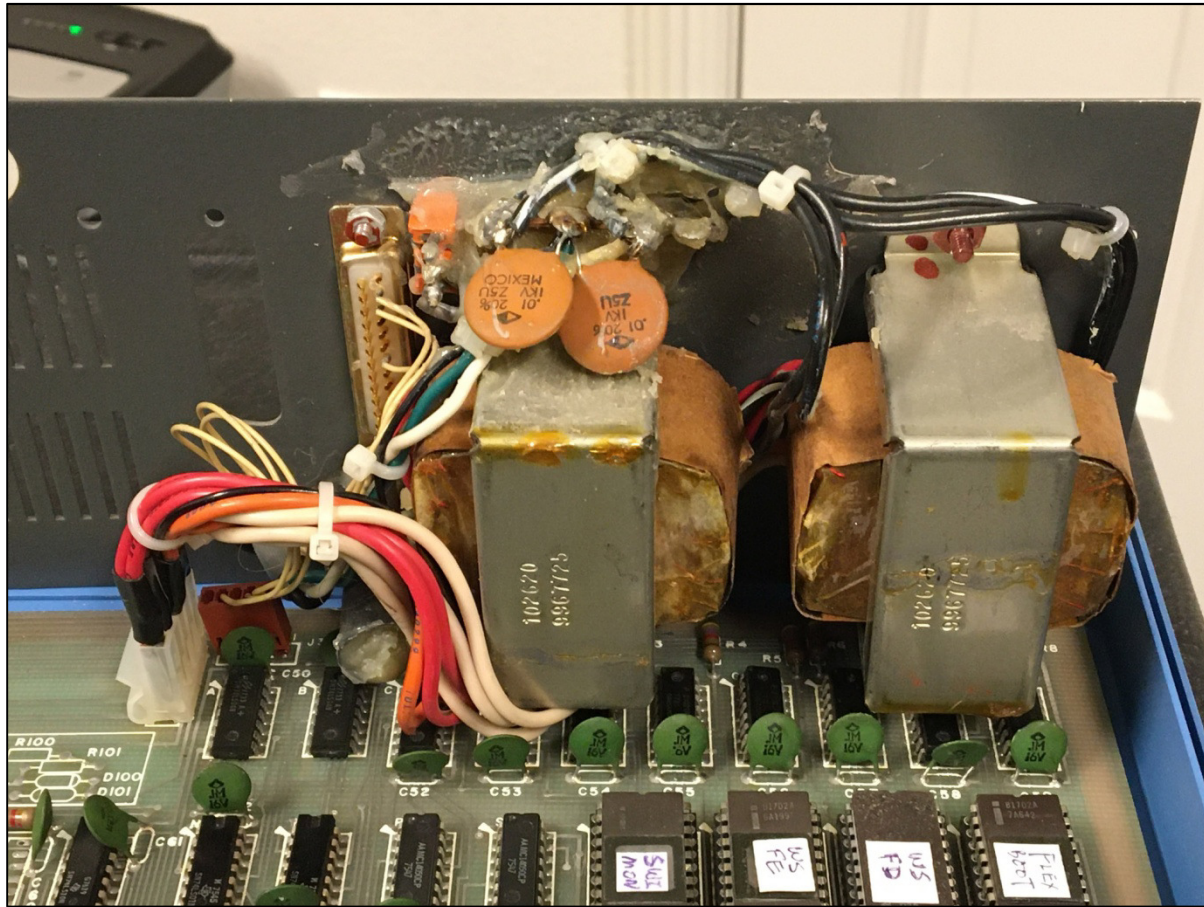
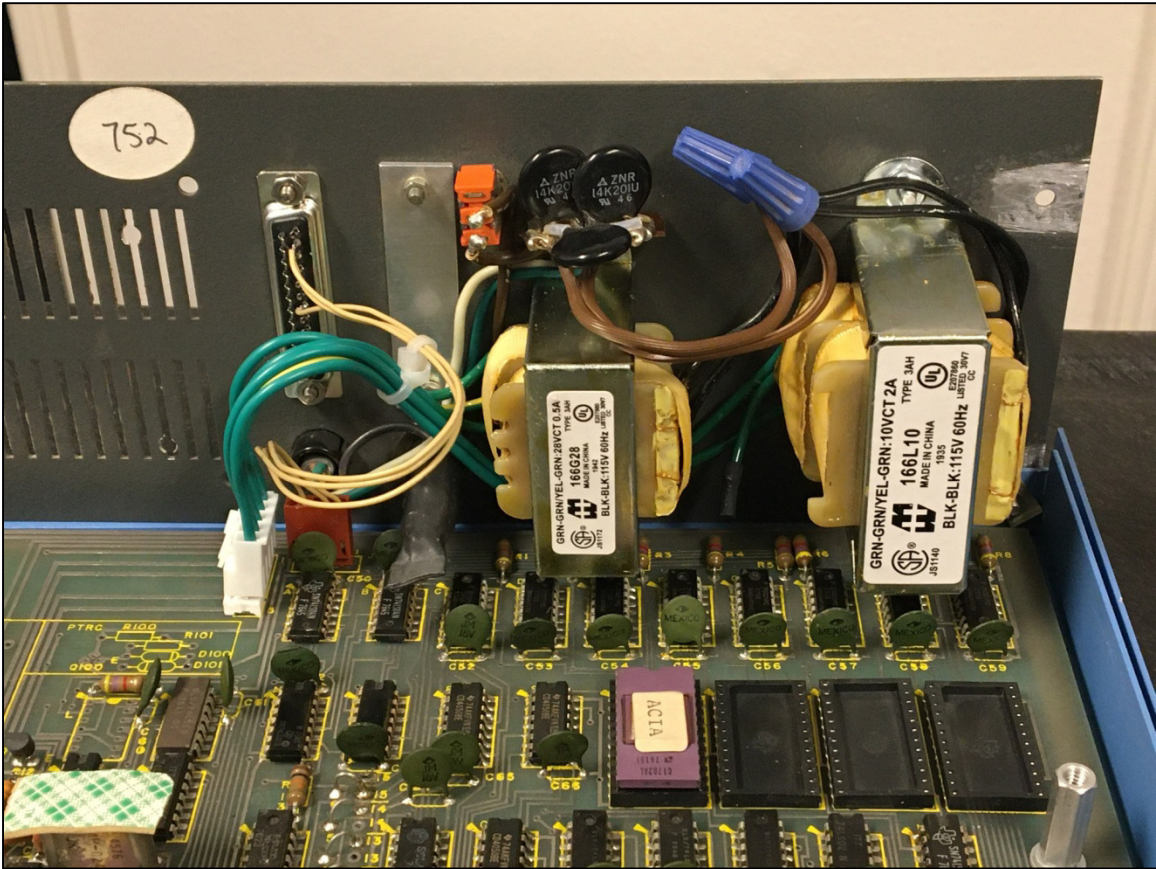


## Upgrading the Altair 680 with Two Transformers

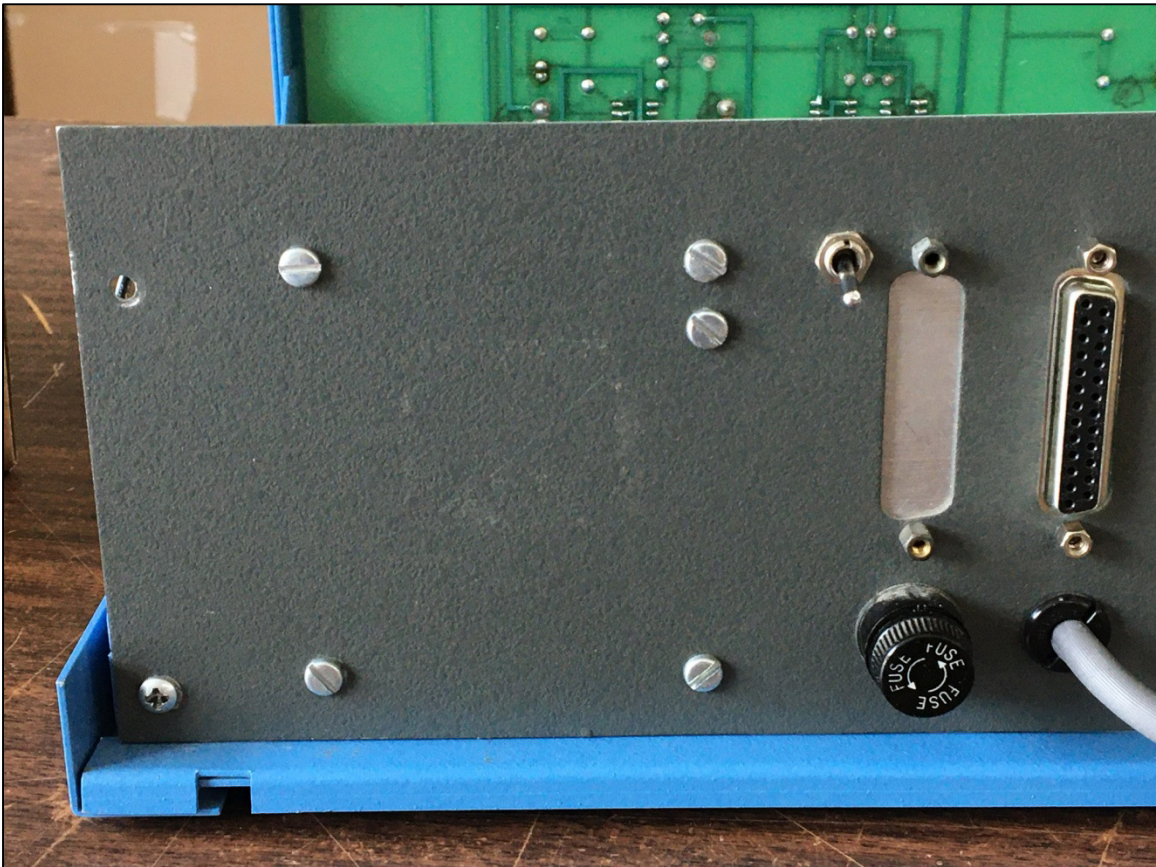
The original transformer provided with the Altair 680 includes two secondary windings: a 10vac winding and a 28vac center tapped winding. These were used to generate the 9vdc supply and the +/-16vdc supplies, respectively. To power two or more expansion boards, MITS recommended running two of these transformers in parallel (ensuring primary and secondary phases of both transformers were in phase with each other). As seen below, this resulted in a very crowded rear panel – especially in the middle where I/O connectors, the power cord, power filter, and the on/off switch are located.



Unfortunately, finding an equivalent off-the-shelf transformer today is basically impossible. However, it is possible to use two transformers – each with a single secondary – to accomplish the same end result. AC RMS current measurements of an Altair using the original two transformers in parallel are shown at the end of this document. From these measurements, we can specify a single transformer for the 9vdc supply and a single transformer for the +/-16vdc supply. This arrangement works well, the wiring is simpler, and the transformers are a bit smaller – especially around the middle of the rear panel where things get especially crowded.



(Transformers shown here are NOT the ideal transformers – see data page at end of document)



### Altair 680b Power Measurements (AC RMS Amps)

(Two original transformers in parallel)

	Main Board	16K RAM		KCACR		UIO		32K RAM + UIO
		Total	Add'l	Total	Add'l	Total	Add'l	Total
9v	0.83	1.04	0.21	1.05	0.22	1.20	0.37	1.62
+/-16V	0.14	0.24	0.10	0.20	0.06	0.15	0.01	0.35

### Secondary Voltages (powering main board only)

10.6 vac

28.2 vac (center tapped)

Red leads are the 10v secondary

White leads are the 28v secondary

Pin 1 on connector is closest to the rear panel

1	28vac
2	28vac
3	Center tap 28vac
4	10vac
5	10vac

Resulting VDC

### Recommended replacement transformers (Hammond Mfg):

0 Boards    3 Boards

#1	166L8	8.5 vac 17va (2.0A)	(to pins 4, 5, CT not used)	10vdc	8.9vdc
#2	166G25	25vac 12.5va (0.5A)	(to pins 1, 2, CT to 3)	20.5/-16.5	17.5/-16

### AC specs of these appear closer to original, but DC voltages too high

#1	166L10	10vac 20va (2.0A)	(to pins 4, 5, CT not used)	11vdc	10vdc
#2	166G28	28vac 14va (0.5A)	(to pins 1, 2, CT to 3)	21.5/-17.5	18.5/-17