7.2.2 Auxiliary Power Supply #8790025 (38W, Hard Disk Drive Only, Astec AA11330)

When the microcomputer is equipped with a built-in hard disk drive, an additional 38W power supply is required to supply voltage to the hard disk drive only. This supply delivers approximately +15 volts in normal operation, but surges to +31 volts durin@ start-up. It is contained in the same housing as the @5W power supply in the Main Unit of the computer.

7.2.2.1 Troubleshooting the Power Supply

Equipment for Test Set Up

1. Isolation Transformer (Minimum of 500 VA rating)

CAUTION

Dangerously high voltages are present in this power supply. For the safety of the individual doing the testing, please use an isolation transformer. The 500 VA rating is needed to keep the AC waveform from being clipped off at the peaks. These power supplies have peak charging capacitors and draw full power at the peak of the AC waveform.

2. 0-280 Variable Transformer (Variac)
   Used to vary input voltage. Recommend 10 Amp, 1.4 KVA rating minimum.

3. Voltmeter
   Needed to measure DC voltages to 50 VDC and AC voltages to 400 Vac. Recommend two digital multimeters.

4. Oscilloscope
   Need X10 probe.

5. Load Board with Connectors
   See Table 7-7 for values of loads required. The entries on the table for Safe Load Power is the minimum power ratings for the load resistors used.

6. Ohmmeter

7. Wattmeter

Setup Procedure

Set up as shown in Figure 7-35. You will want to monitor the input voltage and the output voltage of the regulated bus, which is the +5 Volt output with DVMs. Also monitor the +5 Volt output with the oscilloscope using 50 mv/division sensitivity. The DVM monitoring the +5 Volt output can also be used to check the other outputs. See text under NO OUTPUT for test points within power supply.

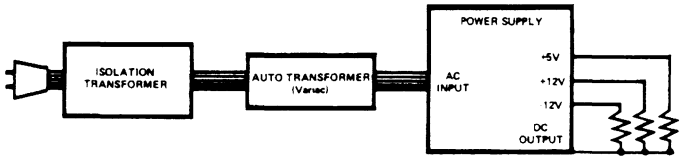


Figure 7-35. Test Setup

Visual Inspection

Check power supply for any broken, burned, or obviously damaged components. Visually check fuse. If there is any question, check with an ohmmeter.

OUTPUT	MIN LOAD	LOAD R	SAFE LOAD POWER	MAX LOAD	LOAD R	SAFE LOAD POWER
+5	0.45A	11.11 ohm	5W	2.5A	2 ohm	25W
+12	0.3A	0.40 ohm	8W	2.02A	24.24 ohm	50W
-12	0	0	0	0	120 ohm	2W

Table 7-7. Load Board Values

Start-Up

First note the position of the input voltage select wire. This wire can be found at the end of the PCB opposite the input/output connectors. Make sure that the jumper wire is in the proper voltage location.

Load the power supply with minimum load as specified in Table 7-7. Bring power up slowly with the variable transformer while monitoring the +5 Volt output with the scope and DVM and the input with a DVM and wattmeter. If the wattmeter shows significant power with low AC power being applied, shut down and refer to section following on NO OUTPUT. The supply should start with approximately 80-120 Vac applied and should regulate when 95 Vac is applied. If the output has reached +5 volts, do a performance test as shown in PERFORMANCE TEST which follows.

NO OUTPUT

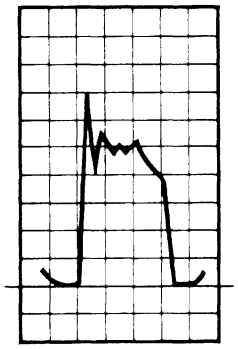
1. Check Fuse. If the fuse is blown, replace it but do not apply power until the cause of failure is found.

2. Preliminary Check On Major Primary Components. Check thermistor (R1), diode bridge (DB1), power transistor (Q2), and catch diode (D3), turn-off transistor (Q1), emitter resistor (R10), and diode (D1) for shorted junctions. If any component is found shorted, replace it.

3. Preliminary Check On Major Secondary Components. Using an ohmmeter from output common to each output (with output loads disconnected), check for shorted rectifiers or capacitors. If +12 volt output is shorted, also check crowbar SCR (SCR1) and zener (Z1).

4. Check For B+. Set up power supply and attach X10 scope probe ground to end of R11 closest to input capacitors. Slowly turn up power and check for B+ on the (+) terminal of the diode bridge (DB1). With the input at 95 Vac, this point should be 120-140 Vdc. If this is not measured, check the fuse, thermister (R1), DB1, R2, D3, and input capacitors C6 and C7.

5. Check Q2 Waveforms. Using X10 probe on the case of T03 package of Q2, check the collector waveform. The transistor should be switching, with the correct waveform shown in Figure 7-36. If this is not present, check for a shorted junction on Q2.



50 V/DIV
5 µsec/DIV

Input – 120VAC
Loads – +5 @ 2A
+12 @ 1A
-12 @ 0.1A

Figure 7-36. Q2 Collector Waveform

If OK, check the base waveform as shown in Figure 7-37. The base of Q2 is the uppermost of the two center leads on the back of Q2 heat sink. If this waveform is not present, check L3, Q1, and D1, secondary components Q3, D11, D12, D5, and L4. If any of the semiconductors is found shorted or if an inductor is open, replace it.

1.0 V/DIV
5 µsec/DIV

Input and Loads
same as above.

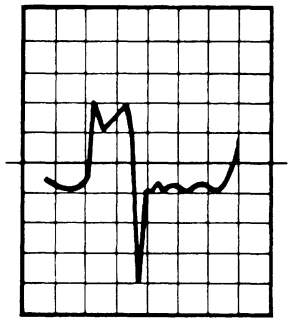


Figure 7-37. Q2 Base Waveform

Performance Test

Each of the test conditions noted below should be set up and results noted to be within the limits specified.

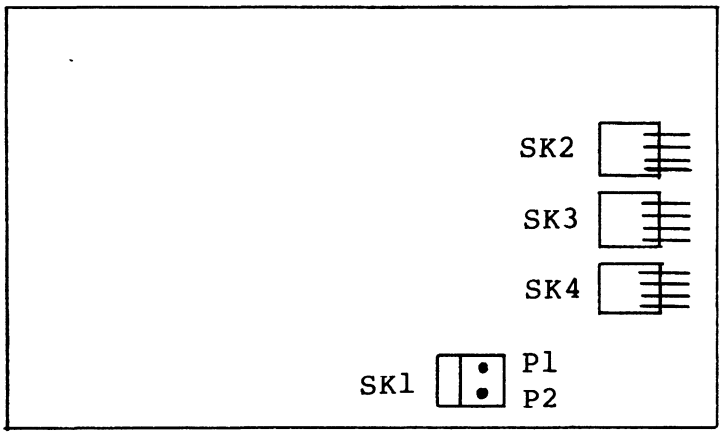
Test	Input	+5 Load	+12 Load	-12 Load
1	95VAC	Max	Max	Max
2	128VAC	Max	Max	Max
3	120VAC	Max	Min	Min
4	128VAC	Min	Min	Min
5	95VAC	Min	Min	Min

VOLTAGE AND RIPPLE SPECIFICATION

OUTPUT	MIN	MAX	NO LOAD	RIPPLE
+5	4.75V	5.25V	-	50mV P-P
+12	11.40V	12.60V	-	150mV P-P
-12	-11.00V	15.00V	-	150mV P-P

* Applies to resistive load only. Not under system operating conditions.

Table 7-8. Performance Tables

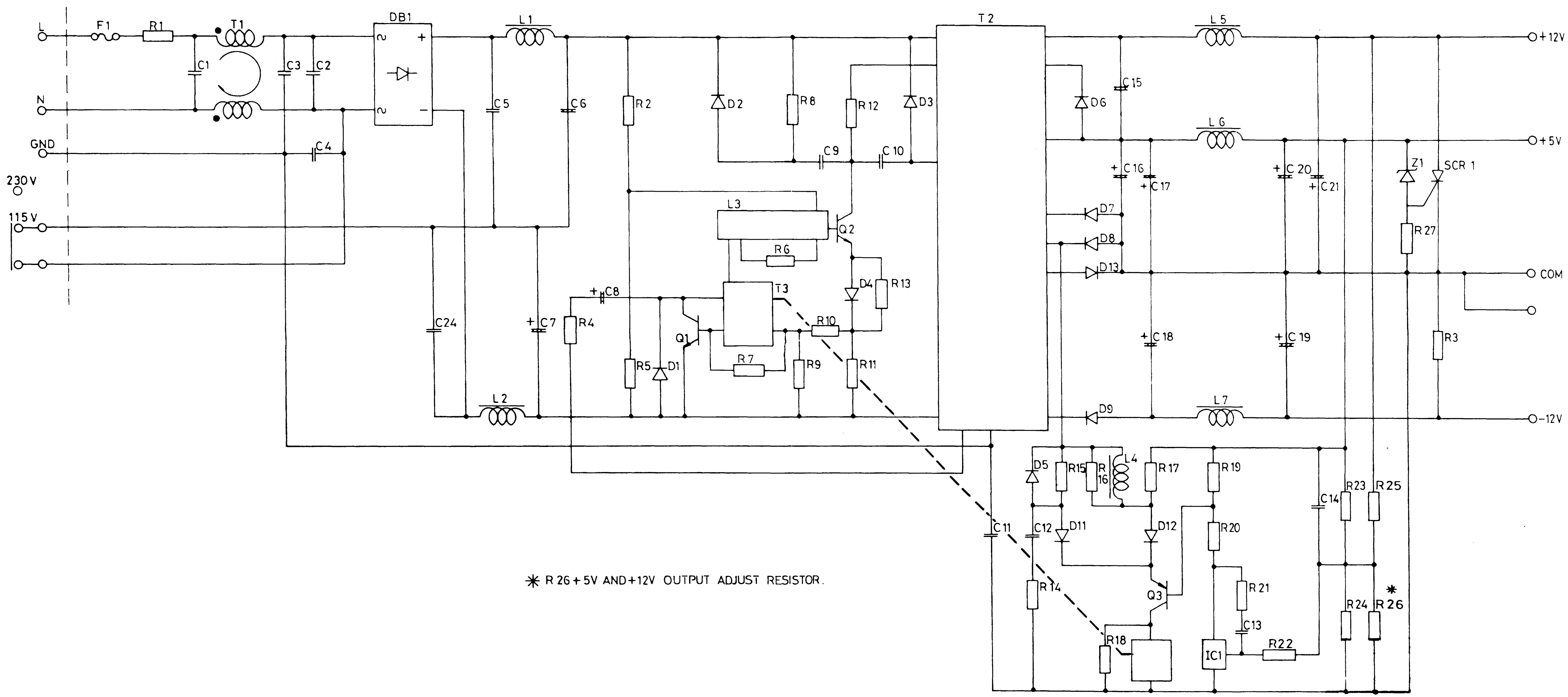


For SK1
P1 - Neutral
P2 - Line

For SK 2,3,4
P1 - -12V 0.1A Max.
P2 - +12V 2.02A Max.
P3 - Common
P4 - +5V 2.5A Max.

Figure 7-38. Power Pin Assignments

R	R1 R4 R2 R5 R6—R13 R14—R18 R19—R 27 R3
C	C1 C2,3,4 C24 C5 C6,7,8 C9 C10 C11 C12 C13—C21
L/T	T1 L2 L1 T3 L3 T2 L4—L7
Q/D	D1 Q1 D2 Q2 D4 D3 D5—D9 D11—D13 Q3
MISC	F1 DB1 IC1 Z1 SCR 1



Schematic, Power Supply 8790025 (Astec AA11330)

Schematic, Power Supply 8790025 (Astec AA11330)

Parts List

Power Supply 8790025 38W (Astec AA11330)

Item	Sym	Description	Part Number
	C1	Capacitor, .01 mfd, 250V 20%	068-10300010
	C2	Capacitor, .1 mfd, 250V 20%	068-10400010
	C3	Capacitor, 4700 pfd, 400V 20% Cer	055-47220001
	C4	Capacitor, 4700 pfd, 400V 20% Cer	055-47220001
	C5	Capacitor, .22 mfd, 250V 20% Poly	058-22400130
	C6	Capacitor, 100 mfd, 250V 20% Elec	057-10120170
	C7	Capacitor, 100 mfd, 250V 20% Elec	057-10120170
	C8	Capacitor, 220 mfd,10V +50/-10 Elec	057-22120080
	C9	Capacitor, 470 pfd, 2KV 10%, Cer	055-47154426
	C10	Capacitor, .01 mfd, 1KV 20%, Cer	055-10368925
	C11	Capacitor, .01 mfd, 1KV 20%, Cer	055-10368925
	C12	Capacitor, .22 mfd, 100V 20% Poly	058-22400160
	C13	Capacitor, .022 mfd, 50V 20% Poly	058-22300090
	C14	Capacitor, .22 mfd, 100V 20% Poly	058-22400160
	C15	Capacitor, 1000 mfd, 25V Elec	057-10220040
	C16	Capacitor, 1000 mfd, 25V Elec	057-10220040
	C17	Capacitor, 1000 mfd, 25V Elec	057-10220040
	C18	Capacitor, 330 mfd, 16V Elec	057-33120120
	C19	Capacitor, 330 mfd, 16V Elec	057-33120120
	C20	Capacitor, 470 mfd, 25V Elec	057-47120110
	C21	Capacitor, 2200 mfd, 16V Elec	057-22220020
	C22	Not Used	
	C23	Not Used	
	C24	Capacitor, .22 mfd, 250V 20%	058-22400130
	D1	Rectifier, RGP10A	226-10400050
	D2	Rectifier, RGP10J	226-10400060
	D3	Rectifier, RGP10M	226-10400100
	D4	Rectifier, 1N4001GP	226-10400080
	D5	Silicon Diode, 1N4606	212-10700210
	D6	Rectifier Assembly	853-00200190
	D7	Rectifier Assembly	853-00200190
	D8	Rectifier Assembly	853-00200190
	D9	Rectifier, RGP10B	226-10400070
	D10	Not Used	
	D11	Silicon Diode, 1N4606	212-10700210
	D12	Silicon Diode, 1N4606	212-10700210
	D13	Rectifier, 1N4001GP	226-10400080
	DB1	Bridge Rectifier, KBP10	226-30500010

Parts List

Power Supply 8790025 38W (Astec AA11330)

Item	Sym	Description	Part Number
	IC1	IC, TL431CLP Regulator	211-10800100
	L1	Filter Choke Coil Assembly	852-20100140
	L2	Filter Choke Coil Assembly	852-20100140
	L3	Base Choke	328-00100030
	L4	Choke, 1.5 mH	328-00100010
	L5	Filter Choke Coil Assembly	852-20100180
	L6	Filter Choke Coil Assembly	852-20100180
	L7	Choke Coil	328-00100060
	Q1	Transistor, SD467, NPN	209-11700460
	Q2	Transistor, Power	853-00400050
	Q3	Transistor, SD561, PNP	210-11700350
	R1	Thermistor, 4 ohm, 10%	258-40970015
	R2	Resistor, 330 kohm, 1/2W 5%	240-33406033
	R3	Resistor, 220 ohm, 1W 5%, Metal Ox	248-22106052
	R4	Resistor, 33 ohm, 2W 5% Metal Ox	248-33006063
	R5	Resistor, 1 kohm, 1/4W 5%	240-10206022
	R6	Resistor, 27 ohm, 1/4W 5%	240-27006022
	R7	Resistor, 68 ohm, 1/4W 5%	240-68006022
	R8	Resistor, 120 ohm, 1W 5% Metal Ox	248-12106052
	R9	Resistor, 10 ohm, 1/4W 5%	240-10006022
	R10	Resistor, 10 ohm, 1/4W 5%	240-10006022
	R11	Resistor, .75 ohm, 1W 5% Metal Flm	247-07586054
	R12	Resistor, 1 ohm, 1W 5% Metal Film	247-10086054
	R13	Resistor, 5.6 ohm, 1/4W 5%	240-56906022
	R14	Resistor, 68 ohm, 1/4W 5%	240-68006022
	R15	Resistor, 270 ohm, 1/2W 5%	240-27106033
	R16	Resistor, 270 ohm, 1/2W 5%	240-27106033
	R17	Resistor, 8.2 ohm, 1/4W 5%	240-82906022
	R18	Resistor, 560 ohm, 1/4W 5%	240-56106022
	R19	Resistor, 56 ohm, 1/4W 5%	240-56006022
	R20	Resistor, 56 ohm, 1/4W 5%	240-56006022
	R21	Resistor, 12 kohm, 1/4W 5%	240-12306022
	R22	Resistor, 470 ohm, 1/4W 5%	240-47106022
	R23	Resistor, 4.7 kohm, 1/4W 2%	247-47015022
	R24	Resistor, 68 kohm, 1/4W 5%	240-68306022
	R25	Resistor, 22 kohm, 1/4W 2%	247-22025022
	R26	Resistor, 2.7 kohm, 1/4W 2%	247-27015022
	R27	Resistor, 12 ohm, 1/4W 5%	240-12006022

Parts List

Power Supply 8790025 38W (Astec AA11330)

Item	Sym	Description	Part Number
	SCR1	Silicon Controlled Rectifier, C122F	227-13000010
	T1	Transformer, Common Mode	852-20200950
	T2	Transformer, Power	851-10200940
	T3	Transformer, Control	852-10200680
	Z1	Zener Diode, 5.6V, 1W 5%	222-56086002