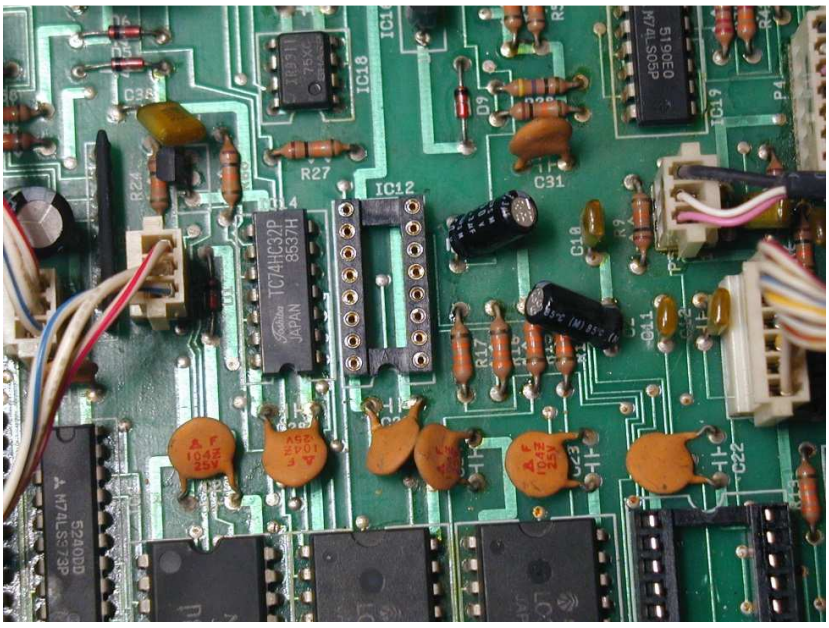
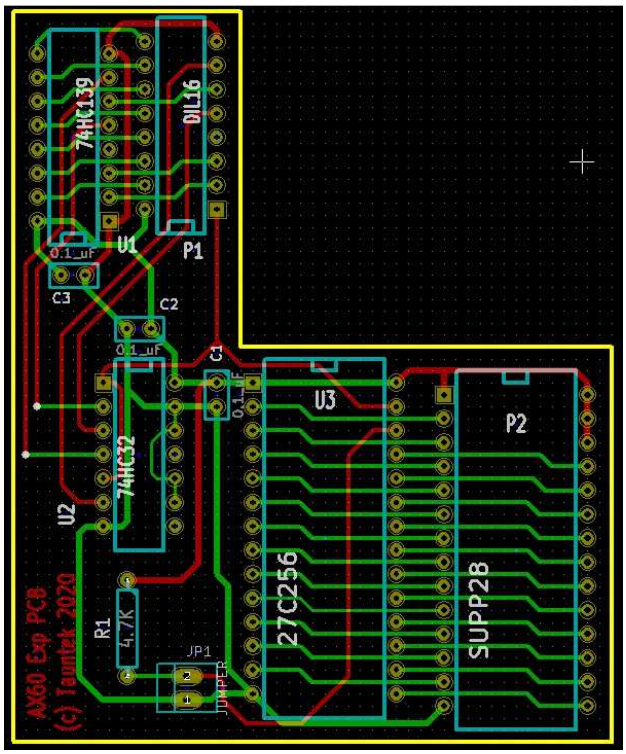
AX60 EPROM Expansion Board Installation R Grieb 2/10/2020

1) **This procedure will erase your patches**, so you may want to save them to "tape" first.
2) Mark all connectors which plug into the CPU board. They are designed so that they will only seat properly if plugged in the right way around, but you can still plug them in backwards. They just won't go all the way down. You may want to mark one end with a line on the connector and a line on the pcb. Or if you can find the "1" on the pcb near one end of the connector, mark that end of the plug with a line. (My AX60 had all of the connectors marked with numbers, but the numbers were simply made up. For some reason they didn't use the connector numbers marked on the pc board. I have re-numbered them.) You may also want to take a few photos showing how the various cables are routed. Mine were a mess, so I re-did them based on some photos from the web.
3) Unplug all connectors and remove the CPU board from the AX60. You will need to remove the nuts and washers from the four rear panel jacks and two additional screws on the rear panel.
4) You will be removing IC12, a 74HC139 decoder which generates the chip enables for the two SRAM chips. This chip gets battery voltage when the synth is powered off. My copy of the schematic shows only one of the SRAM chips as being battery-backed-up, but on my unit both RAMs were. In any case, when you remove IC12, the RAM chip enables will be floating, causing these chips to draw undesired current from the battery. To avoid this, I suggest unsoldering the end of R25 (green brown red, 5.1K ohms, next to the battery) that connects to diode D2, and bending this end of the resistor up so that it does not connect to the pcb. This will completely disconnect the battery, preventing any drain when IC12 is removed. **All patches will be erased**. If your battery has been replaced with a socketed one, simply remove it from the socket.
5) Once the battery has been disconnected, using a pair of small diagonal cutters, cut each pin of IC12 close to the body of the chip, then use tweezers and a soldering iron to remove each pin from the top side of the circuit board. This technique insures that no damage is done to the pcb eyelets or traces. Clean the solder from the IC12 pcb holes with de-soldering braid or a suction device.
6) Install a 16-pin IC socket with machined pins in place of IC12. It should look like this:



7) Remove the 2764 EPROM IC7 from its socket by carefully prying up each end in turn using a small flat blade screwdriver. Be sure to pry between the socket and the IC and not the socket and the pcb. Try to bring the EPROM straight up (not tilted end to end) to avoid bending any pins.
8) To get the best alignment between the headers, the pcb, and the IC sockets, it's best to fit everything together first, then solder it in place, as in the following steps.
9) Insert the two SAM1111-8 round gold headers into the IC12 socket, with the smaller diameter pins plugged into the socket.

10) Insert the longer pins of the Aries 28-pin header into the IC7 EPROM socket. (The pin 1 corner is rounded off)
11) Place the EPROM pcb onto the 16 gold header pins and the 28 header pins from the previous steps and gently push down on it to seat it. The gold pins are slightly higher than the Aries header ones, so the board will not be perfectly level. You will notice that the ends of the Aries header pins are just barely above the top surface of the pcb. If they are not above the pcb, gently push the pcb down onto the header.
12) Once you are satisfied that both ends of the board are seated properly, solder all pins of both headers on the top side of the pcb.
13) Carefully unplug the pcb from the AX60 board. Probably the best way to do this would be with a small screwdriver prying between the Aries header and the 28-pin IC socket. This header has more friction with its socket than the one at IC12.
14) Install the remaining components on the EPROM pcb. Note that the two smaller IC's are not facing in the same direction. Install the 2-pin male header at position JP1, but don't place the shorting jumper on it. Here is a layout capture showing the component placement. I have cut the trace between C1 and U2 pin 14 on the bottom of the board to correct an oversight.



15) Check the ceramic capacitors on the AX60 board which will be under the EPROM pcb and gently bend them over just enough to prevent them from hitting.

16) Carefully plug the assembled pcb into the sockets at IC12 and IC7. You will mainly need to press (gently) on the board above the EPROM socket, after making sure that both sets of header pins are lined up with their sockets. This is how it should look:

17) After you have the pcb headers correctly inserted into the two IC sockets, and you are sure that the notches on the ICs match the silkscreen, reconnect R25 to apply battery power to the SRAMs.
18) If you have a DMM with a low DC voltage range, you can measure the voltage from one end of R25 to the other. On my unit I get 0.028mV across this resistor with the battery connected. Since R25 is 5.1K ohms, if the standby current is 1 uA, the voltage will be 5.1mV. So on my unit, the current is much lower than this. I would say that anything less than 5mV across R25 is probably OK. If your meter's lowest scale is 200 mV, then you may have trouble getting an accurate reading, but can still see if there is a standby current problem. If the meter shows 0.0mVolts, then you may not be making a good connection to R25.
19) After confirming that the standby current is correct, re-install the CPU board in the AX60. It's easy to cross-thread the nuts on the four ¼" jacks, so watch out for that. Re-connect all of the cables.
20) This completes the installation of the EPROM expansion board. You can revert to un-modified V1.2 firmware by installing the jumper at JP1. This would be useful in case you want to answer a "Did it do that before?" kind of question. You should only install or remove the jumper when the AX60 is powered off.

Slider Taper Mod:

While you have the AX60 open, you may want to add some resistors to modify the tapers of five of the sliders. The five sliders are VCF Resonance, and Envelope Attack, Decay, Sustain and Release. The new firmware has a feature that achieves a similar result, however the firmware modifies these parameters as they are read from the patch buffer. As a result, patches made before the mods may sound a little different with the mods enabled. Using the resistors affects only the sliders and not recalled patch parameters, so it avoids this issue. If you don't care about having existing patches changed a little, then just use the firmware feature to implement the changes. If you don't want existing patches to be affected at all, then install the five resistors and leave the firmware feature disabled. The resistors are 2.2K 1/4 W 5%. The one on the resonance slider connects from the wiper to ground. On the A,D,S and R sliders, the resistor connects from the wiper to the top (non-ground) end of the slider. (Note: I did not come up with the idea of adding resistors to modify the AX60 slider response. But it seems to make a definite improvement so I am mentioning it here.) **Adding the resistors or enabling the mod in the firmware does not affect the overall range of the slider.** It only changes the response curve. If you do decide to install the resistors, here is how they should look: