (which will connect to the turbo board). Connect the yellow wire to the resistor you just installed (as shown below). Connect the pink wire to resistor R182 as shown. The yellow wire presumably provides power to the optional RAM disk chips.
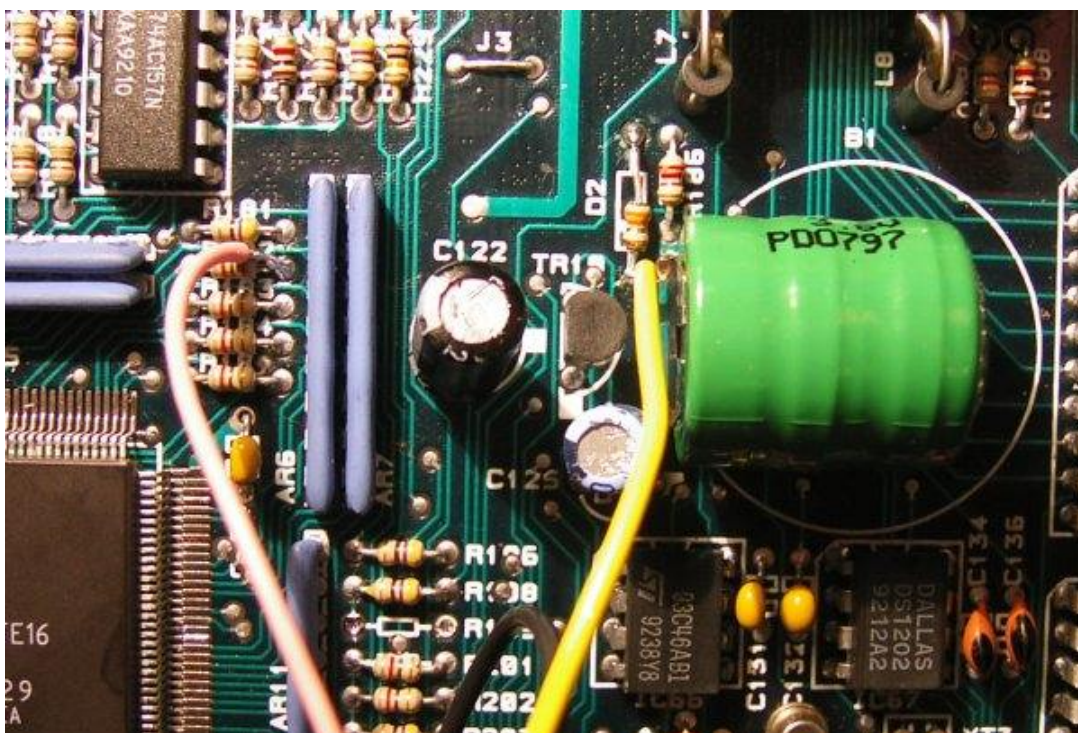
Remove resistors R199 and R221. Connect the black wire where R221 was just removed, as shown below.
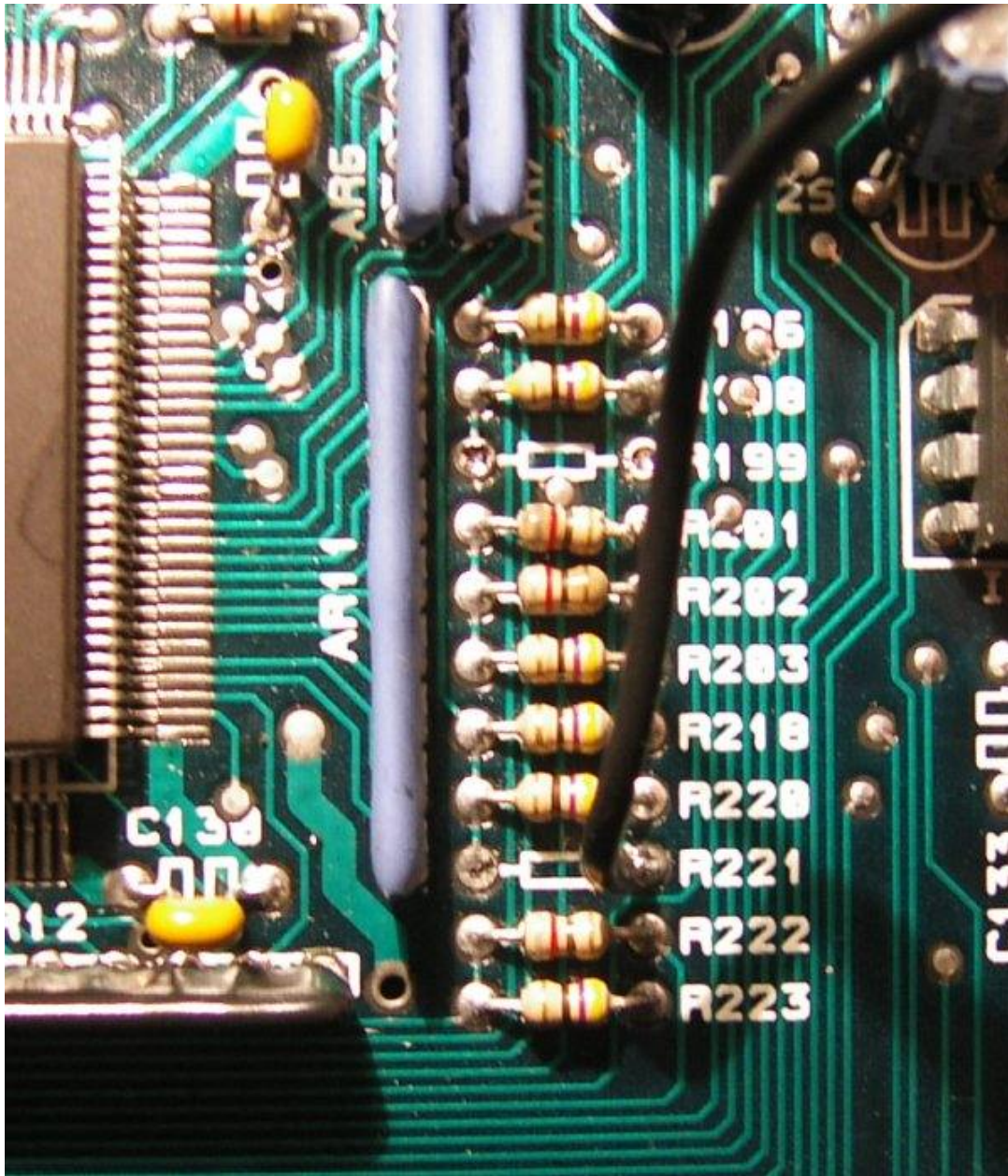

Install R161 (2200 ohm; red-red-red marking), C116 (10 pF) and C119 (22 pF) and the 32 MHz crystal as shown below. Replace the floppy controller with the one contained in the turbokit.
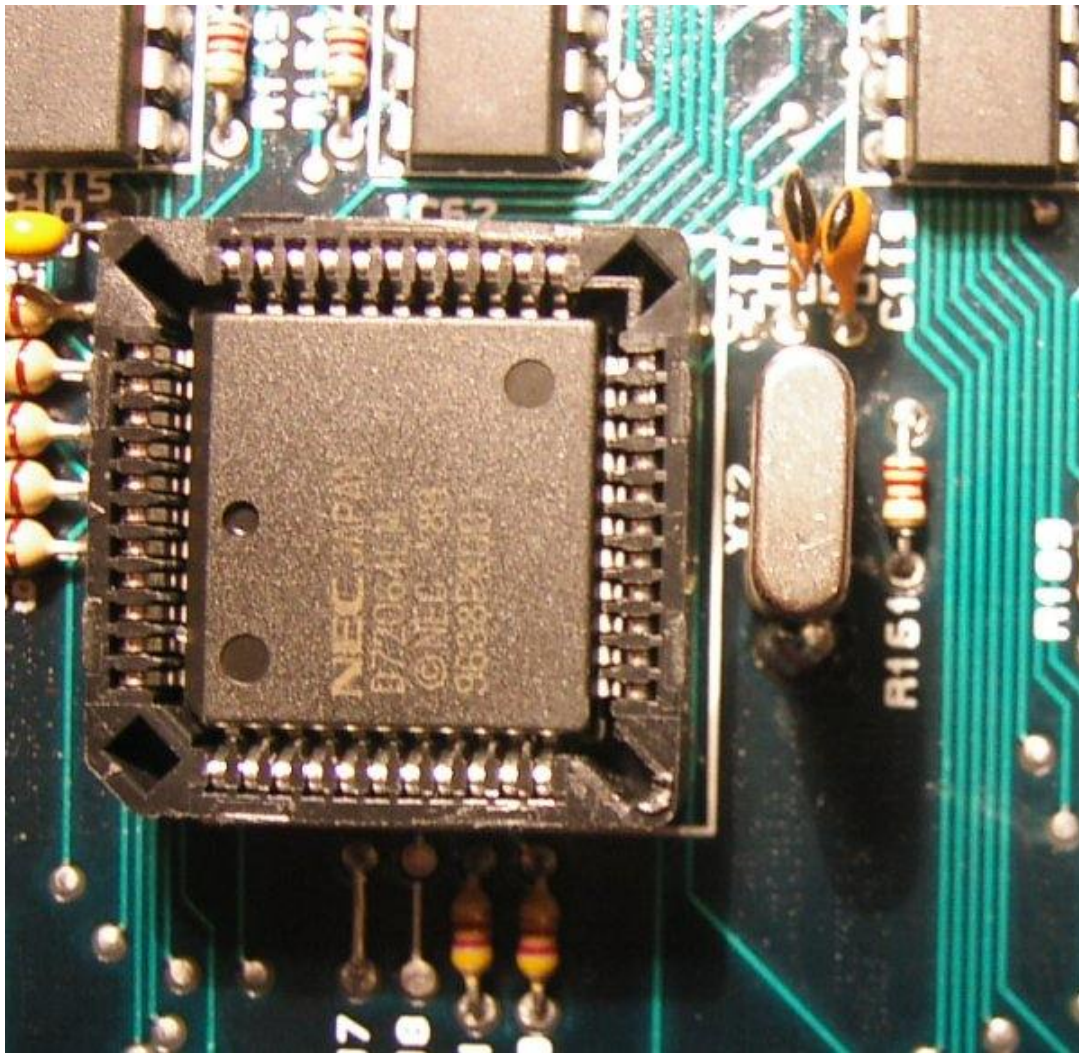
Remove jumper J6. This feeds the system clock to the floppy controller and is now replaced by the new 32 MHz clock on the controller itself.
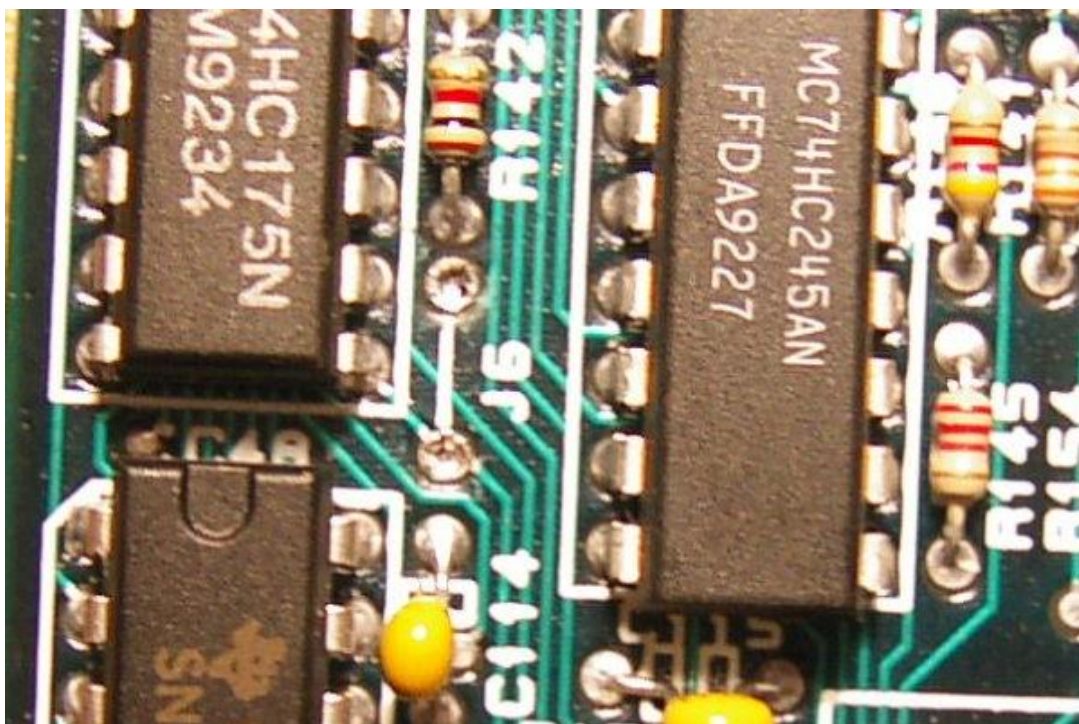
Remove the old ROMs. The turbokit will fit into these sockets.
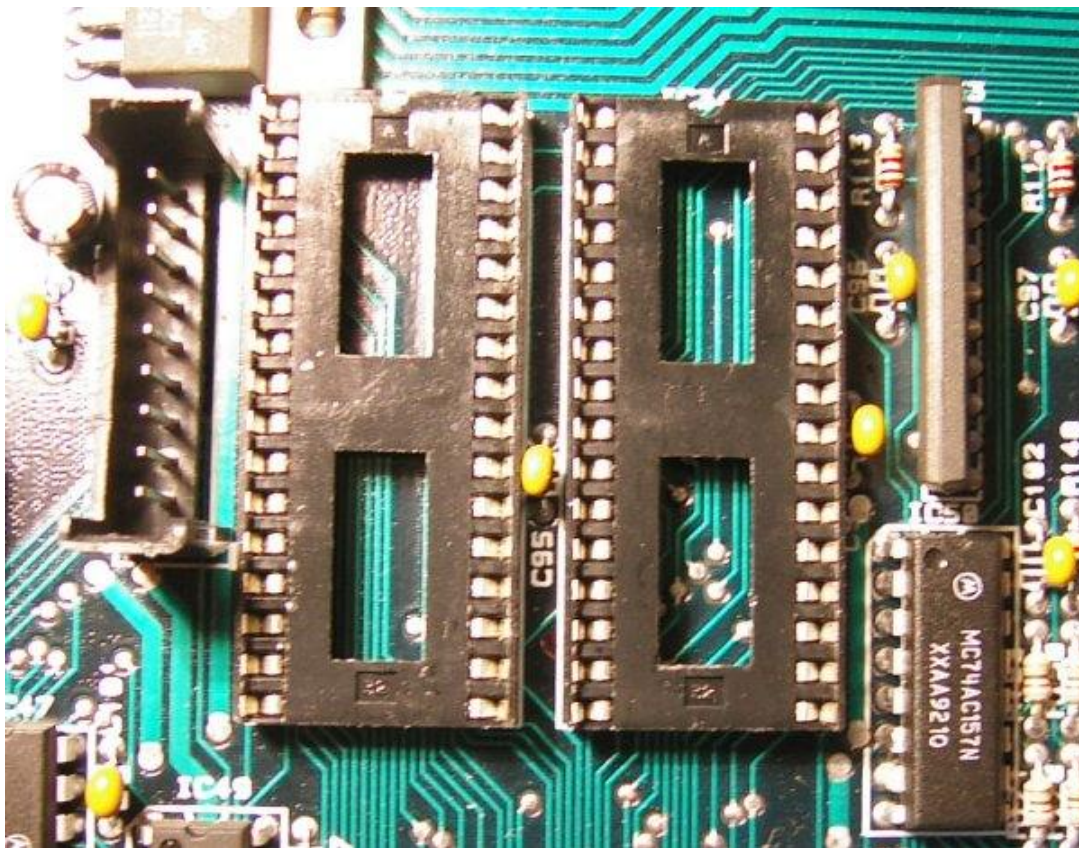
The piece of felt folds around the sharp edges of the metal to protect the flatcables. You need to do some creative bending and folding to fit the cables between the turbo board and the CPU board. Take some extra care connecting the two plugs to the original ROM sockets. The pins are somewhat fragile.
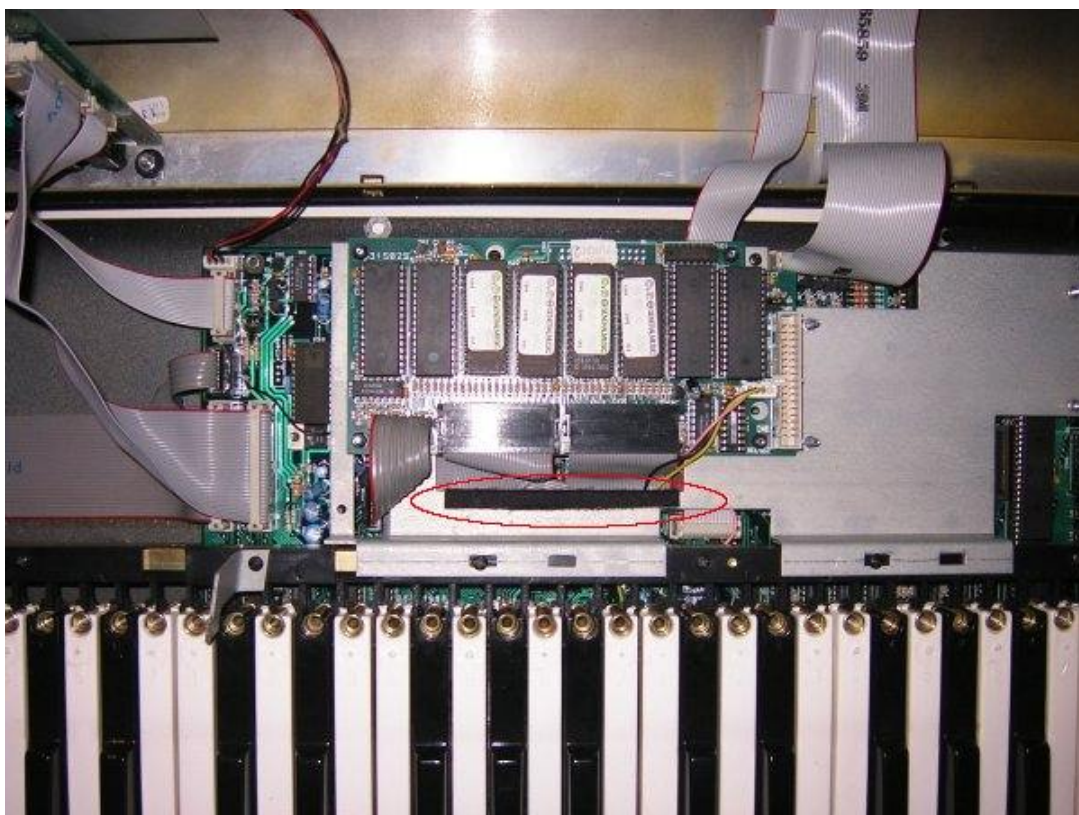

After installing the kit I was left with three resistors (one 220 ohm and two 82 ohm) I could not find in the installed S2 and hence did not installed in the S3. This worked without problems. However, since I did find the installation manual in the end I've now managed to locate these. The 220 ohm resistor is R186. My S3 already had a 220 ohm resistor in that position, so there was no need to replace that.
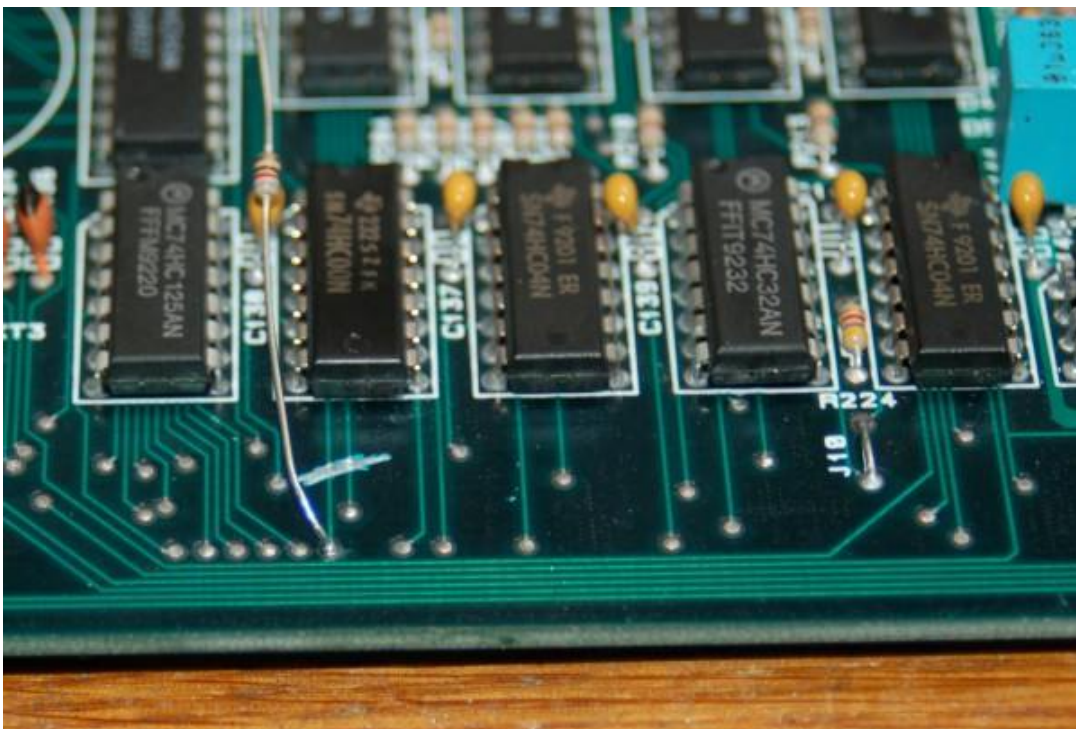
One 82 ohm resistor fits on the back of the CPU board and connects to pin 3 of IC53.
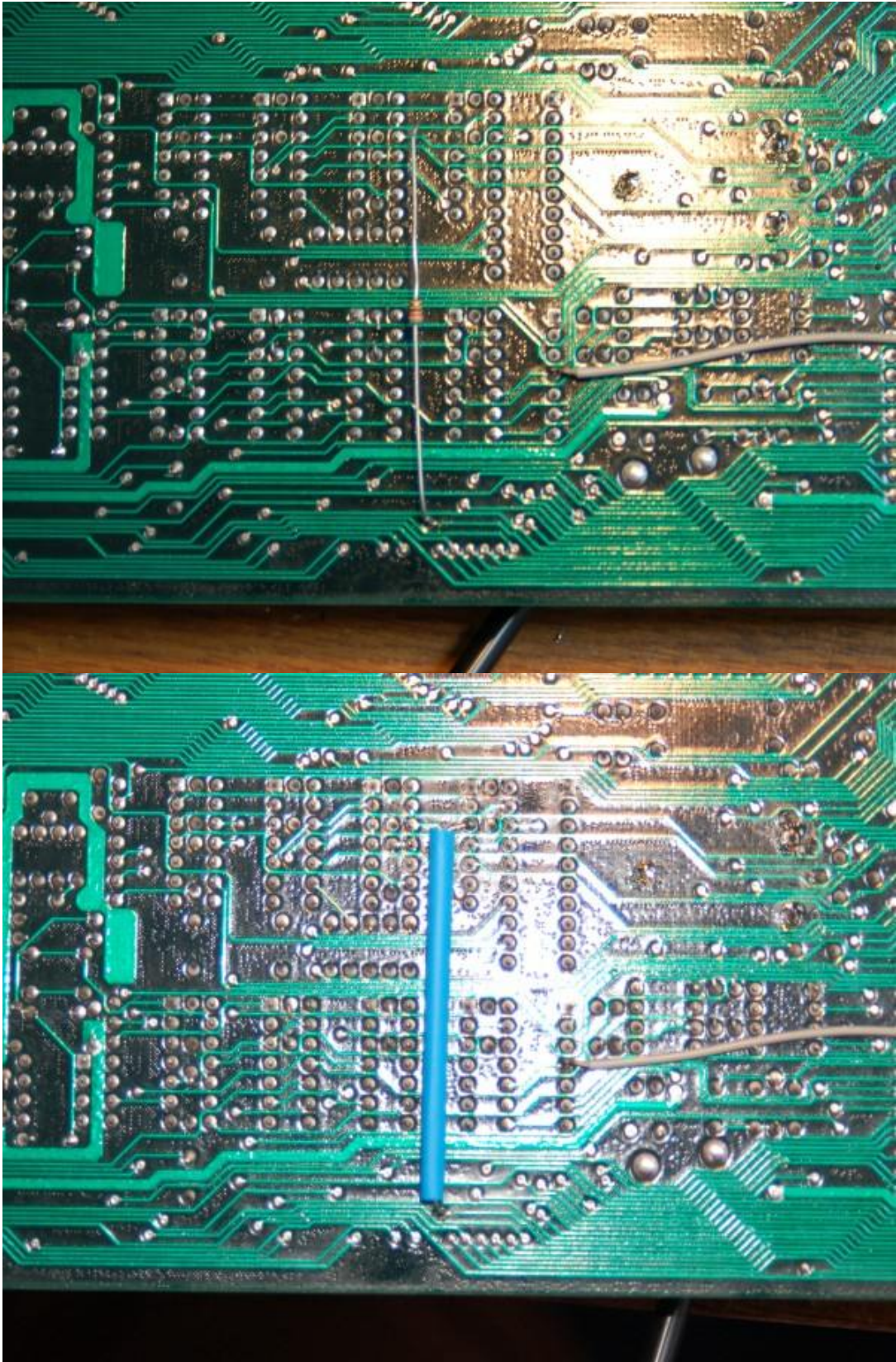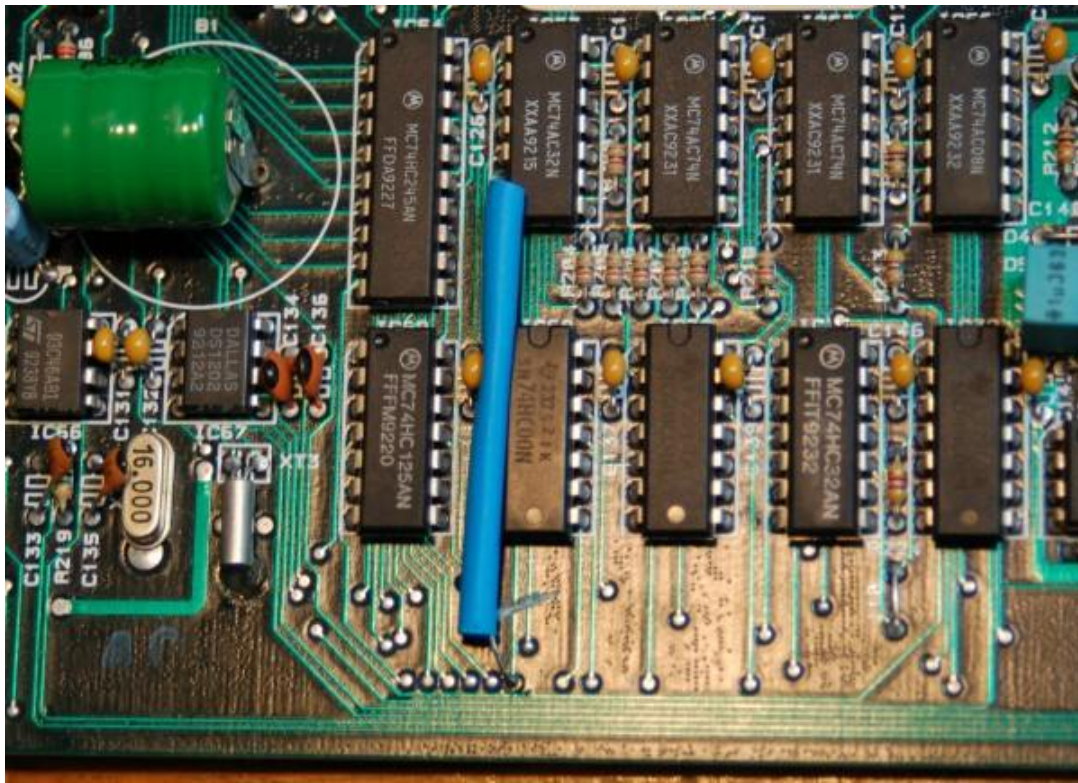
Two tracks are cut below IC68
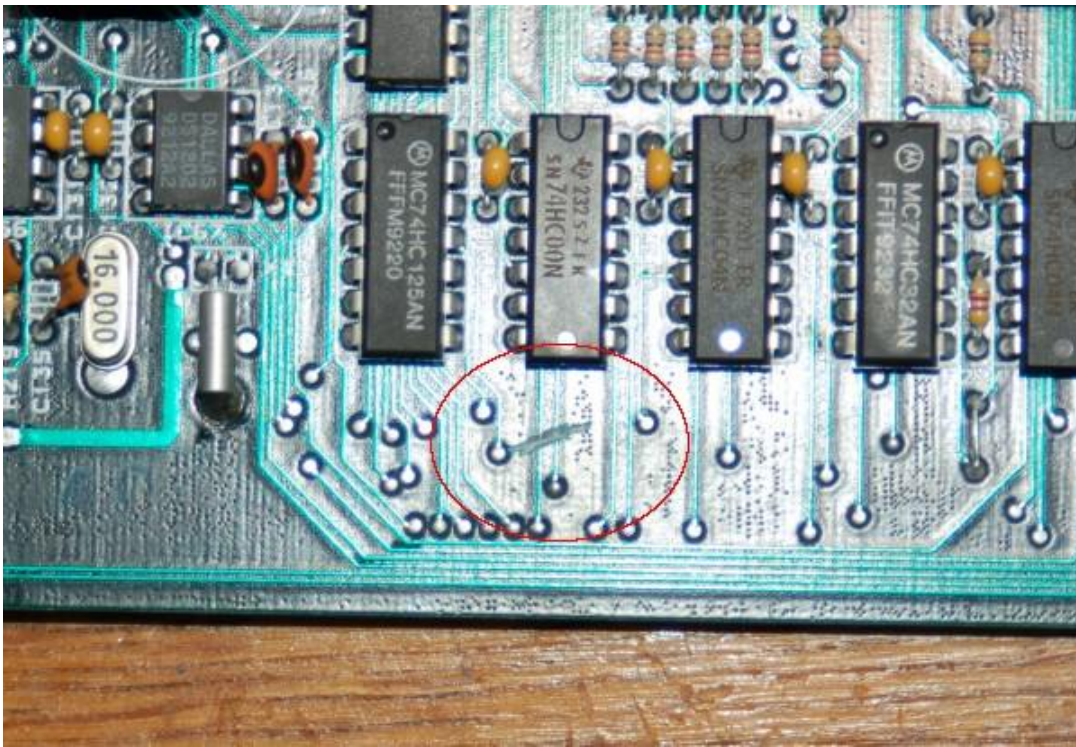
The other 82 ohm resistor is connected to pin 6 of IC53.

NOTE 1: my self-installed S3 Turbo did not accept the RAM disk chips. I then swapped the turbo board with the S2 which *did* accept the RAM disk. As the turbo boards come pre-fitted, and the S2 board RAM disk works fine in my self-modified S3, the problem probably lies with the board that came with the new turbokit. I think it might have been the 1MB/4MB jumper which was in a bad state. Any fault in the modification of the CPU board would show with either board. Since I wanted the RAM disk chips in the S3 I ended up using the old board (with the ROMs from the new board) in there.

NOTE 2: there were marked differences between the S2 CPU board and the S3 CPU board. Most notably the S2 board had a number of wires running right across the board. Measuring the connections I found that all of these extra wires were integrated into the board for the S3. Another smaller example is that in the picture of the battery above, which is from the S3, R229 is parallel with the four other resistors. In the S2 it is placed diagonally across to where J3 is, and the wiring on the board is slightly different. There are more of these subtle differences between the two boards. As far as I could tell these are all cosmetic and the underlying electronics are identical.