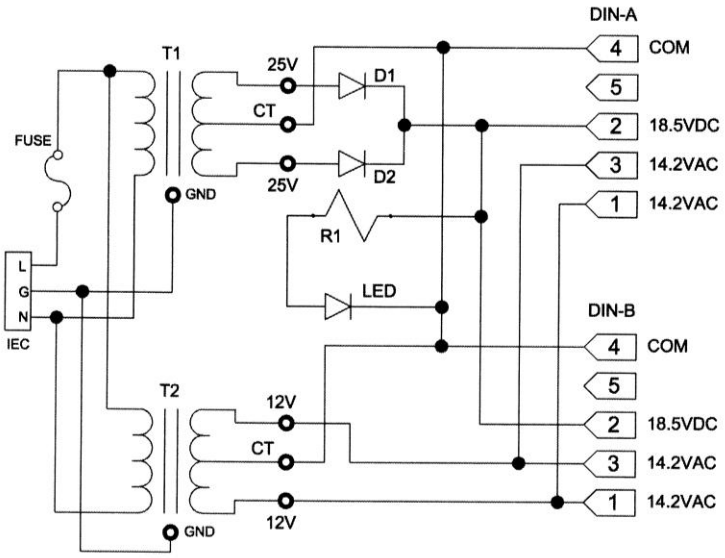
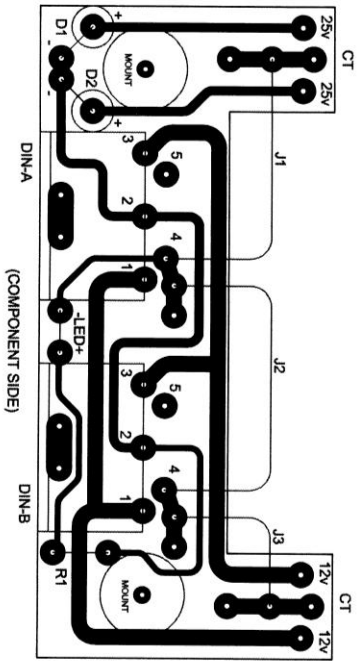
Radio Shack TRS-80 Power Supply Replacement

TRS-80 MODEL I POWER SUPPLY





Note: The following parts are for USA 120 VAC Mains:

IEC Power Entry Module	Mouser	693-6100.3100
Fuse Holder	RadioShack	270-367
T1 - 25.2V CT @2.0A	RadioShack	273-1512
T2 – 12.6V CT @3.0A	RadioShack	273-1511
D1, D2 – 200PIV @3.5A	Mouser	625-SBYV28-200-E3/51
R1 – 560 ohm Resistor 1/2W	RadioShack	271-1116
LED – Red T-1 ¾ 10mA If	Mouser	78-TLHR5400
DINA, DINB - Circular Conn.	Mouser	806-KCDX-5S-S2-PS
Enclosure – Hammond	Mouser	546-1594E-BK
Circular DIN Conn. Plug-5 pin	Mouser	568-NYS322G

The replacement power supply is for the TRS-80 Model I Radio Shack computer. The original “official” supply turned out to be an odd mix of AC and DC voltages that require a custom OEM transformer that is no longer available (except on E-Bay).

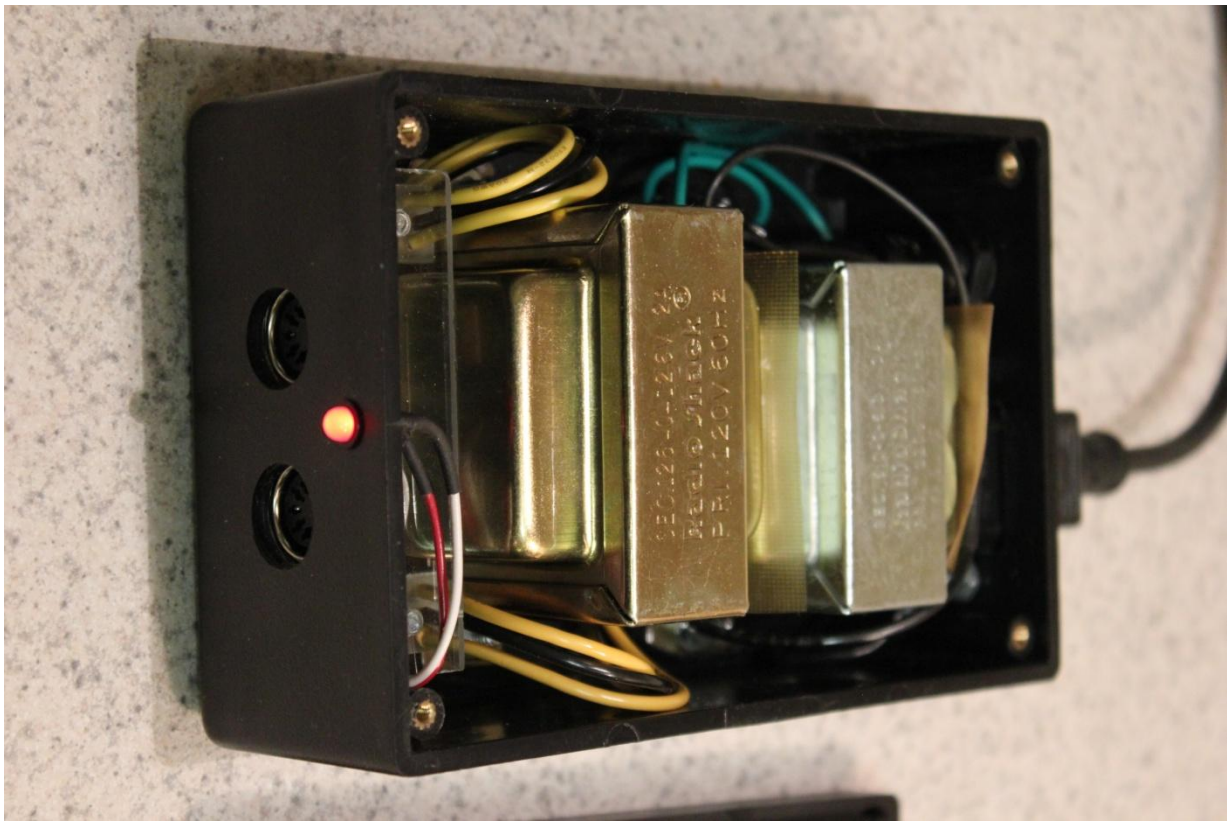
The design was to be compact and capable of powering the TRS-80 computer and the Expansion Interface combined. For this, two Radio Shack transformers were chosen. The (25.2V CT @2.0A) and the (12.6V CT @3.0A) were available and reasonably priced.

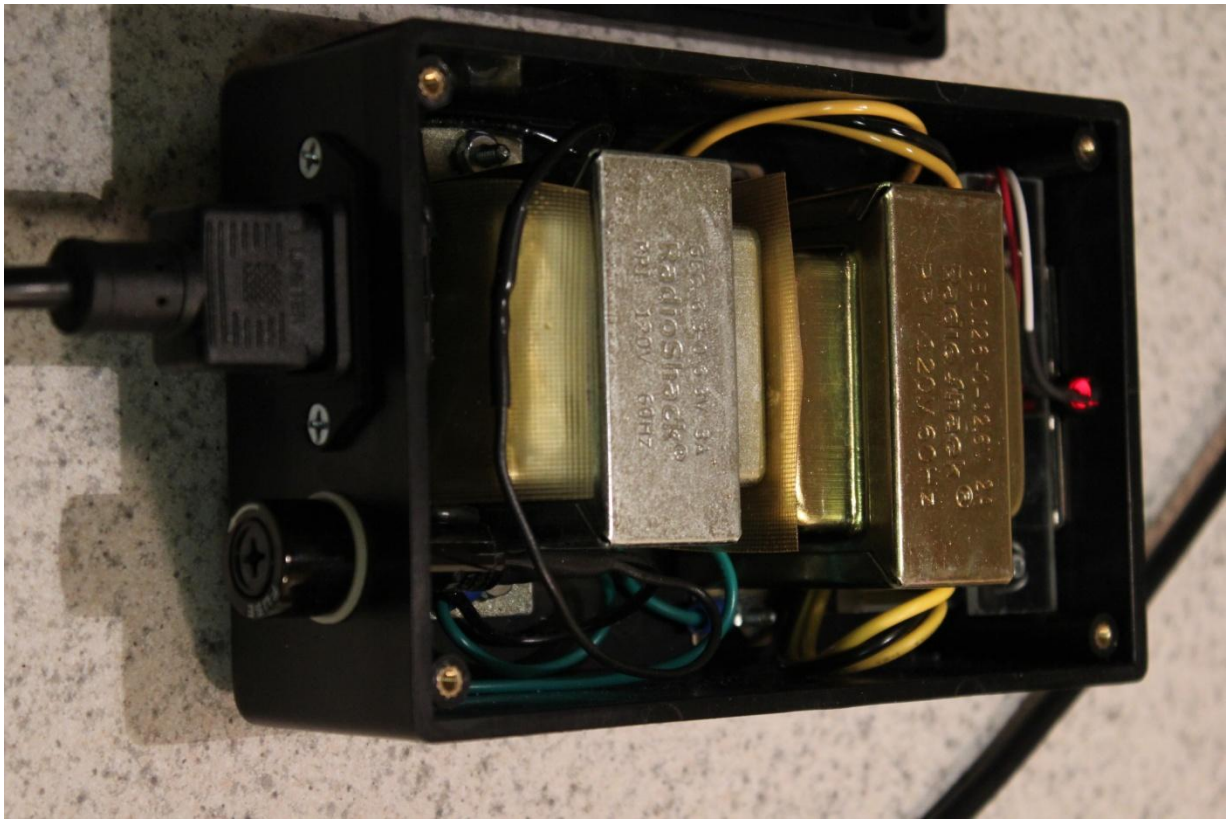
The Hammond Enclosure used was the smallest one found that could hold all the parts. A larger or cheaper plastic enclosure would have worked well too. The Hammond (546-1594E-BK) is made of a very thick ABS plastic that can support the weight of the two transformers. A Black colored unit was used for this project.

Holes were cut in the plastic enclosure for the IEC Power Connection Module as well as a hole for the Fuse Holder.

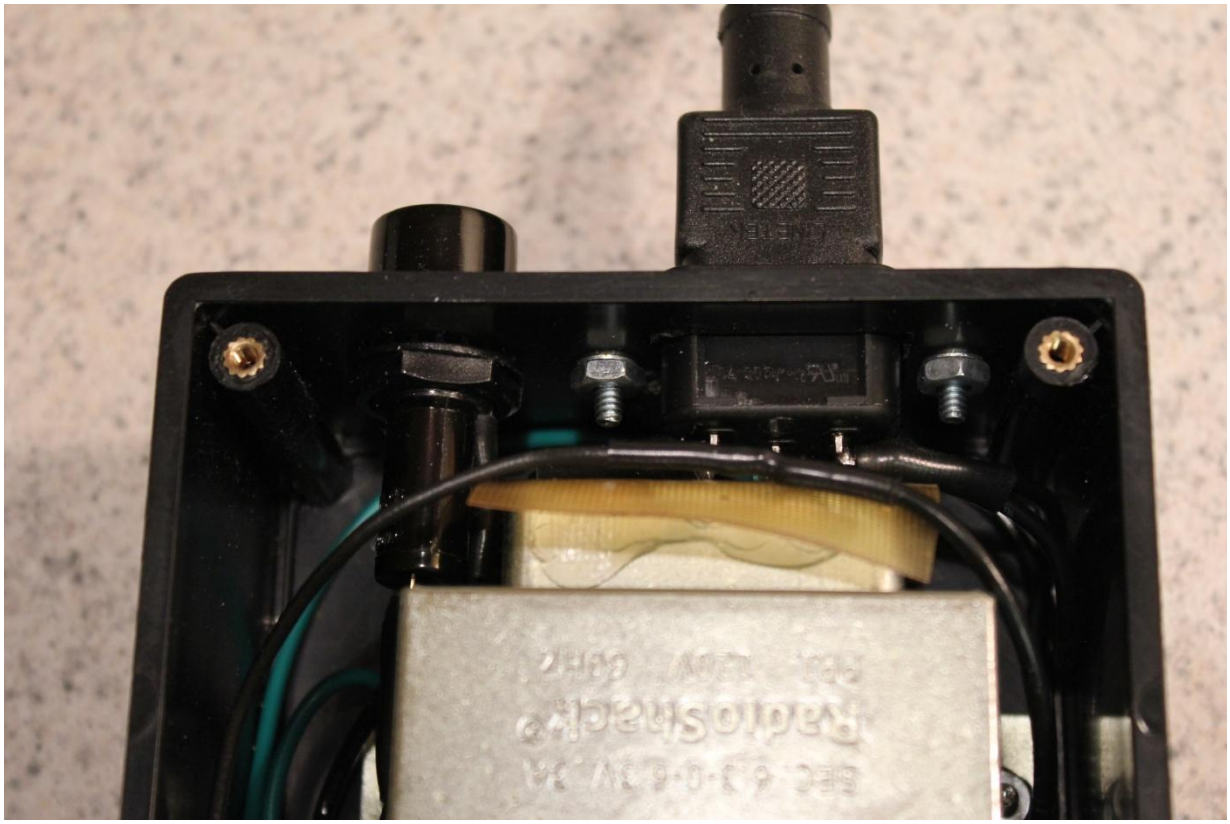
Additional holes were very carefully milled for the two Circular DIN connectors and the power LED. The DIN holes were actually cut after the PCB had been completed such that everything would line up.

The two transformers were mounted next inside the enclosure.

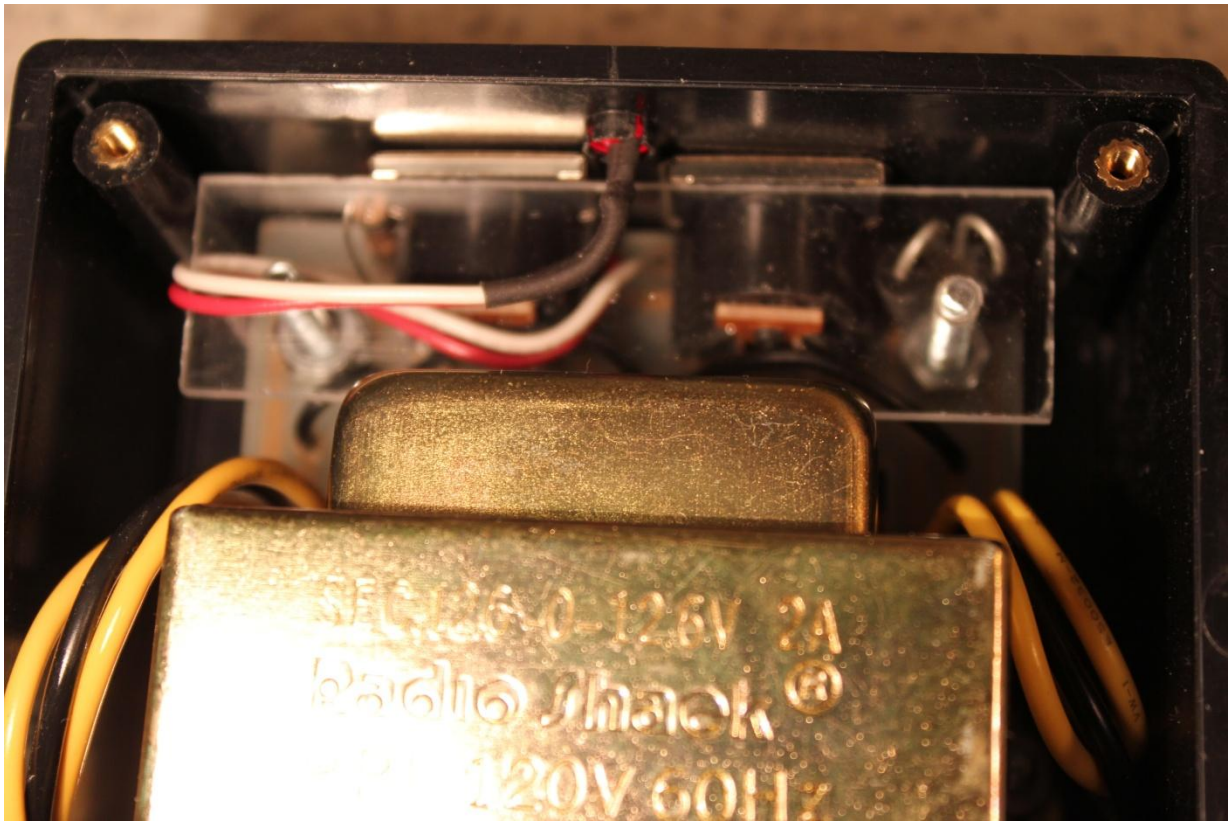




The IEC Power Connector, Fuse Holder and Primaries of the Transformers were wired together, soldered and insulated with heat shrink tubing. A piece of “fish paper” insulation was added around the transformers to prevent shorts. The 12.6V transformer is offset a bit to the left for the fuse holder.



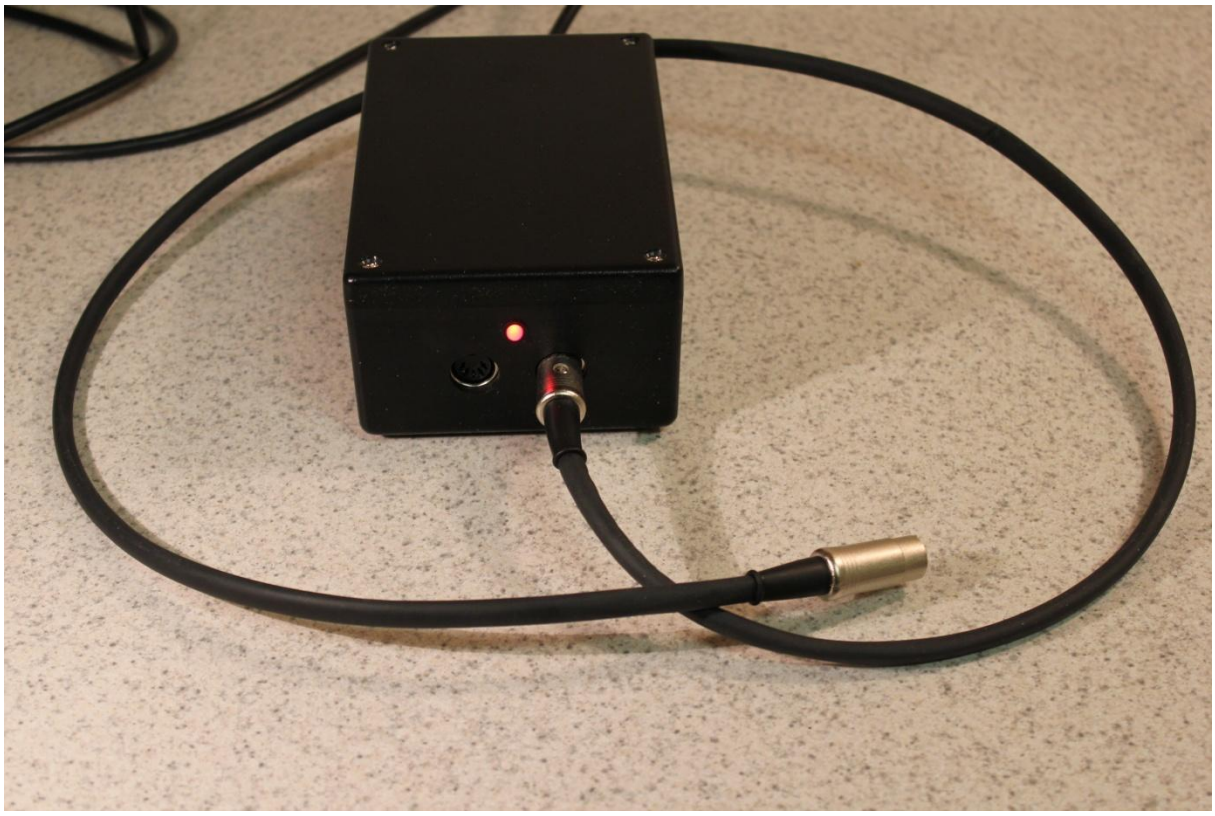
The 25.2V transformer is mounted toward the front of the enclosure and is used as a brace for the circuit board holding the DIN connectors. There is also a piece of clear plastic over the DIN connectors for bracing and insulation. Two holes drilled in the plastic hold the plastic brace in position.



The circuit for the power supply is very simple. The DC supply is created using two Diodes to rectify the AC into about 18.5V DC. The Diodes were used because of space constraints, the original supply used them and they produce the same output as a bridge rectifier. The AC supply comes directly off the transformer and is about 14.2V AC. Wiring and PCB traces should be heavier for the higher current passed. The Power LED uses the DC supply and a LED with dropping resistor. The DIN connectors are thru-hole PCB units that are soldered to the board. The PCB artwork was drawn with a CAD program, inverted and two copies were printed using a Laser Printer and overhead projector plastic sheet. The two copies were lined up and sandwiched between glass along with a pre-sensitized positive etch circuit board. After exposing, etching, drilling and cutting, the components were soldered to the PCB.

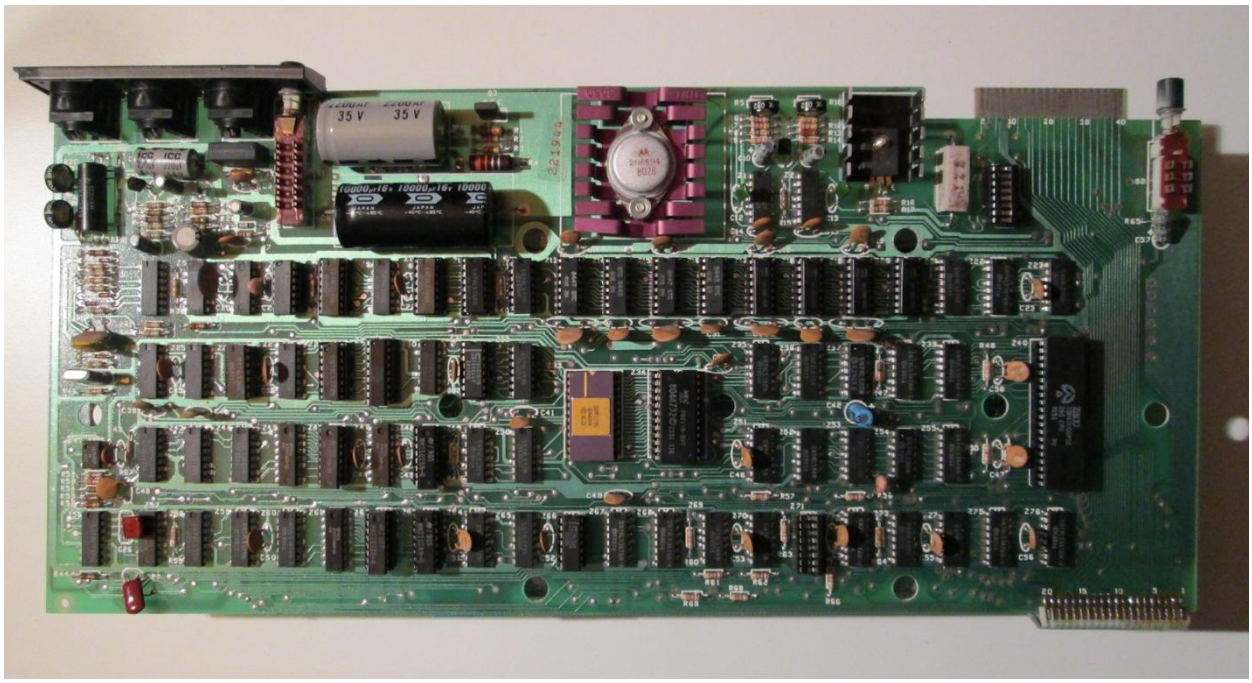
The finished PCB is held in place with two bolts and nylon stand-offs that position the DIN connectors over the holes cut in the front of the enclosure.

To connect the Power Supply to the TRS-80 computer a cable is required. Multi-conductor cables are very expensive so a poor-mans cable was made using a piece of heat shrink tubing and (4) 22 AWG stranded & insulated wires about three feet in length. Both ends of the cable were terminated using a male DIN plug (Circular DIN Conn. Plug-5 pin Mouser P/N:568-NYS322G). These are all metal construction and are very sturdy.



The finished Power Supply has adhesive rubber feet on the bottom of the enclosure. The unit has been working well for many months powering the TRS-80 Model I shown below. The high amp transformers should have no problem powering the Expansion Interface in addition to the computer.

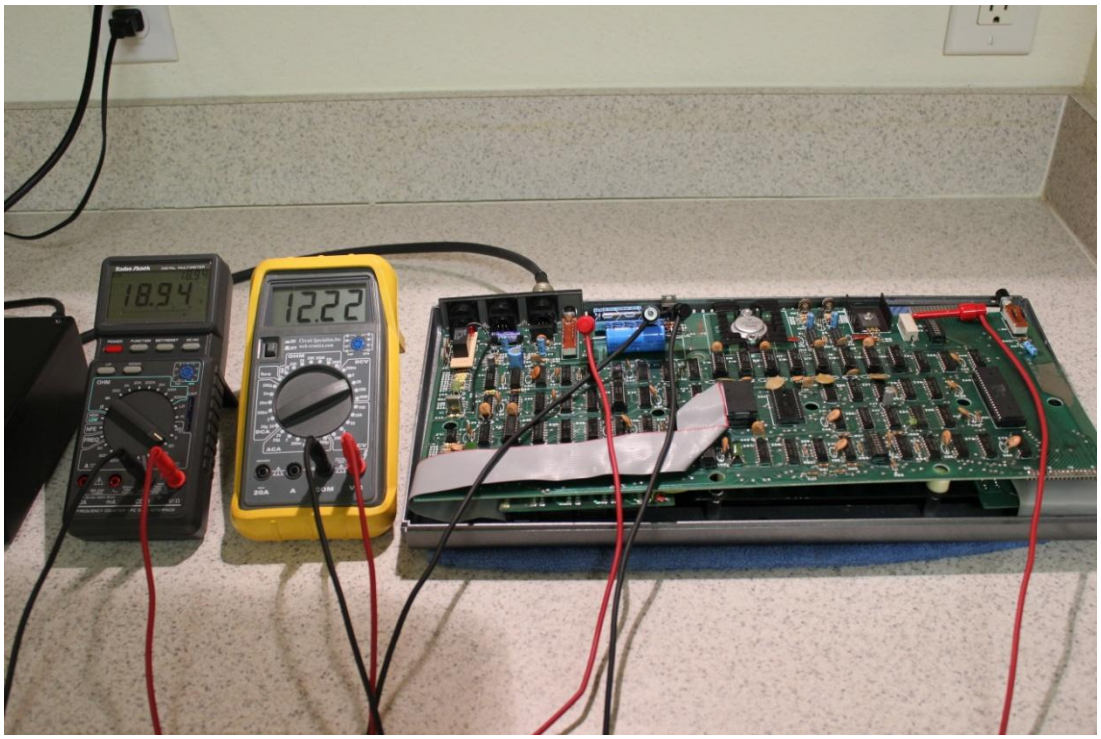
In conclusion, this Power Supply works very well but is more expensive than one found on E-Bay. If a different plastic enclosure was used that was larger, the simple circuit could have been assembled on perf-board. All the cables do not have to be removable, and if they were fixed to the enclosure, there would be a cost savings on IEC and DIN connectors.

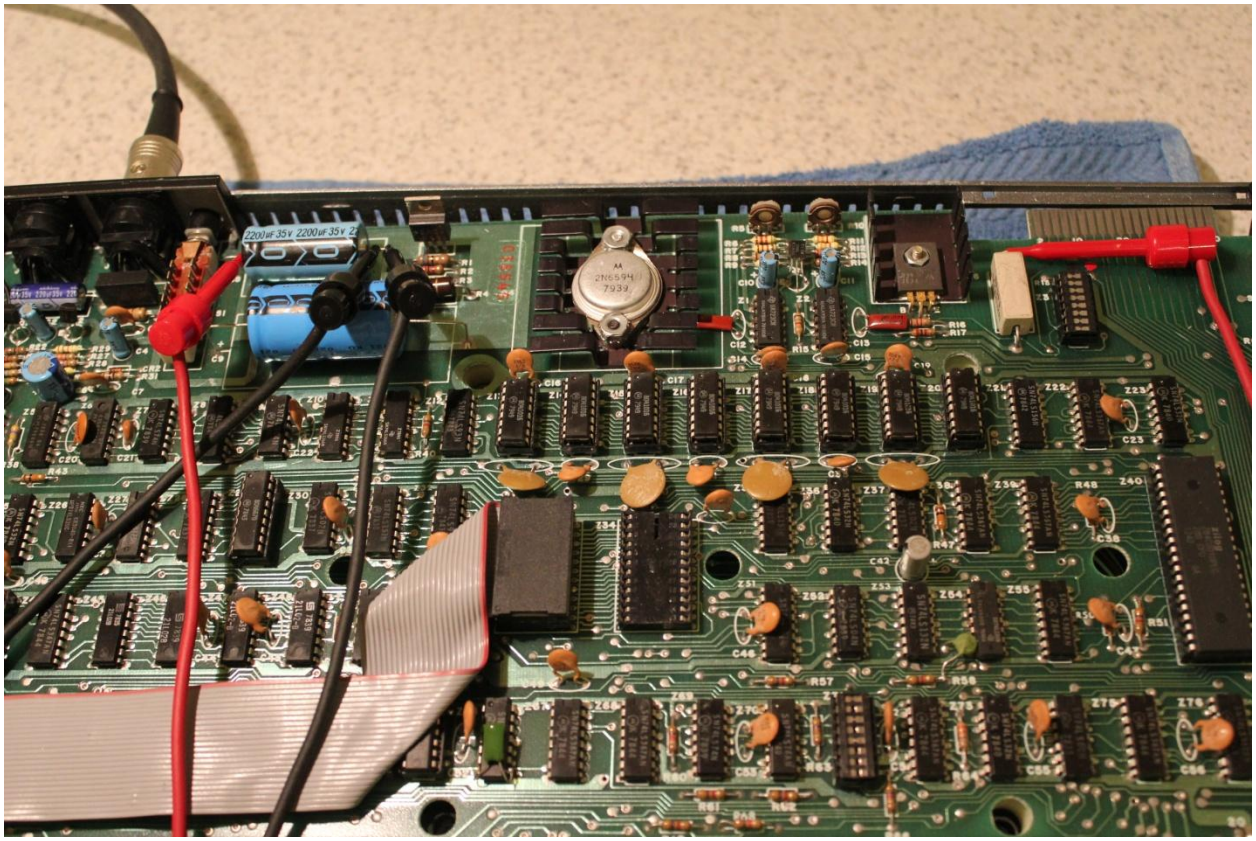


In operation, the TRS-80 runs cool with the heat sink on the 2N6954 transistor just getting warm. The internal 5VDC, 12VDC, -5VDC supply rails are all good.

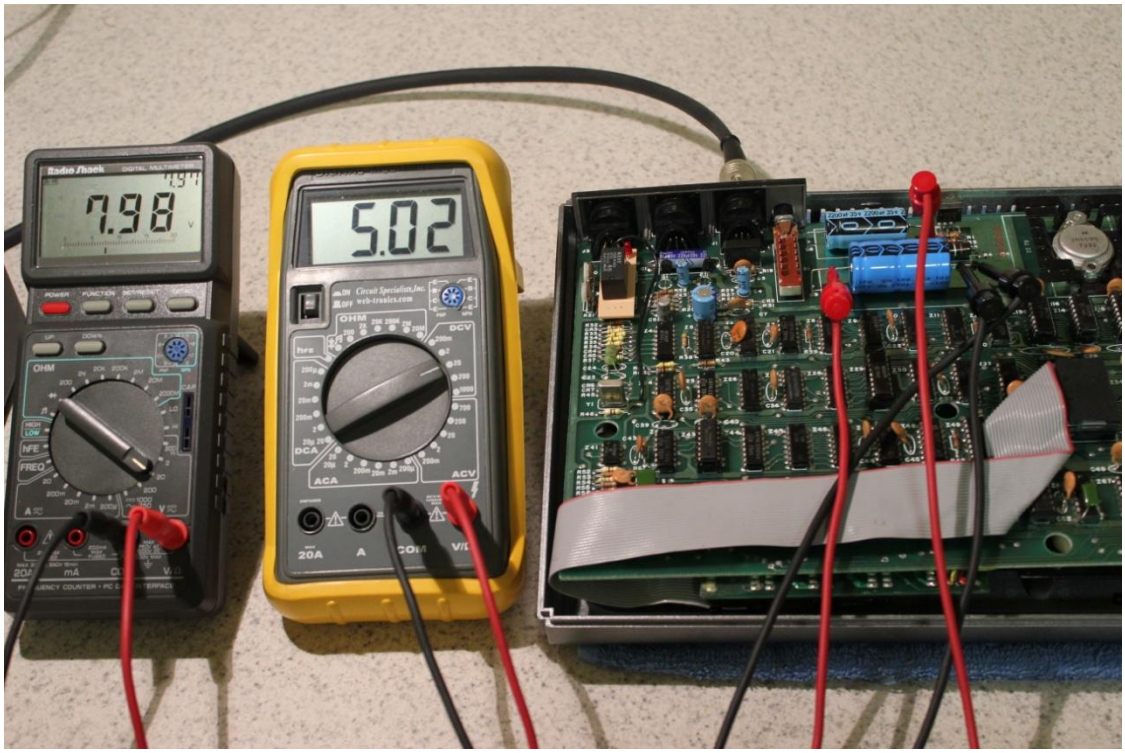
Measurements:

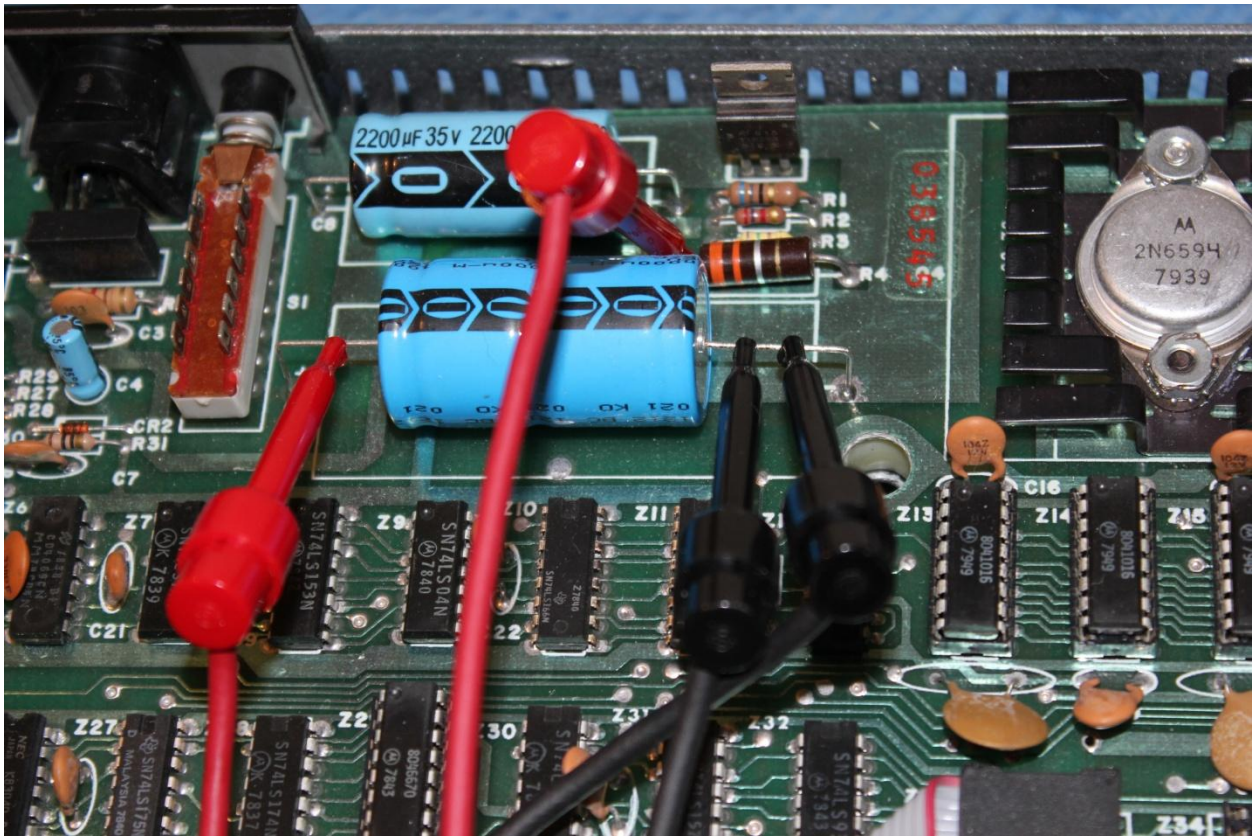
12 Volt Power Supply- Measured from C8 (input) and R18 (output)…12.22 volts



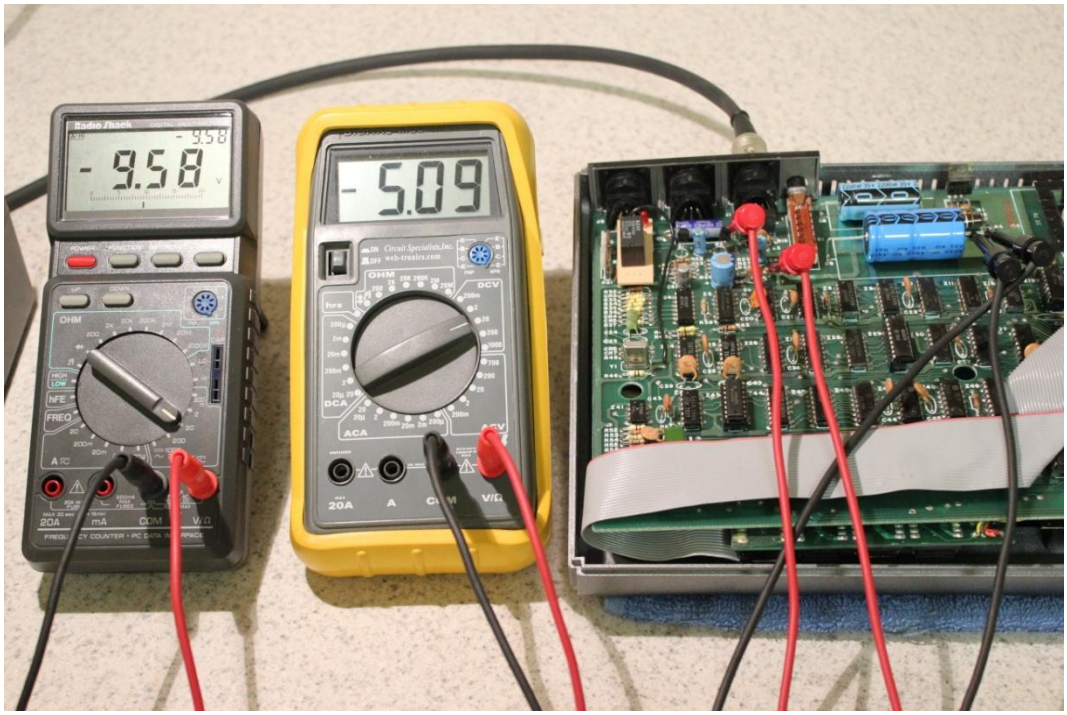


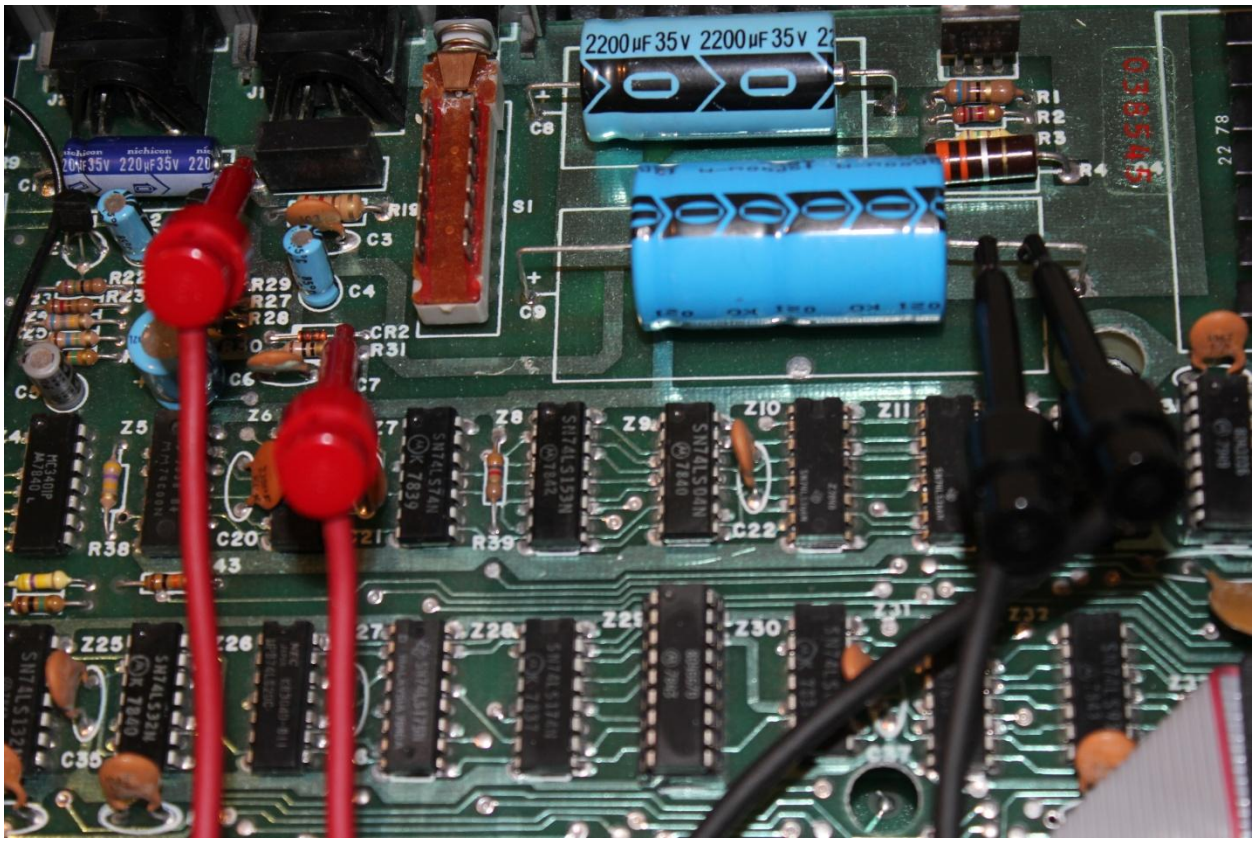
5 Volt Power Supply – Measured from C9 (input) and R4 (output)…5.02 volts





-5 Volt Power Supply – Measured from C1 (input) and CR2 (output)…-5.09 volts





Conclusion - Power supply seems to function correctly.