SINGLE STAGE

(FLYBACK-DISCONTINUOUS)

POWER SUPPLY

MAINTENANCE MANUAL

SINGLE STAGE (FLYBACK-DISCONTINUOUS) POWER SUPPLY

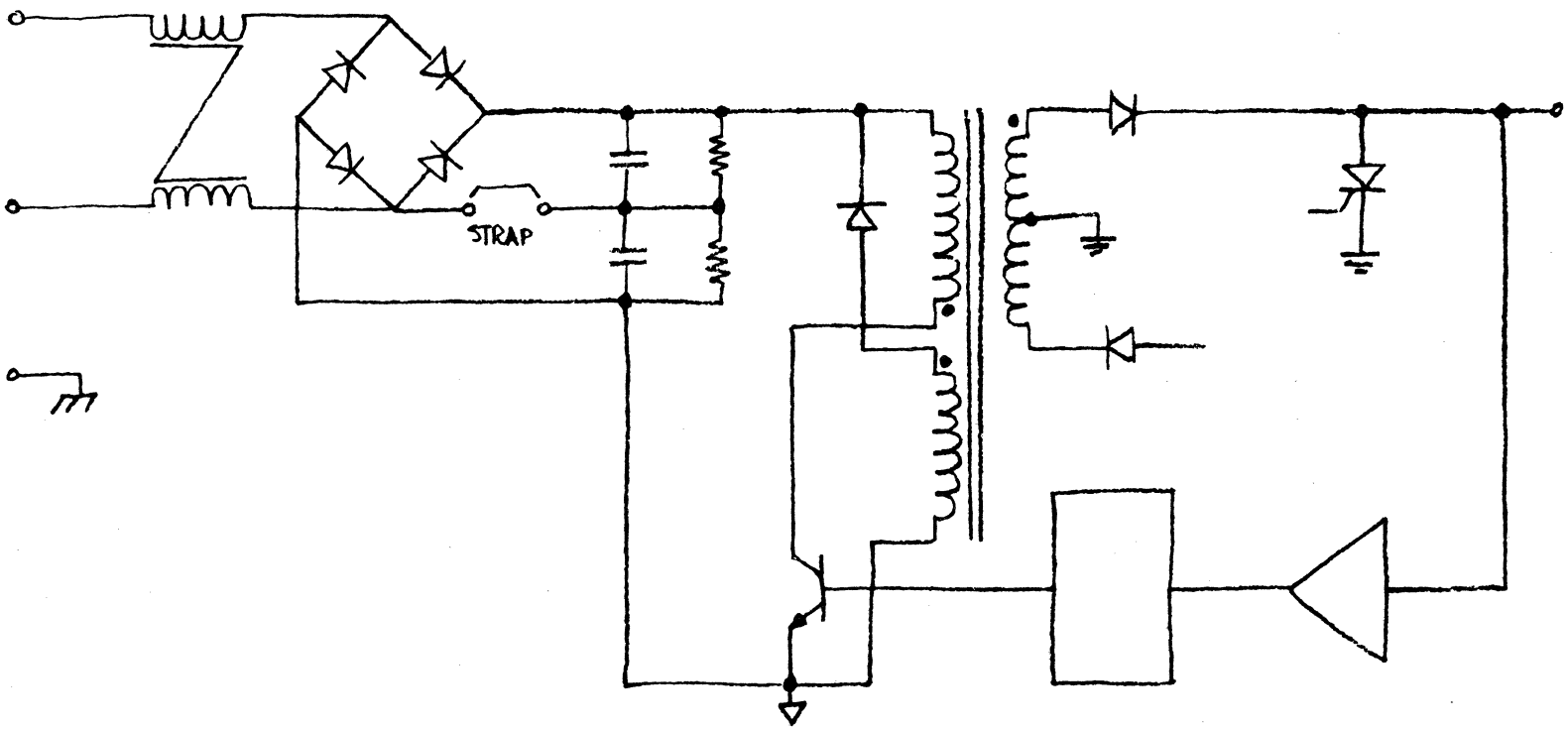
TABLE OF CONTENTS

NOTE: The descriptions and component designations in this manual refer to the OL25-1001. However, all flyback-discontinuous supplies have analogous circuits which operate in a manner similar to the OL25-1001.

FIGURE 1

SINGLE STAGE (FLYBACK - DISCONTINUOUS) POWER SUPPLY

SIMPLIFIED SCHEMATIC



SINGLE STAGE (FLYBACK-DISCONTINUOUS) POWER SUPPLY

GENERAL THEORY OF OPERATION

The flyback converter-discontinuous mode derives its name from the fact that during each cycle a point is reached where current ceases to flow in either the primary or secondary windings. Thus, the flux in the transformer virtually "ceases" at some point in the cycle.

The converter design is extremely simple. This class of converter operates as a blocking oscillator under the following control law: The output is linearly proportional to the current flowing in the power switch when it turns off, i.e., the output voltage is proportional to the amount of energy loaded into the core in the form of a magnetic field. The greater the field, the higher the output voltage.

The feedback loop regulates output voltages by adjusting the turn-off point of the power switch. Switching frequency is around 25 kHz at full power, and operating frequency is inversely proportional to the output power. The duty cycle remains relatively constant for a constant line voltage.

SINGLE STAGE (FLYBACK-DISCONTINUOUS) POWER SUPPLY

DETAILED THEORY OF OPERATION

Input Circuit

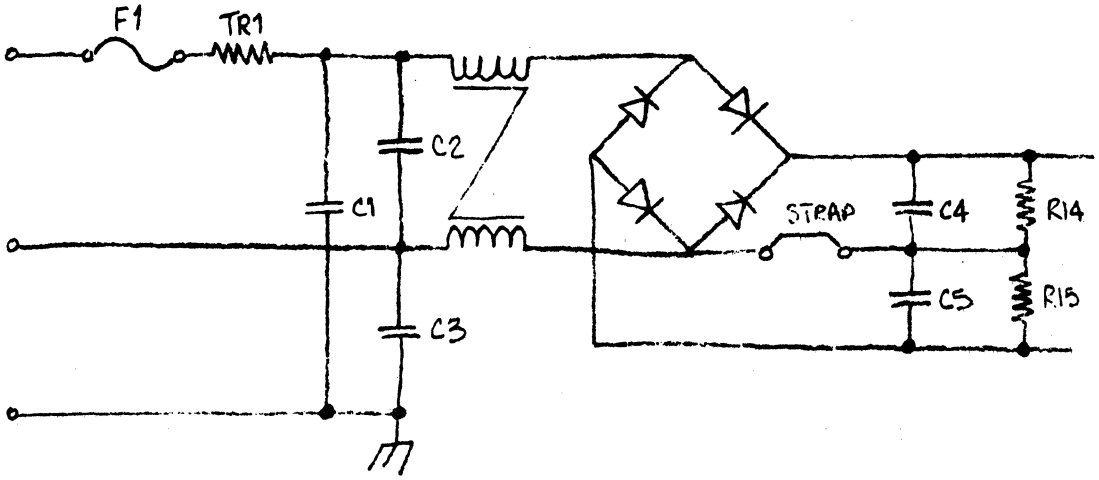


Figure 2
INPUT CIRCUIT

a. RFI Filter. Consists of L1, C1, C2 and C3. The purpose of this circuit is to filter out 20 kHz and above switching noise, preventing it from being transmitted back out the input line.

b. Fuse. F1 is included to protect the PC board traces and to reduce fire and personal hazard in the event of catastrophic supply failure. Boschert strongly recommends the use of an additional external line fuse for further protection. A Littlefuse 3AG series or equivalent rated at 1-1/2 A is sufficient.

c. Voltage Doubler Circuit is a method of allowing the supply to operate from either a 115 VAC or 220 VAC source. In the 115 VAC mode (strap in) capacitors C4 and C5 charge on alternate line half cycles. The voltage which appears across each capacitor is approximately the peak input voltage (about 150 V). The total voltage to the switching regulator is about 300 V.

In the 220 VAC mode (strap out) the input rectifiers act as a full wave bridge rectifier, charging C4 and C5 to approximately the peak input voltage (about 300 V). Resistors R14 and R15 force C4 and C5 to charge equally, and discharge the capacitors when the power is turned off.

d. Inrush Limiting is accomplished with thermistor R1. When cool, its resistance is high. When the supply is initially turned on, it prevents a huge surge current from flowing into C4 and C5, which are initially discharged. In operation, the normal input current quickly heats R1 decreasing its resistance by a factor of about 10. Since C4 and C5 are fully charged by this time, there is no further need for surge limiting. When the supply is turned off, R1 cools and C4 and C5 discharge. The circuit is designed so that the discharge time constant and cooling time constant are roughly equal. Thus, if the supply is turned back on before R1 has fully cooled, the inrush current is limited by a combination of the charge remaining on C4 and C5, and the resistance of R1.

e. Energy Storage in capacitors C4 and C5 insure that the supply will continue to operate within regulation limits for a minimum of 16 mS after the input line has fallen below limits or failed. This allows time for information in a volatile memory to be stored permanently before system failure following line interruption or line brownout.

Power Switch Circuit

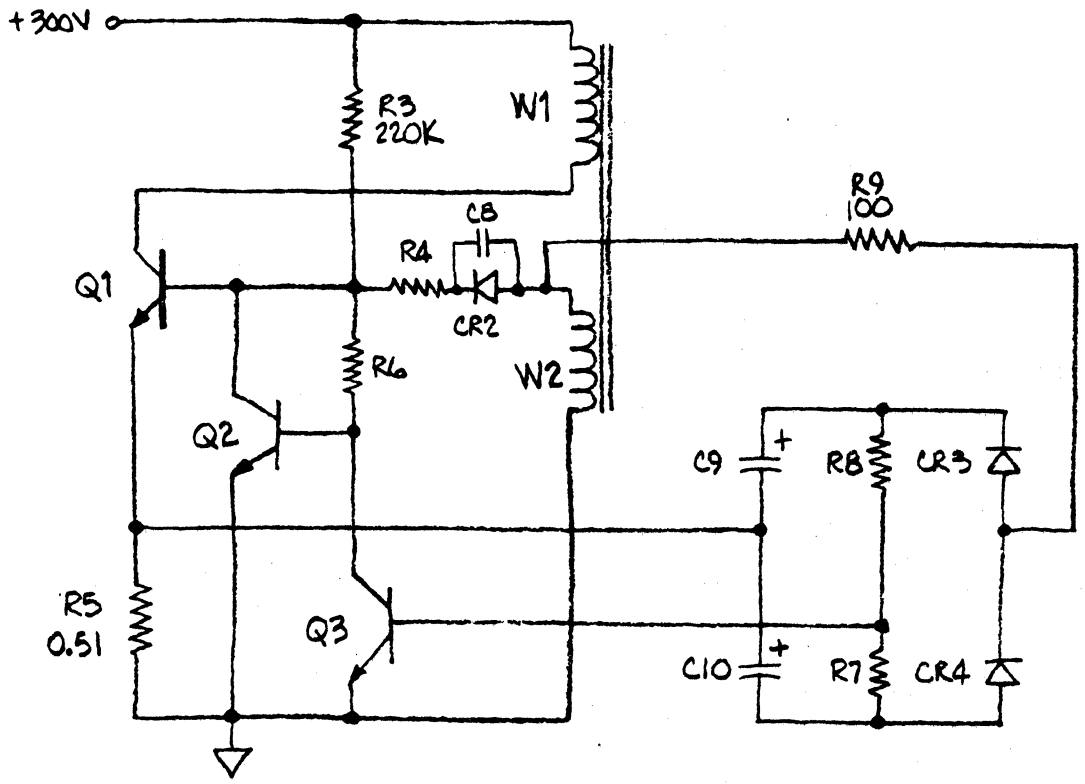


Figure 3
POWER SWITCH CIRCUIT

In the first half of the power cycle, switch Q1 will turn on and load energy into the transformer in the form of a magnetic field. Switch Q1 will then turn off.

The second half of the power cycle is described in the Output Circuit description.

When power (+300) is applied, a small trickle current through R3 begins to bias Q1 on. As the full supply voltage +Vcc begins to appear across winding one (W1), transformer action induces about 6 V across winding two (W2). CR2 is forward biased, and regenerative feedback current from W2 quickly forces Q1 into saturation.

Now the current in W1 begins to ramp up linearly. A voltage ramp also appears across R5 due to the current ramp.

Meanwhile, W2 is also charging C9 to about +6 V via R9 and CR3. When this voltage rises high enough, Q3 is biased on. This also turns on current buffer Q2. Q1 begins to turn off because Q2 and Q3 are conducting base drive away from Q1. The current ramp in W1 stops rising because Q1 is beta limited and is coming out of saturation. The rate of current change (di/dt) has become negative, therefore the voltage polarity on the windings must change. W2 has now reversed voltage (the dotted end is now positive) and it helps turn off Q1 by completely backbiasing the base emitter junction via R5, R4 and C8. When Q1 is off, and the voltage across all transformer windings has reversed, C10 is charged via CR4 and R9.

(The second half of the cycle is continued in the Output Circuit Section.)

Output Circuit

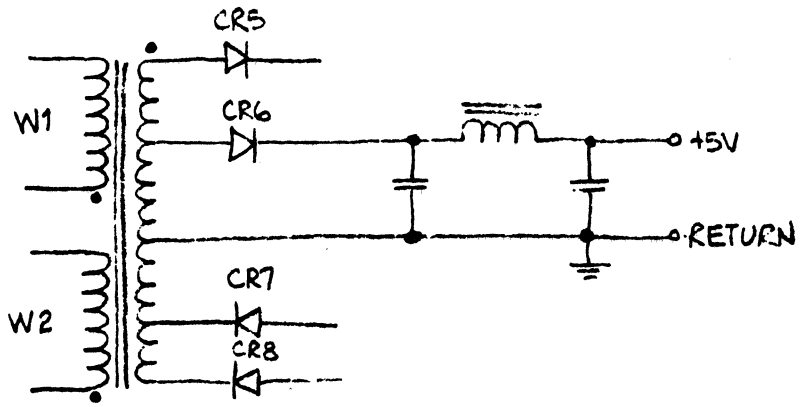


Figure 4
OUTPUT CIRCUIT

This section describes the second half of the power cycle. The first half was described in the Power Switch Circuit description.

In the first half of the power cycle, switch Q1 turned on and loaded energy into the transformer in the form of a magnetic field. Q1 then turned off, and the collapsing magnetic field is now driving positive the dotted ends of all transformer windings, looking for a discharge path.

As the voltage rises on the dotted ends of all the windings, it will eventually forward bias diodes CR5 through CR8. The magnetic field in the transformer rapidly collapses by discharging energy into the outputs. The C-L-C PI filters in the output store and filter this energy.

When the magnetic field has sufficiently collapsed, diodes CR5 through CR8 stop conducting. There is enough energy left in the core to allow it to "ring back." That is, the current in the secondary suddenly reduces its rate of discharge when the diodes stop conducting. di/dt changes, and the dotted end of all windings becomes negative. Q1 begins to conduct again. This is the start of the next cycle.

Modulator Circuit

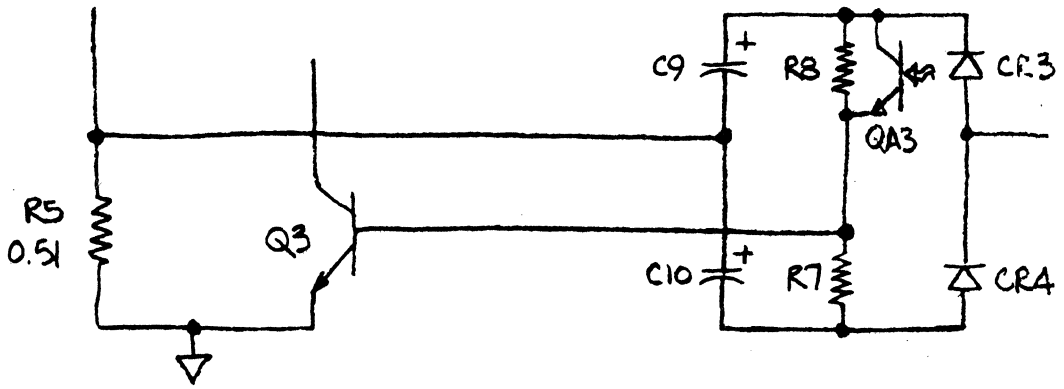


Figure 5
MODULATOR CIRCUIT

The modulator varies the point at which Q1 turns off thereby regulating the output voltages.

In the absence of any feedback loop, Q1 would continue loading energy into the core until a fixed point was reached. This fixed amount of energy would be subsequently discharged into the load. If the load changed, the output voltage would change because Q1 was still loading a fixed amount of energy into the transformer. To compensate for load changes, the feedback loop varies the point at which Q1 turns off, thereby varying the amount of energy loaded in the core. The greater the load, the more energy is loaded into the core. This accomplishes regulation.

During normal operation, C9 and C10 are each charged to about 6 V, or about 12 V total. Since the junction of C9 and C10 is referenced essentially to ground via R5, the base-emitter junction of Q3 must be back

biased due to the base voltage determined by dividers R8 and R9. When Q1 turns on, the voltage across R5 ramps up. This makes the entire modulator circuit voltage rise relative to ground. Eventually a point is reached where Q3 is biased on, which turns off Q1, terminating the first half of the cycle.

The point at which Q3 turns on can be varied by changing the ratio of R8 to R9. The opto-isolator transistor, Q A3, acts as a variable resistor to change this ratio. If the +5 V output tended to fall due to an increase in load, for example, the opto-isolator transistor would turn off, making the base voltage on Q3 more negative. It would take longer for the voltage ramp on R5 to reach a point where Q3 was biased on. More energy would be loaded into the transformer, which would be discharged into the load, raising the output voltage.

Main Feedback Loop

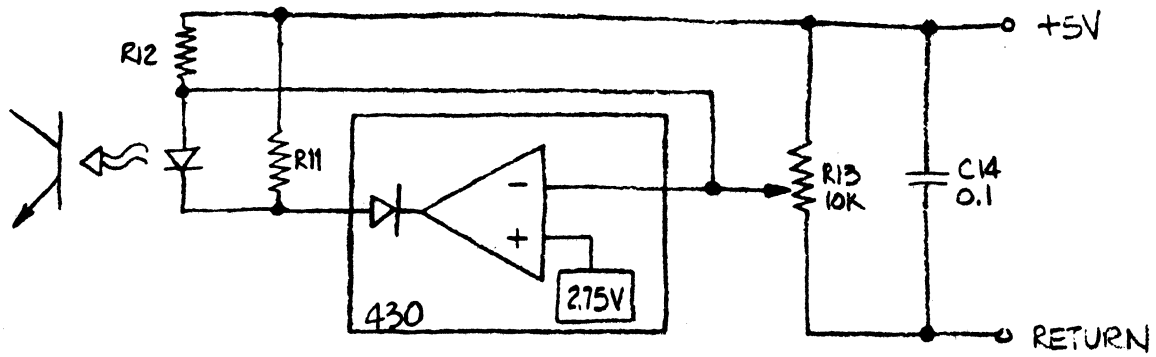


Figure 6
MAIN FEEDBACK LOOP

This circuit maintains the +5 V output at a constant voltage. The loop compares a voltage divided down from the +5 V output via R13 to a 2.75 V reference within the 430 integrated circuit. A proportional current is sunk by the 430, driving the opto-isolator diode via R12. R11 provides bias current for the 430. C13 frequency compensates the loop.

The auxiliary (other than +5V) outputs are "semi-regulated." That is, because of the tight magnetic coupling of all the outputs, an increased load on an auxiliary output lowers the volts per turn of the transformer, which is reflected in the +5V output (which begins to go down). The feedback loop works to restore the +5V output, and in so doing partially compensates for the load change on the auxiliary output. Boschert calls this "semi-regulation."

Overvoltage Protection

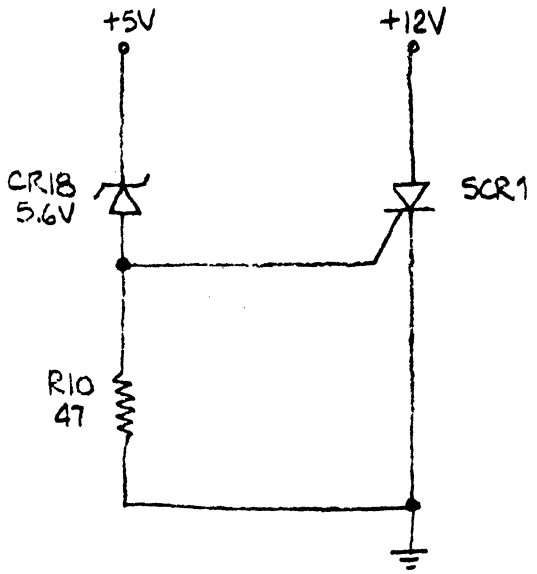


Figure 7
OVP CIRCUIT

The purpose of overvoltage protection is to protect the user's load from an overvoltage condition caused by supply failure. All standard Boschert supplies incorporate this feature. Also, Boschert supplies require OVP on only one output. If all outputs have simple passive filtering, and if one output should rise due to supply failure, they all would rise. Thus, protection is needed on only one output.

If the +5 V output exceeds 6.25 V ±0.75 V, the SCR pulls the +12 V supply down (to about 1.5 V) and activates the short circuit protection. The +12 V supply is used to insure clean foldback. Pulling the +5 V down to 1.5 V might not exceed the foldback point, and might simply deliver a lot of power to the SCR, destroying it.

This circuit can be cleared by cycling line power.

Spike Catcher Circuit

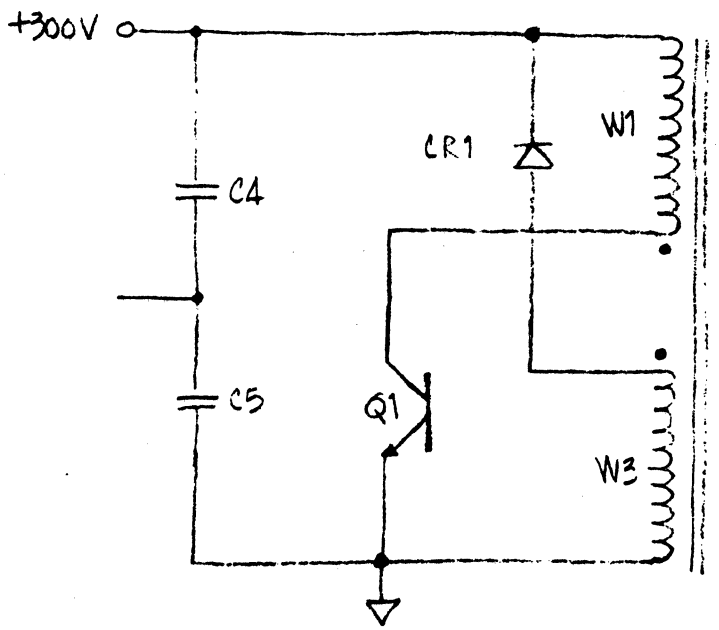


Figure 8
SPIKE CATCHER CIRCUIT

The purpose of the spike catcher circuit is to prevent high voltage turn off transients on the collector of Q1 from destroying it.

C4 and C5 are the input capacitors, charged to about 300 V. When Q1 has finished loading energy into the transformer core and turns off, W1 begins to look like a current source. Its dotted end becomes positive and the voltage rises. Although the discharge path is ultimately through the output, there is enough leakage inductance in W1 to allow the voltage to rise to a destructive value. However, as the dotted end of W1 reaches 300 V, so does the dotted end of W3. (They both have the same number of turns.) As the voltage tries to rise further, CR1 conducts and clamps the collector voltage to 600 V. This prevents the destruction of Q1.

SINGLE STAGE (FLYBACK-DISCONTINUOUS) POWER SUPPLY

TROUBLESHOOTING INSTRUCTIONS

EQUIPMENT NEEDED:

1 50 MHz oscilloscope with isolated ground

1 DVM or VTVM with isolated ground

1 Isolation transformer

1 1A Variac (0-130Vac)

2 Adjustable lab supplies, 0-20VDC @ 500mA, with adjustable current limit. A good supply of resistors and clip leads.

1 AC voltmeter (0-130Vac)

CAUTION: Lethal voltages are present in this supply. Only authorized service technicians should perform these tests. Use AC isolated equipment in all tests.

NOTE: It is desirable to use an AC isolation transformer in performing all tests to minimize shock hazard. The kVA rating of this transformer should be three times the maximum supply power to avoid AC line waveform distortion.

NOTE: Steps 1 thru 9 are intended as passive tests to be performed with the supply completely disconnected from line power. To prevent any oscillations, connect jumper wire from the anode of CR5 to the cathode of CR8.

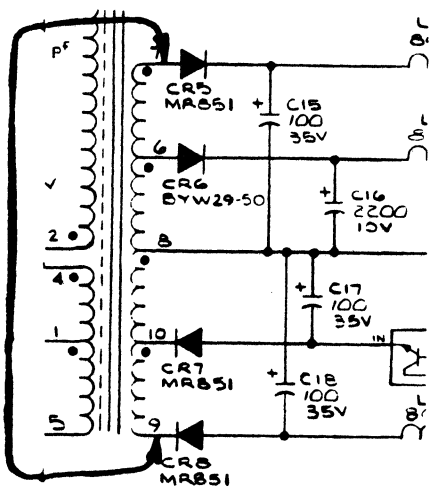


Figure 9

1. Use DVM to check the continuity of the input fuse (F1), thermistor (TR1) bridge rectifier (BR-1), diodes CR1 thru CR8 for proper continuity. Replace as necessary.

2. Connect a lab supply (15V with current limit at 500mA) across the AC input terminals. After an initial surge, no current should flow. Reverse the leads and repeat. If any current flows, check the input section for shorts.

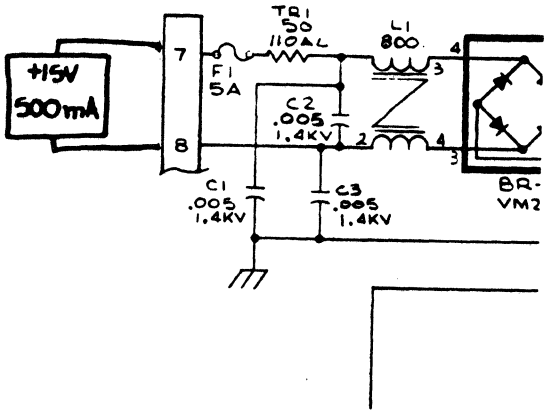


Figure 10

3. Check the operation of Q1. Set the lab supply for 15V with the current limit set for 500mA. Connect a 220 ohm resistor in series with the positive output and connect this to the 115V input terminals as shown. With the DVM across the collector-emitter terminals of Q1, momentarily parallel R3 (220K) with a 100 ohm 1/4W resistor. Is voltage drop across Q1 as follows?

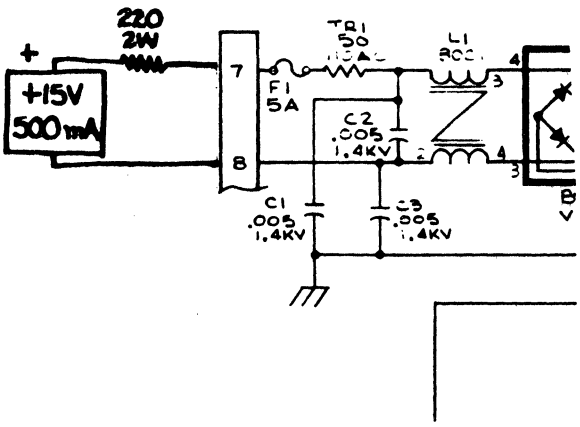


Figure 11

	Vce (Q1)
R3 not paralleled	13.5V ±1V
R3 paralleled	1.5V ±1V

Yes - Go to Step 4

No - Replace Q1 and repeat Step 3

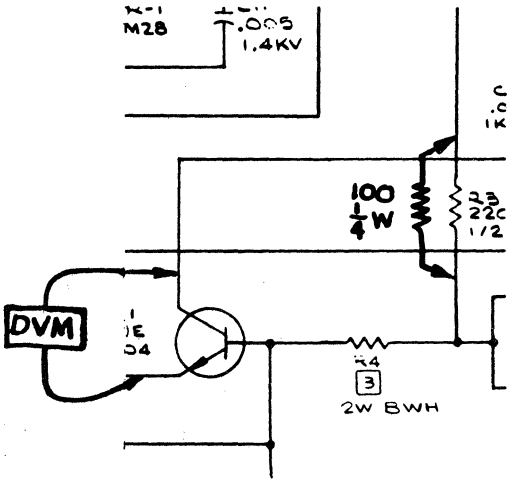


Figure 12

4. Check the operation of Q2 and Q3. Use a DVM or a lab supply with the output set at +5V, current limit at 10mA. Check the continuity of Q2 and Q3 for opens or shorts. Replace as necessary. Then go to Step 5.

5. Check overvoltage protection operation. Set both supplies to +5.0V with the current limit set to 100mA. Connect the first supply across the +5V output and return. Connect the second supply across the +12V output and return. (The +12V output should be the one which the anode of the SCR is connected to. If not, the supply should be connected to the output which is connected to the SCR anode. Now slowly ramp up the voltage on the first supply. At 6.25V ±0.75V on the first supply, does the second supply suddenly go into current limit?

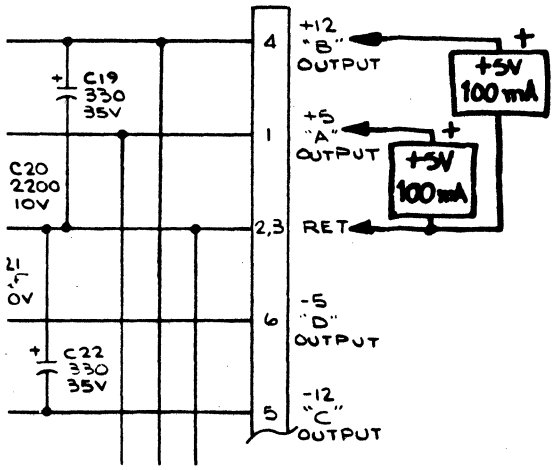


Figure 13

Yes - Go to Step 7
No - Go to Step 6

6. Check CR9. Set lab supply current limit to 100mA and the voltage to 0. Connect the positive terminal to the +5V output and the negative terminal to the return. Put a DVM across CR9. Turn the voltage slowly up to 10V, or to the point where the supply limits. Does the DVM voltage ramp up to 5.6V ± 0.25V and stop?

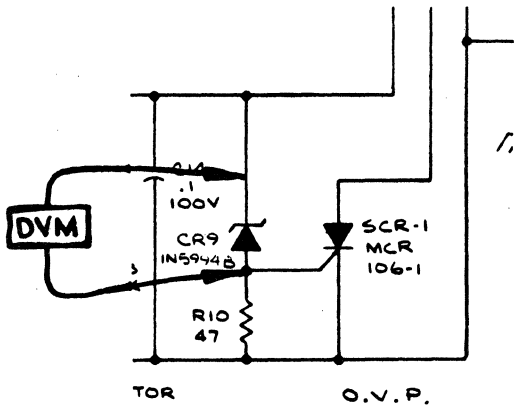


Figure 14

Yes - Replace CR4, and Repeat Step 5
No - Replace SCR-1 and Repeat Step 5

7. Check A2. Set lab supply to +5.0V (Ilim = 300 mA) across +5V output. Read voltage across R11 with DVM while adjusting pot R13. Are the voltages as follows?

   R13 fully clockwise 3.0V ± 0.5V
   R13 fully counterclockwise 0.2V ± 0.2V

   Yes - Go to Step 8
   No - Replace A2 and repeat Step 7

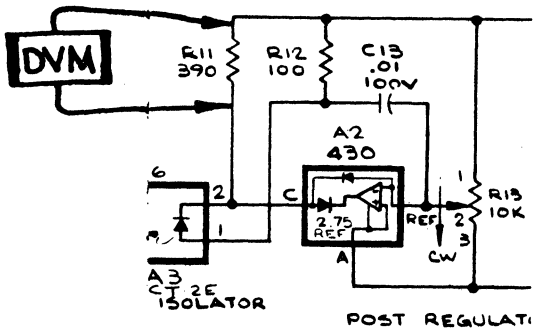


Figure 15

8. Check A3 and modulator. Hook up first supply (+5V, Ilim = 300mA) across the +5V output. Hook up second supply (+5V, Ilim = 300mA) across the modulator. Watch the voltage across R8 with the DVM while adjusting R13. Are the voltages as follows?

   R13 fully clockwise 3.0V ± 0.5V
   R13 fully counterclockwise 0.3V ± 0.2V

   Yes - Go to Step 9
   No - Replace A3, repeat Step 8

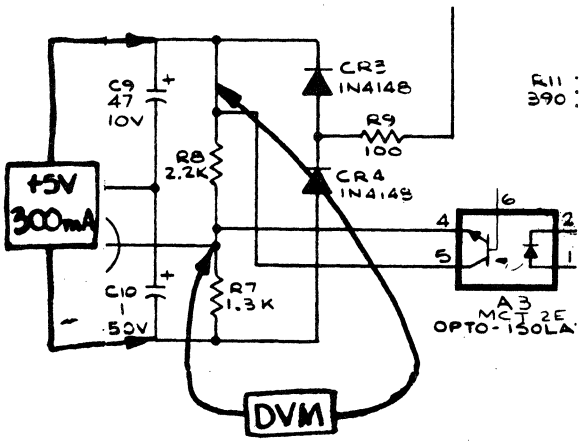


Figure 16

NOTE: This concludes all the passive tests. Disconnect all supplies, DVM, and jumper from CR5 to CR8 before proceeding.

9. Disconnect all connections made for the passive tests. Plug the supply into the Variac and turn the voltage up to 115Vac. Is the voltage across the input capacitor(s) within the following limits?

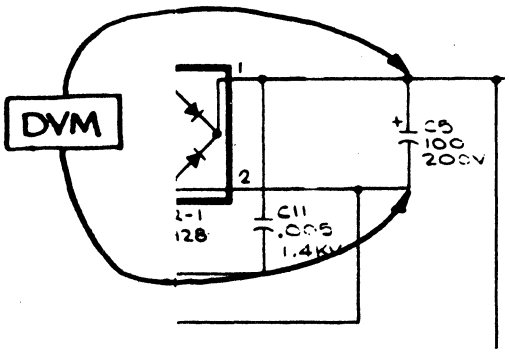


Figure 17

Supply designed for 115Vac only
150V ±10V

Supply designed for 220Vac only
300V ±20V

Supply 115/220 strappable
300V ±20V

Yes - Go to Step 10

No - Look for faulty component in input circuit. Repeat Step 9.

10. Use an oscilloscope to check the voltage waveform on the collector of Q1 with respect to emitter.

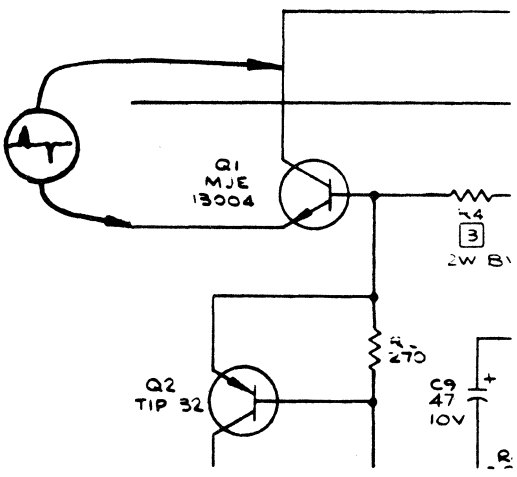


Figure 18

With proper waveform, notice that duty cycle is roughly 50%.

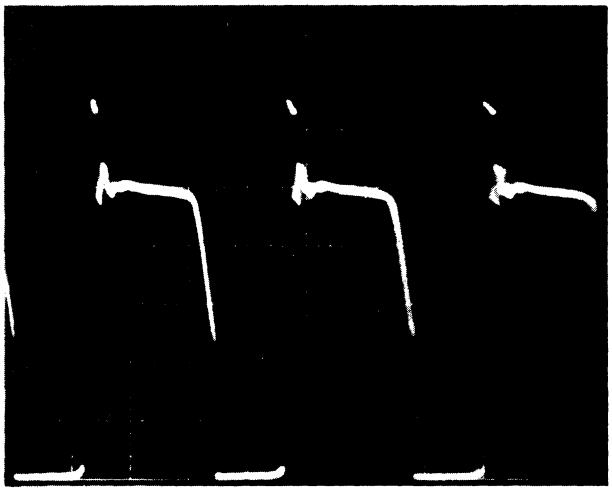


Figure 19
Proper Waveform
Horizontal - 5 μs/Div.
Vertical - 50V/Div.

With no output load, the supply "burps" every 120 ms or so. This is known as the burp mode. (The supply waits about 120ms, tries to turn on, the SCR fires because there is no +5V load to keep it from overshooting, and it folds back and waits 120ms again.)

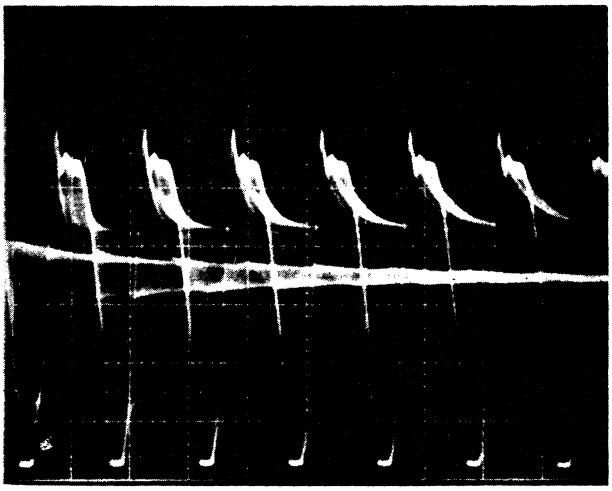


Figure 20
No load waveform
Horzontal - 5μs/Div.
Vertical - 50V/Div.

In an overload condition, all output voltages and currents are very low. Notice the very short duty cyle (about 12%) which typifies the overload condition. Under a heavy overload, the supply "burps" every 500ms or so.

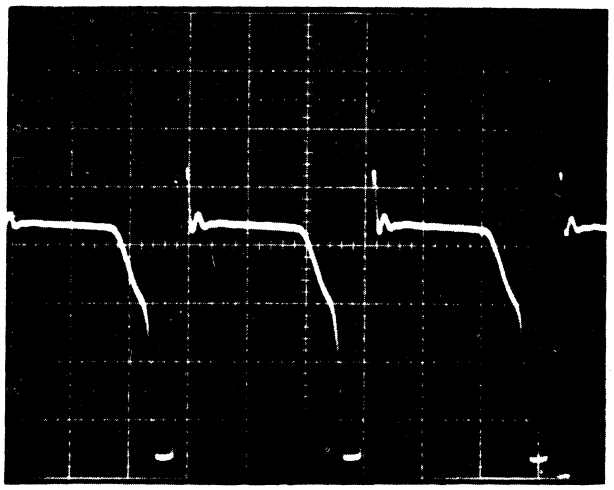


Figure 21
Overload Waveform
Horizontal 5μs/Div.
Vertical 50V/Div.

With an output short, the supply goes into its "burp" mode again. The period is about 160ms between "burps."

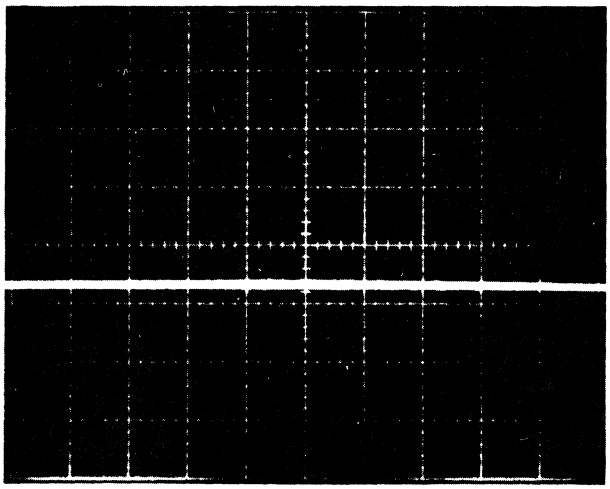


Figure 22
Output Short Waveform
Horizontal 5μs/Div.
Vertical 50V/Div.

11. Use the oscilloscope on each or any output to determine if any faults are occurring.

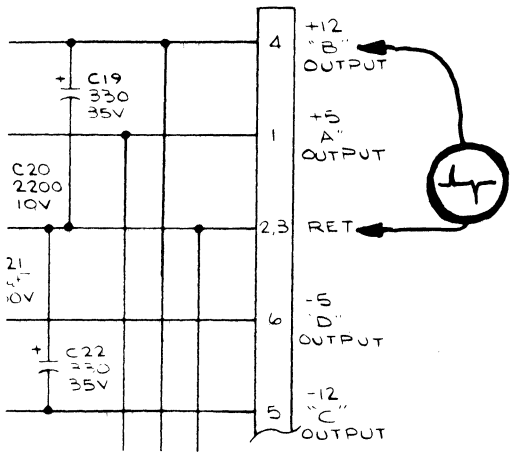


Figure 23

+12V Output Proper Waveform

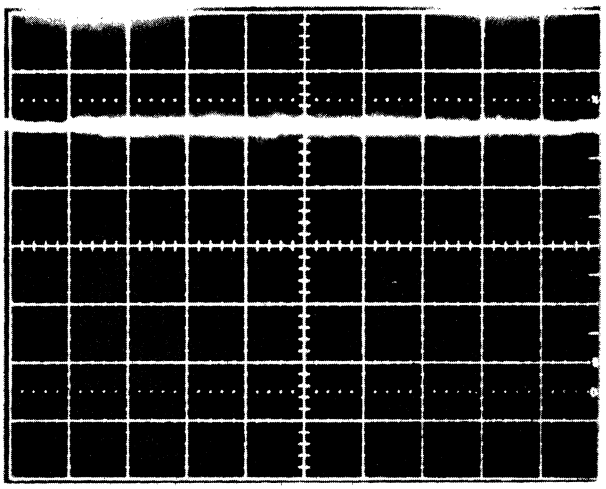


Figure 24
Proper Output Waveform
Horizontal - 50ms/Div.
Vertical - 2V/Div.

The sharp rise and fall time of an output is due to unloaded outputs. Generally only an SCR firing can cause such a rapid fall time on an output.

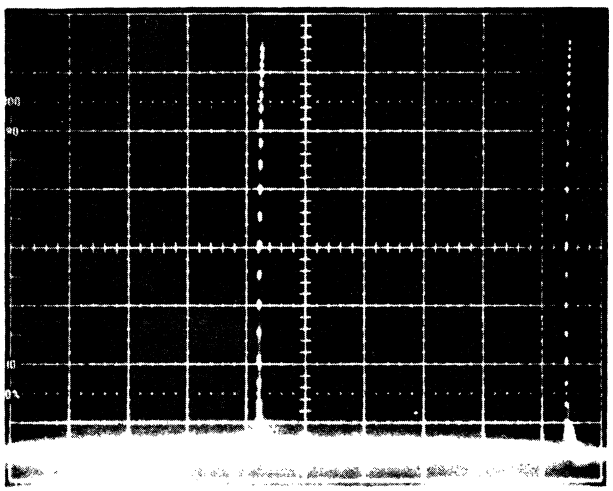


Figure 25
No Load on Outputs
Horizontal - 50ms/Div.
Vertical - 2V/Div.

The much longer fall time of an output indicates a short on some other output than the one measured.

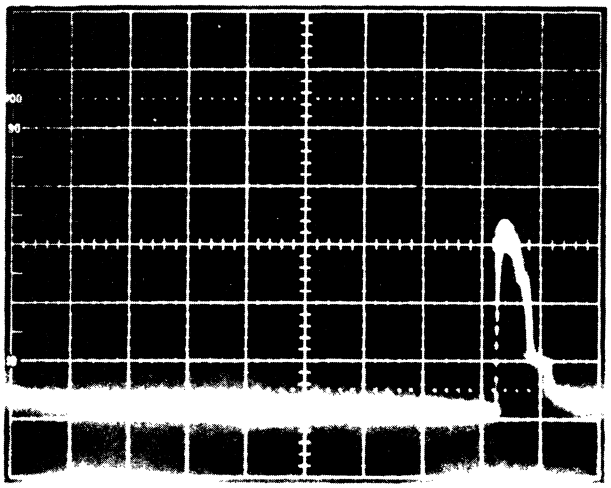


Figure 26
Short on some other output
Horizontal - 50ms/Div.
Vertical - 2V/Div.

No rise or fall indicates the short is on this output.

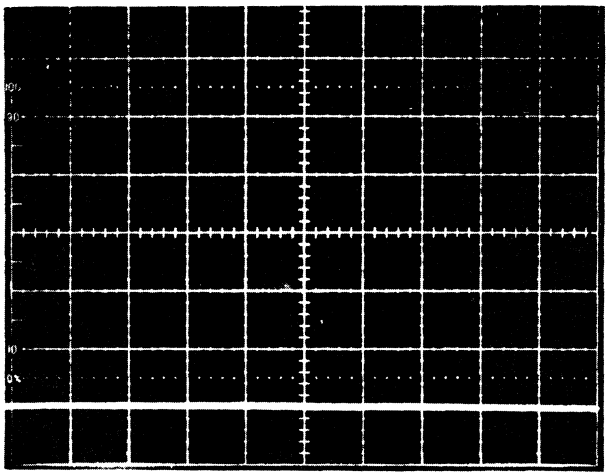


Figure 27
Short on this output
Horizontal - 50ms/Div.
Vertical - 2V/Div.

APPLICATION	
NEXT ASSY	USED ON
10006	

REVISION				
REV	ECO	DESCRIPTION	DATE	APPROVED
1	1986	PRE RELEASED FOR PROD		
A	2259	RELEASED FOR PROD.	9-13-78	
B	2385	CORRECTED CURRENT CALL-OUTS ADDED PARA. 3 ON PG. 3	12-18-78	
C	3335	CORRECTED NOTE 3C. SHT 3 OF 3.	11-2-79	RKS
D	4072	INCORPORATED	4-23-80	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ARE:
FRACTIONS DECIMALS ANGLES
± — .XX ± — ± °
.XXX ± —

MATERIAL

FINISH

DO NOT SCALE DRAWING

CONTRACT NO.

APPROVALS	DATE
DRAWN FRANK KRALOVETZ	7-13-78
CHECKED	7-17-78
W S Lee	9-19-78
	9-19-78
A Jackson	9-20-78

BOSCHERT

TEST SPECIFICATION

MODEL: 25-1001

SIZE	CODE IDENT NO.	DRAWING NO.	REV
A		91-20269	D

SCALE N/A | SHEET 1 OF 3

20269 REV

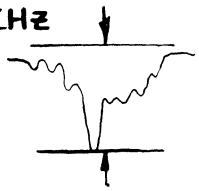
25-1001

	TEST MINIMUM	SPECIFICATION MAXIMUM
VISUAL INSPECTION		
TURN ON AND TURN OFF		
SWITCH WAVEFORM		
CURRENT MAX. LIMIT RANGE	SEE PAGE 3 FOR LIMITS	
CURRENT MIN. LIMIT RANGE		
INVERTER WAVE FORMS SAME		
INVERTER PERIOD RANGE		
INVERTER PEAK-PEAK VOLTAGE		

OUTPUT VOLTAGE-CURRENT TEST POINTS:

OUTPUT	VOLTAGE		CURRENT		MINIMUM		MAXIMUM		
1	+5	V	1.5	A	+4.98	V	+5.02	V	[SET VOLTAGE HERE]
2	+12	V	0.25	A	+11.45	V	+12.55	V	
3	-12	V	0.25	A	-11.45	V	-12.55	V	
4	-5	V	0.25	A	-4.75	V	-5.25	V	
5		V		A		V		V	
6		V		A		V		V	
1	+5	V	3	A	+4.96	V	+5.04	V	
2	+12	V	0.1	A	+10.40	V	+13.60	V	
3	-12	V	0.1	A	-10.40	V	-13.60	V	
4	-5	V	0.1	A	-4.75	V	-5.25	V	
5		V		A		V		V	
6		V		A		V		V	
1	+5	V	0.6	A	+4.96	V	+5.04	V	
2	+12	V	.5	A	+10.40	V	+13.60	V	
3	-12	V	.5	A	-10.40	V	-13.60	V	
4	-5	V	.5	A	-4.75	V	-5.25	V	
5		V		A		V		V	
6		V		A		V		V	
1	+5	V	3	A	+4.96	V	+5.04	V	
2	+12	V	.4	A	+10.40	V	+13.60	V	
3	-12	V	.4	A	-10.40	V	-13.60	V	
4	-5	V	.1	A	-4.75	V	-5.25	V	

120 Hz & 20 KHz



MAX. RIPPLE & NOISE:

95	MV P-P		MV
228	MV P-P		MV
228	MV P-P		MV
95	MV P-P		MV

	MINIMUM	MAXIMUM
OVP 5994B (IN752)	5.7	6.8
5993B (IN751)		

SNAP-ON

AUDIBLE NOISE

FACTORY SELECT PROCEDURE FOR R4, SEE PAGE 3.

BURN IN NO. 001

TEST CABLE NO. 050

- [X] 110 VAC
- [ ] 220 VAC
- [ ] STRAPABLE

SIZE	CODE IDENT NO.	DRAWING NO	RE
A		91-20269	D
SCALE N/A		SHEET 2 OF 3	

J Ham 9-19-78

FACTORY SELECT PROCEDURE FOR R4

1. a. SET LOAD AT: 3A, +5V
   .5A, +12V
   .5A, -12V
   .5A, -5V
   b. SET LINE VOLTAGE AT 90VAC
   c. SELECT R4 FOR +5V OUTPUT TO BE 4.95V ≤ +5V OUTPUT ≤ 5.05V

2. a. SET LINE VOLTAGE TO 110VAC
   b. SET ALL LOADS TO 0 AMP
   c. LOAD 5V SLOWLY. 5V OUTPUT VOLTAGE MUST REGULATE TO 5V ± 0.050V AT +5V OUTPUT CURRENT OF ≤ 0.8 AMP.

CURRENT MAX LIMIT TEST

a. SET LINE VOLTAGE TO 110 V AC

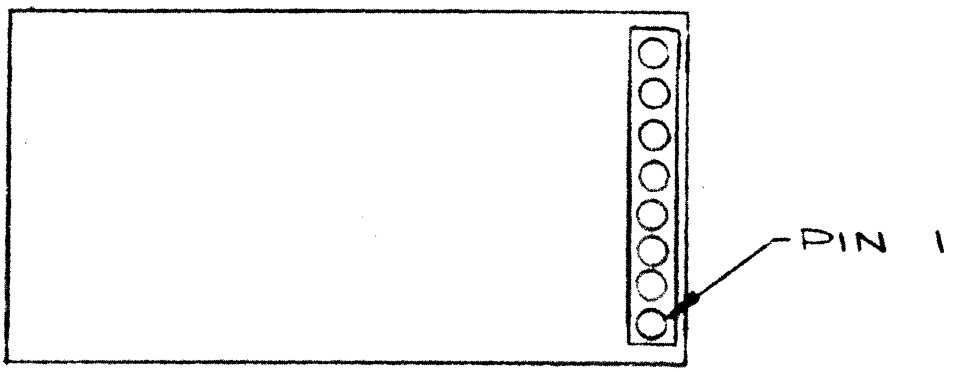
b. SET LOAD TO: +5V 3A
   ±12V 0.5A
   -5V 0.5A

c. INCREASE OUTPUT CURRENT OF +5V AND NOTE MAXIMUM CURRENT.
   MAXIMUM CURRENT, I_{MAX}, MUST BE: $6.5A \leq I_{MAX} \leq 8.0A$. IF CURRENT LIMIT IS NOT IN SPEC, CHANGE R14 TO ANOTHER VALUE BETWEEN 470 AND 10K (NOMINAL VALUE INSTALLED IS 1.2K). LOWER THE RESISTOR VALUE TO BRING THE CURRENT LIMIT DOWN OR RAISE THE VALUE TO INCREASE THE CURRENT LIMIT.

SIZE	CODE IDENT NO.	DRAWING NO.	REV
A		91-20269	D
SCALE N/A		SHEET 3 OF 3	

APPLICATION		REVISION				
NEXT ASSY	USED ON	LTR		DESCRIPTION	DATE	APPROVED
		1	1986	PRE-RELEASED FOR PROD		
		A	2259	RELEASED FOR PROD.	9-13-78	

PIN #	FUNCTION
1	+5V
2	RETURN
3	RETURN
4	+12V
5	-12V
6	-5
7	AC IN
8	AC IN



UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ARE:
FRACTIONS ± — DECIMALS .XX ± — .XXX ± — ANGLES ± —

MATERIAL

FINISH

DO NOT SCALE DRAWING

CONTRACT NO.

APPROVALS	DATE
DRAWN FRANK KRALOVETZ	7-13-78
CHECKED Miyasaki	7-17-78
WSL	
[illegible] GB	9/19/78
A Jackson	9/29/78

BOSCHERT

PINOUT CHART
25-1001

SIZE	CODE IDENT NO.	DRAWING NO.	REV
A		20267	A

SCALE N/A SHEET 1 OF 1

BISHOP GRAPHICS/ACCUPRESS REORDER NO. A-7825

20267 RKS

REVISIONS

ECO	LTR	DESCRIPTION	DATE	APPROVED
1986	4	PRE-RELEASED FOR PRODUCTION	5-2-78	
2259	A	RELEASED FOR PRODUCTION	9-13-78	
2369	B	ITEM 28 WAS P/N 2061 (NO DESCRIPTION CHG.); ITEM 45 WAS P/N 1140 (NO DESCRIPTION CHG); ADDED P/N 3810 TO ITEM 86 22Ω 2W BWH SAT R4.	12-13-78	
2413	C	ASSY CHG ONLY	12-13-78	
2623	D	ITEM 76 WAS 1.3K (NOT F.S) ADDED R7 REF TO NOTE 8. ADDITIONAL CHGS NOT PER ECO AS FOLLOWS: DELETED NOTE [8] REF AT ITEM 86 & NOTE [4] REF AT ITEMS 107 & 108	3-27-79	
2799	E	ITEM 76 WAS 1.3K; DELETED ITEM 8 P/N 7641, 45 P/N 10-10056-01, 59 P/N 1081; 61 P/N 1142; ADDED ITEMS 4,5,6.	9-25-79	
3335	F	CHG'D NOTE [8], ITEM 76 WAS P/N 3075, ITEM 81 WAS P/N 3080; ADDED ITEM 77 TVA Pending	5-1-79 11-2-79	2546 RKS
3915	H	INCORPORATED	3-5-80	
4440	J	CHANGED PER ECO	7-1-[illegible]	

SEE SEPARATE ASSY, DWG NO. 40006 "C" SIZE

FINAL	25-1001
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE:
FRACTIONS DECIMALS ANGLES
± — .XX ± — ± —
.XXX ± —

MATERIAL

FINISH

DO NOT SCALE DRAWING

CONTRACT NO.

APPROVALS	DATE
DRAWN FRANK KRALOVETZ	4-5 78
CHECKED	5-2-78
W S Lee	9-19-78
[illegible]	9/14/78
G. Jackson	9/20/78

boschert

ASSEMBLY, POWER SUPPLY 25WATT 115V

SIZE	CODE IDENT NO.	DRAWING NO.	REV
A		45-40006	J

SCALE N/A | SHEET 1 OF 6

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED

NOTES:

8. FACTORY SELECT R4 & R14.
7. FOR QA SPEC SEE DWG NO. 20270
6. FOR PINOUT CHART SEE DWG NO 20267
5. FOR OUTLINE INSTALLATION SEE DWG NO. 20168
4.
3. FOR TEST SPEC SEE DWG NO. 20269
2.
1. FOR SCHEMATIC SEE 20139

NEXT ASSY	USED ON	UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS DECIMALS ANGLES ± .XX ± ± .XXX ±	CONTRACT NO.		
			APPROVALS	DATE	
			DRAWN		
		MATERIAL	CHECKED		
		FINISH			
APPLICATION		DO NOT SCALE DRAWING			

Beckett

ASSEMBLY, POWER SUPPLY
25W, 115V

SIZE	CODE IDENT NO.	DRAWING NO.	REV
A		45-40006	J

SCALE N/A | SHEET 2 OF 6

ITEM	PART NO.	QTY	DESCRIPTION	REF DES
1	51-9148	1	BOARD, P.C.	
2				
3				
4	43-10568	1	SUB ASSY, HEATSINK, RECTIFIER, BYW 29-50	CR6 REF
5	43-10570	1	SUB ASSY, HEATSINK, TRANSISTOR, MJE-13004	Q1 REF
6	43-10575	1	SUB ASSY, HEATSINK, VOLT REG. I.C., MC7905CT	A4 REF
7				
8				
9				
10				
11	80-8001	1	INDUCTOR,	L1
12	80-8135	1	INDUCTOR,	L2
13	80-8077	2	INDUCTOR,	L3,5
14				
15				
16	80-8190	1	TRANSFORMER, 25W	T1
17				
18				
19	22-2060	1	CAP, CERM, 470 pF, ±20%, 1000V	C7
20	22-2002	4	" " .005μf, ±20%, 1.4KV	C1,2,3,11
21	22-2005	2	" " .01 μf, ±20%, 1000V	C6,12
22	22-2008	2	" " .1 μf, ±20%, 100V	C8,14
23				
24				
25				
26				
27	22-2059	1	CAP, CERM, .01μf, ±20%, 100V	C13

TITLE: POWER SUPPLY 115V 25WATT	beschert	DRAWING NO. 45-40006	REV J
		SIZE A / SCALE N/A	SHEET 3 OF 6

ITEM	PART NO.	QTY	DESCRIPTION	REF DES
28	20-2089	1	CAP, ELECT, 100μf, +75%-10%, 200V	C5
29	20-2083	2	" " 330μf, +75%-10%, 35V	C19,22
30	20-2106	1	" " 47μf, +75%-10%, 10V	C9
31				
32	20-2119	3	" " 100 uf +50% -10%, 35V	C15,17,18
33	20-2047	2	" ELECT, 2200μf, +50%-10%, 10V	C16,20
34				
35				
36	21-2076	2	CAP, TANT, 1μf, ±10%, 50V	C10,21
37				
38				
39	10-1038	2	DIODE, GEN PUR, IN4004	CR1,2
40				
41				
42	10-1013	2	" GEN PUR, IN4148	CR 3,4
43				
44				
45				
46				
47				
48	10-1088	3	" FAST RECV, MR851	CR5,7,8
49				
50				
51	11-1014	1	DIODE, ZENER, IN5994B	CR9
52				
53	1141	1	BRIDGE, VM28	BR1
54				

TITLE		DRAWING NO.	REV
POWER SUPPLY 115V, 25 WATT	beschert	45-40006	J
		SIZE A / SCALE N/A / SHEET 4 OF 6	

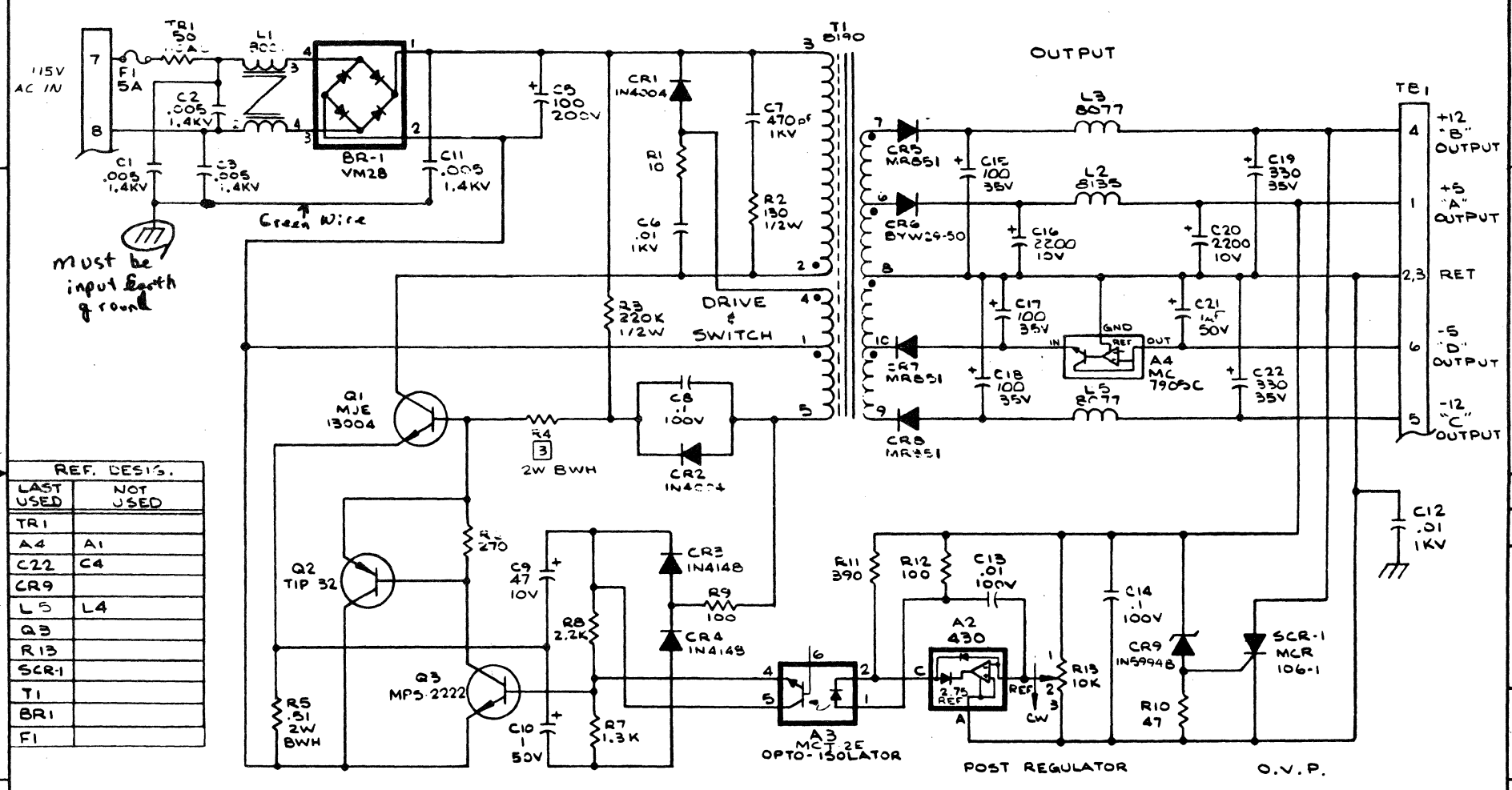
ITEM	PART NO.	QTY	DESCRIPTION	DES
55	16-1132	1	SCR, MCR106-1	SCR-1
56				
57	15-1001	1	I.C, OPTO-ISOLATOR, MCT-2E	A3
58	14-1071	1	I.C, VOLTAGE REG, 430	A2
59				
60				
61				
62	13-1055	1	TRANS, NPN, AMPL, MPS-2222	Q3
63	12-1146	1	TRANS, PNP, TIP32	Q2
64				
65				
66	83-7011	1	FUSE, SUB-MINI, 5A	F1
67				
68				
69	30-3024	1	RES, C.F., 10, ±5% 1/4W	R1
70	3040	1	47	R10
71	3048	2	100	R9, 12
72				
73	3058	1	270	R6
74	3062	1	RES, C.F., 390, ±5%, 1/4 W	R11
75				
76	3074	1	RES, C.F. 1.2K, ± 5%, 1/4 W,	R7
77	3074	1	RES. C.F. SAT. (1.2K NOM) ±5% 1/4W	R14 [8]
78				
79				
80				
81	30-3082	1	RES, C.F., 2.7K, ±5%, 1/4W	R8

TITLE: POWER SUPPLY 115V, 25 WATT	beckett	DRAWING NO. 45-40006	REV J
		SIZE A / SCALE N/A	SHEET 5 OF 6

ITEM	PART NO.	QTY	DESCRIPTION	REF DES
82	30-3251	1	RES, C.F., 130 , ±5%, 1/2 W	R2
83				
84	30-3328	1	, C.F., 220K , ±5%, 1/2 W	R3
85				
86	31-3810	1	, C.C., SAT (22 Ω NOM.) 10%, 2W BWH	R4 [8]
87				
88	35-3802	1	, W.W., .51Ω , ±10%, 2W BWH	R5
89				
90				
91				
92	36-3944	1	, POT, 10K	R13
93				
94	39-3900	1	RES, 50Ω, THERMISTOR	TR1
95				
96	73-6058	1	TERMINAL STRIP	
97				
98				
99				
100	53-7742	1	LABEL, 115 VOLTS	
101	53-7740	1	LABEL, DANGER HIGH VOLTAGE	
102	53-7881	1	LABEL, MODEL & SERIAL NUMBER	
103				
104	-7884	A/R	GLYPTAL, RED	
105	87-7959	1	WIRE BARE 22 AWG, .50LG	
106	87-7960	1	WIRE, BARE, 22 AWG, .60LG	
107	87-7464	1	WIRE, GRN, 22 AWG, 3.00 × 1/4 × 1/4	
108				

TITLE		DRAWING NO.	REV
POWER SUPPLY 115V, 25 WATT	beechert	45-40006	T
		SIZE A / SCALE N/A	SHEET 6 OF 6

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
1984	4	PRE-REL. FOR PROD.	5-2-78	
2259	A	RELEASED FOR PRODUCTION	9-13-78	



REF. DESIG.	
LAST USED	NOT USED
TR1	
A4	A1
C22	C4
CR9	
L5	L4
Q3	
R13	
SCR-1	
T1	
BR1	
F1	

3 FACTORY SELECTED. SAT (22 NOM)
2. CAPACITORS ARE IN μf.
1. RESISTORS ARE IN OHMS, 1/4 W.

NOTES: UNLESS OTHERWISE SPECIFIED

QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION

PARTS LIST

	25-1001
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ARE:
FRACTIONS ± — DECIMALS .XX ± — .XXX ± — ANGLES ± —

MATERIAL

FINISH

DO NOT SCALE DRAWING

CONTRACT NO.

APPROVALS	DATE
DRAWN FRANK KRAJEWITZ	4-4-78
CHECKED	5-2-78
W S Lee	9-19-78

BOSCHERT

SCHEMATIC, 115V 25 WATT

SIZE	CODE IDENT NO.	DRAWING NO.	REV.
C		20139	A

SCALE N/A SHEET 1 OF 1

20139 REV A

APPLICATION		REVISION				
NEXT ASSY	USED ON	REV	ECO	DESCRIPTION	DATE	APPROVED
45-10157-01	XL25-1001	1	—	PRE REL FOR PROD	11-6-79	[illegible]
45-10152-01	XL25-3001	A		REL. FOR PROD.		[illegible] 2/6/80
45-10152-02	XL25-4001					

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS DECIMALS ANGLES - ——— .XX ± ——— ± ——— .XXX ± ———	APPROVALS	DATE
	DRAWN John Sanchez	11-6-79
	CHECKED SCHATZMAN	2 JAN 80
	ENG [illegible]	1-25-80
	MFG MGR [illegible]	2-6-80
	QA MGR [illegible]	2/7/80
	RELEASED [illegible]	1-28-80
	C. Forney	1-28-80

boschert

BOSCHERT INCORPORATED
SUNNYVALE, CALIFORNIA

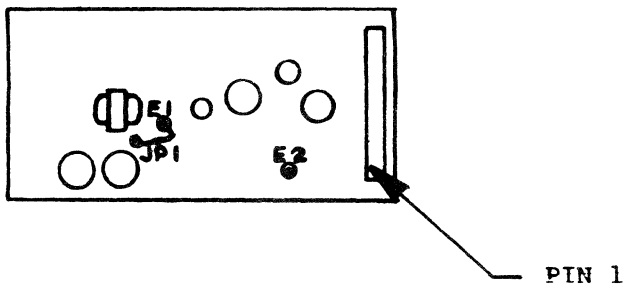
PIN OUT CHART
XL 25

MATERIAL	FINISH	DO NOT SCALE DRAWING

SIZE	DRAWING NO.	REV
A	97-10147	A

SCALE N/A | SHEET 1 OF 2

PIN ORIENTATION



NOTE 1 - For 110V as shown; For 220V strap JP1 to E2 (applicable to the XL25-3001/4001 only).

PIN		VOLTAGE
2	INPUT	A.C. NEUT/HOT
3	INPUT	A.C. HOT
1	CHAS GND	
4	OUTPUT	-5V
5	OUTPUT	-12V
7	OUTPUT	+5V
8	OUTPUT	+12V
	OUTPUT	
	OUTPUT	
	OUTPUT	
	OUTPUT	
6	RETURN	
	NOT USED	

MODEL NO. XL-25

MFG. ASSEMBLY NO. _____

MATING CONNECTOR

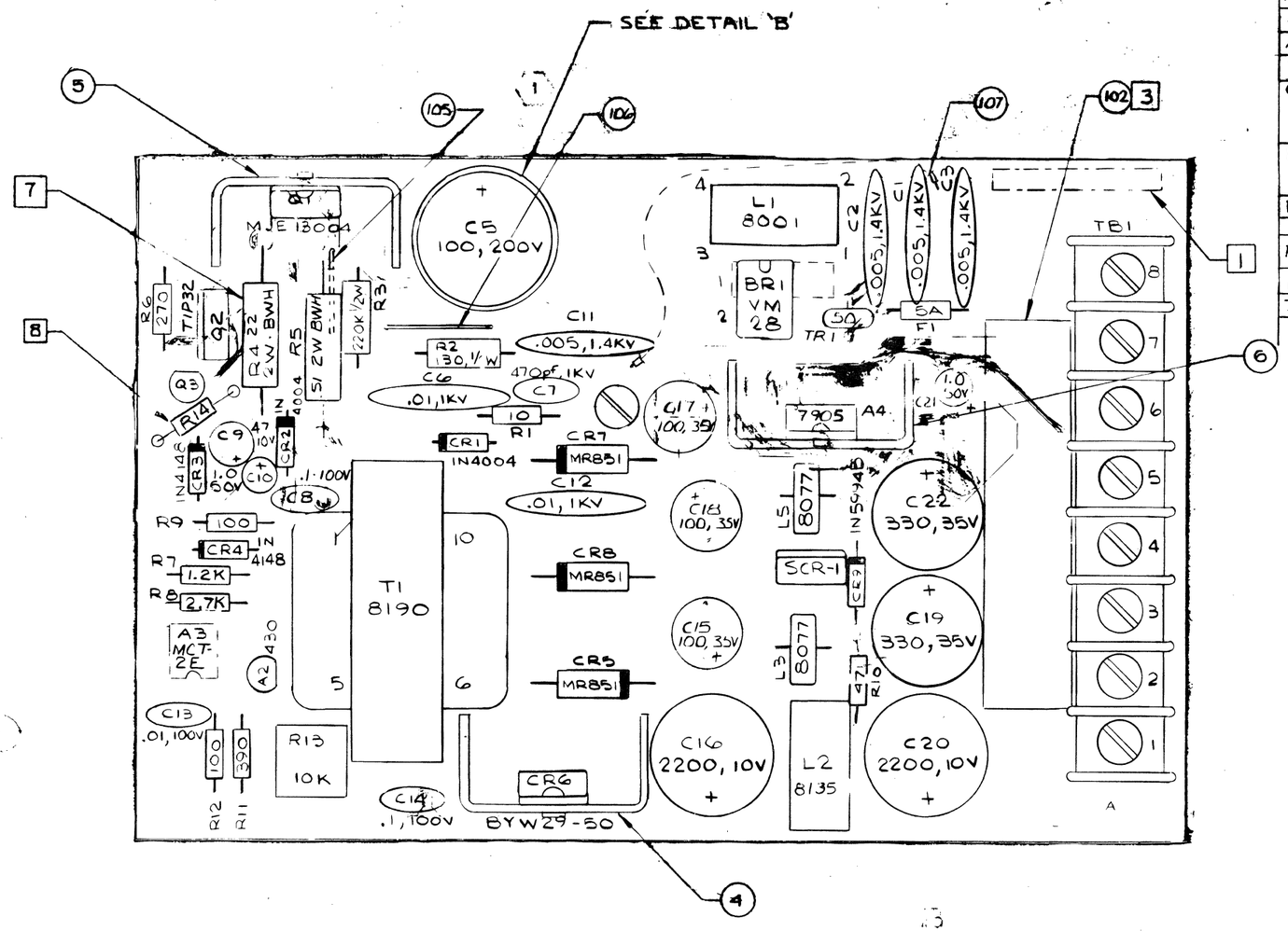
AUTOMATIC SHORT CIRCUIT RECOVERY ☐

AUTOMATIC SHORT CIRCUIT SHUT DOWN ☐

DWG. NO. 97-10147 REV A

SHT. 2 OF 2

REV	DESCRIPTION	ECO	DATE	APPROVED
4	PRE-RELEASED FOR PROD.	1782	5-2-78	
A	RELEASED FOR PRODUCTION	2259	7-13-78	
B	L/M CHG ONLY	2369	12-13-78	
C	ADDED DETAIL B; DELETED [3] & (100) FROM T1 AND [3] & (100) FROM C-5	2413	12-13-78	
D	ADDED NOTE [6] & CALL OUT. CHG NOT PER ECO: ADDED VALUE TO R4.	2623	3-27-79	
E	REVISED PER ECO CHG'S	2799		
	TVA PENDING 2596 5-1-79			
F	ADDED R14, R7 WAS F.S. R8 WAS 2.2K.	3335	11-2-79	
H	INCORPORATED	3915		
J	CHANGED PER ECO	4446	7-1-80	



DETAIL 'B'
N.T.S.

DWG NO 40006

[8] FACTORY SELECTED SAT (1.2K NOM).

[7] FACTORY SELECTED SAT (22 NOM).

6. ALL RESISTORS 2 WATT AND ABOVE MUST BE MOUNTED .15 INCHES ABOVE BOARD.

5

4

[3] APPLY LABELS IN APPROX LOCATION SHOWN.

2. FOR REFERENCE DWG. SEE SHEET TWO OF L/M.

[1] APPLY ASSY. NO. AND CURRENT REVISION LEVEL IN APPROX LOCATION SHOWN.

NOTES:

SEE SEPARATE P/L DWG NO. 40006 "A" SIZE

ITEM	QTY	PART NUMBER	DESCRIPTION	REF DESIGNATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES:
TOLERANCES:
DECIMALS (.XX) ± — FRACTIONS ± —
DECIMALS (.XXX) ± — ANGLES ± —

NEXT ASSY	MOD NO.
FINAL	25-1001

DO NOT SCALE DRAWING

APPROVALS:		DATE
DRAWN	FRANK FRANCOVETZ	4-6-78
CHECKED		5-2-78
ENG		
ENG MGR		
MFG MGR		
QA MGR		
RELEASED		

boschert
BOSCHERT ASSOCIATES
SUNNYVALE, CALIFORNIA

POWER SUPPLY
115V, 25W

SIZE C | DWG NO 45-40006 | REV J
SCALE 2:1 | SHEET 1 OF 1

REVISIONS				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
1984	4	PRE-REL. FOR PROD.	5-2-78	
2259	A	RELEASED FOR PRODUCTION	9-13-78	
2623	B	ADDED NOTE [4]; AT R7 DELETED VALUE AND ADDED NOTE [4] REF	3-27-79	
3335	C	ADDED R14, R7 WAS F.S., R8 WAS 2.2K	11-2-79	RKS

INPUT FILTER & BRIDGE

115V AC IN

F1 5A

TR1 50 110AC

L1 8001

C2 .005 1.4KV

C1 .005 1.4KV

C3 .005 1.4KV

BR-1 VM28

C11 .005 1.4KV

C5 100 200V

CR1 IN4004

R1 10

C6 .01 1KV

C7 470pf 1KV

R2 130 1/2W

T1 8190

R3 220K 1/2W

DRIVE & SWITCH

Q1 MJE 13004

R4 [3] 2W 8 WH

C8 .1 100V

CR2 IN4004

OUTPUT

L3 8077

CR5 MR851

C15 100 35V

L2 8135

C19 330 35V

CR6 BYW29-50

C16 2200 10V

C20 2200 10V

C17 100 35V

C21 50V

CR7 MR851

A4 MC 7905C

C18 100 35V

L5 8077

C22 330 35V

CR8 MR851

TB1

+12 "B" OUTPUT

+5 A OUTPUT

RET

-5 D OUTPUT

-12 "C" OUTPUT

C12 .01 1KV

Q2 TIP 32

R6 270

C9 47

R14 10V F.S. [4]

R8 2.7K

CR3 IN4148

R9 100

CR4 IN4148

Q3 MPS 2222

R5 .51 2W BWH

C10 1 50V

R7 1.2K

A3 MCT 2E OPTO-ISOLATOR

R11 390

R12 100

C13 .01 100V

A2 430

2.75 REF

REF

CW

R13 10K

C14 .1 100V

CR9 IN5248B

R10 47

SCR-1 MCR 106-1

MODULATOR

POST REGULATOR

O.V.P.

REF. DESIG.	
LAST USED	NOT USED
TR1	
A4	A1
C22	C4
CR9	
L5	L4
Q3	
R14	
SCR-1	
T1	
BR1	
F1	

[4] FACTORY SELECTED SAT (1.2K NOM)

[3] FACTORY SELECTED. SAT (22 NOM)

2. CAPACITORS ARE IN mf.

1. RESISTORS ARE IN OHMS, 1/4W.

NOTES: UNLESS OTHERWISE SPECIFIED

NEXT ASSY	USED ON
	25-1001

APPLICATION

DO NOT SCALE DRAWING

QTY REQD	CODE IDENT	PART OR IDENTIFYING NO.	NOMENCLATURE OR DESCRIPTION

PARTS LIST

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ARE:
FRACTIONS ± — DECIMALS .XX ± — .XXX ± — ANGLES ± —

MATERIAL

FINISH

CONTRACT NO.

APPROVALS	DATE
DRAWN FRANK KRALOWETZ	4-1-78
CHECKED	4-3-78

BOSCHERT

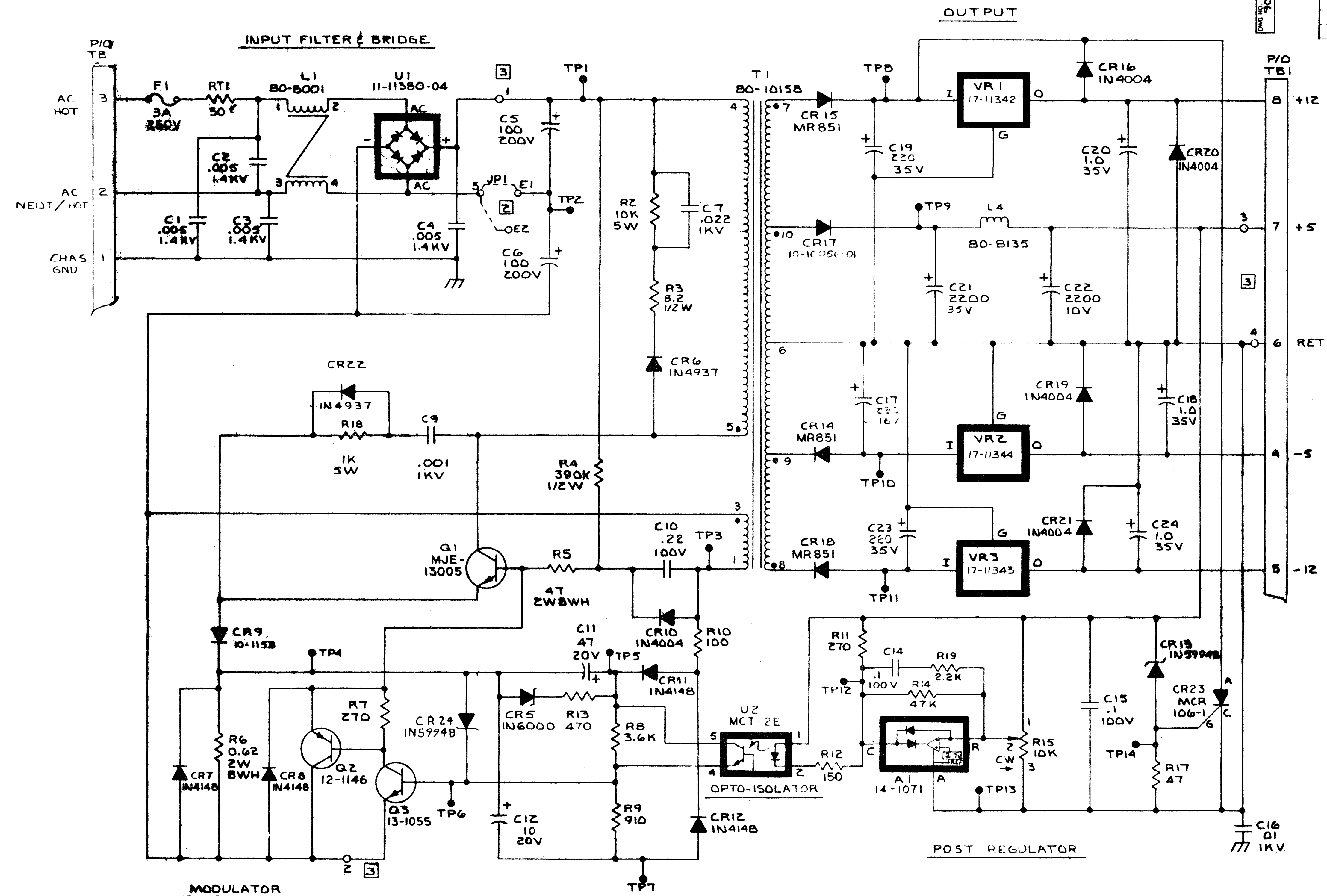
SCHEMATIC, 115V 25 WATT

SIZE	CODE IDENT NO.	DRAWING NO.	REV.
C		90-20139	C

SCALE N/A SHEET 1 OF 1

DWG NO 90-10150 REV E

LTR	DESCRIPTION	ECO	DATE	APPROVED
2	REVISED & REDRAWN		3-30-79	
3	ENG PROTOTYPE			
4	ENG PROTOTYPE			
5	PRE REL TO PROD			
A	REL FOR PROD.			
B	INCORPORATED	4213	3-31-80	



TP14	
VR3	
T1	
U2	
RT1	
R19	R1,16
Q3	
L4	L3,2
JP1	
TB1	
F1	
E2	
CR24	CR1,2,3,4,
C24	C8, C13
A1	
LAST USED	NOT USED
REFERENCE DESIGNATOR	

NOTES:

1. UNLESS OTHERWISE [redacted]: CAPACITORS ARE IN [redacted] RESISTORS ARE IN [redacted]

2. FOR 220V OPERATION [redacted] JP1 TO E2. FOR 110V OPERATION [redacted] JP1 TO E1

3. STRAP POINTS 1 THRU 4 ARE FOR FLYING LEADS.

VOLTAGE	NEXT ASSY	MOD NO.
110 V	45-10152-01	XL25-3001
220 V	45-10152-02	XL25-4001

ITEM	QTY	PART NUMBER	DESCRIPTION	REF DESIGNATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES:
TOLERANCES:
DECIMALS (.XX) ± ~ FRACTIONS ± ~
DECIMALS (.XXX) ± ~ ANGLES ± ~

DO NOT SCALE DRAWING

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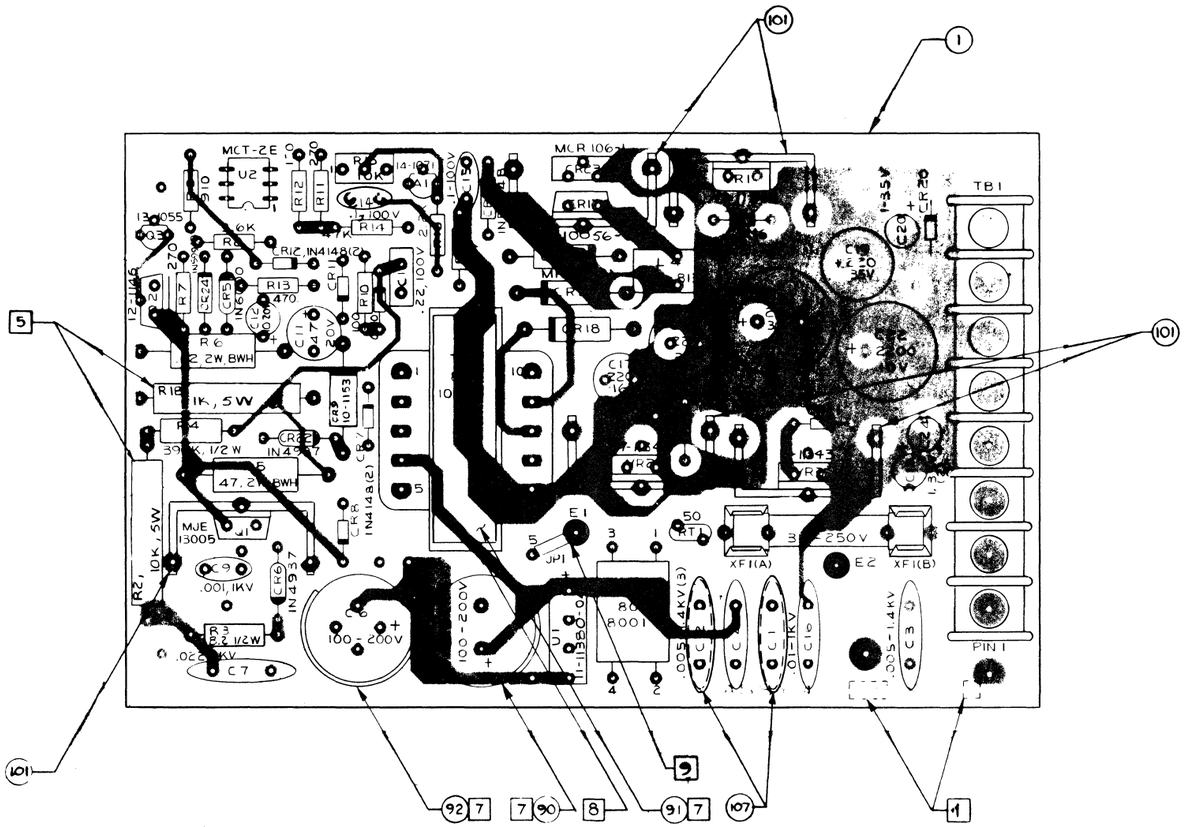
SCHEMATIC
XL25-3001/4001
110/220V

SIZE D — DWG NO. 90-10150 — REV E
SCALE NONE — SHEET 1 OF 1

REV	DESCRIPTION	ECO	DATE	APPROVED
1	PRE REL FOR PROD		10-22-79	WJ
A	REL FOR PROD.		2-6-80	
B	INCORPORATED	4070 4213	3-20-80	

DWG NO 45-10152-01/02 REV



OPTION TABLE [1]

ASSY P/N	MOD NO.	VOLT. RATING
45-10152-01	XL25-3001	110
45-10152-02	XL25-4001	220

11. UNLESS OTHERWISE SPECIFIED : RESISTORS ARE 1/4 W : DIODES ARE IN4004 : CAPACITANCE IS IN μf.
10.
[9] FOR -01 (110 V) STRAP JP1 TO E1 AS SHOWN ; FOR -02 (220V) STRAP JP1 TO E2
[8] CORE MUST BE .15 ABOVE BOARD.
[7] APPLY LABELS IN APPROX POSITION SHOWN NOT COVERING THE COMPONENT IDENTIFICATION.
[6]
[5] R2 & R18 MUST BE MOUNTED .30 IN. OFF THE BOARD.
4. ALL HEATSINKS MUST BE MOUNTED .10 IN OFF THE BOARD.
3. ALL RESISTORS TWO (2) WATTS AND ABOVE MUST BE MOUNTED .15 IN OFF THE BOARD UNLESS OTHERWISE SPECIFIED.
2. FOR REFERENCE DWG SEE LIST OF MATERIAL.
[1] MARK ASSY IDENT NO & CURRENT REV LEVEL IN APPROX LOCATION SHOWN PER OPTION TABLE.

NOTES:

ITEM	QTY	PART NUMBER	DESCRIPTION	REF DESIGNATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES:
TOLERANCES:
DECIMALS (.XX) ± FRACTIONS ±
DECIMALS (.XXX) ± ANGLES ±

NEXT ASSY	MOD NO.
FINAL	XL25-3001
FINAL	XL25-4001

DO NOT SCALE DRAWING

APPROVALS: DATE
DRAWN 8-17-79
CHECKED 10-19-79
ENG 10-22-79
ENG MGR
MFG MGR
QA MGR
RELEASED 3-20-80

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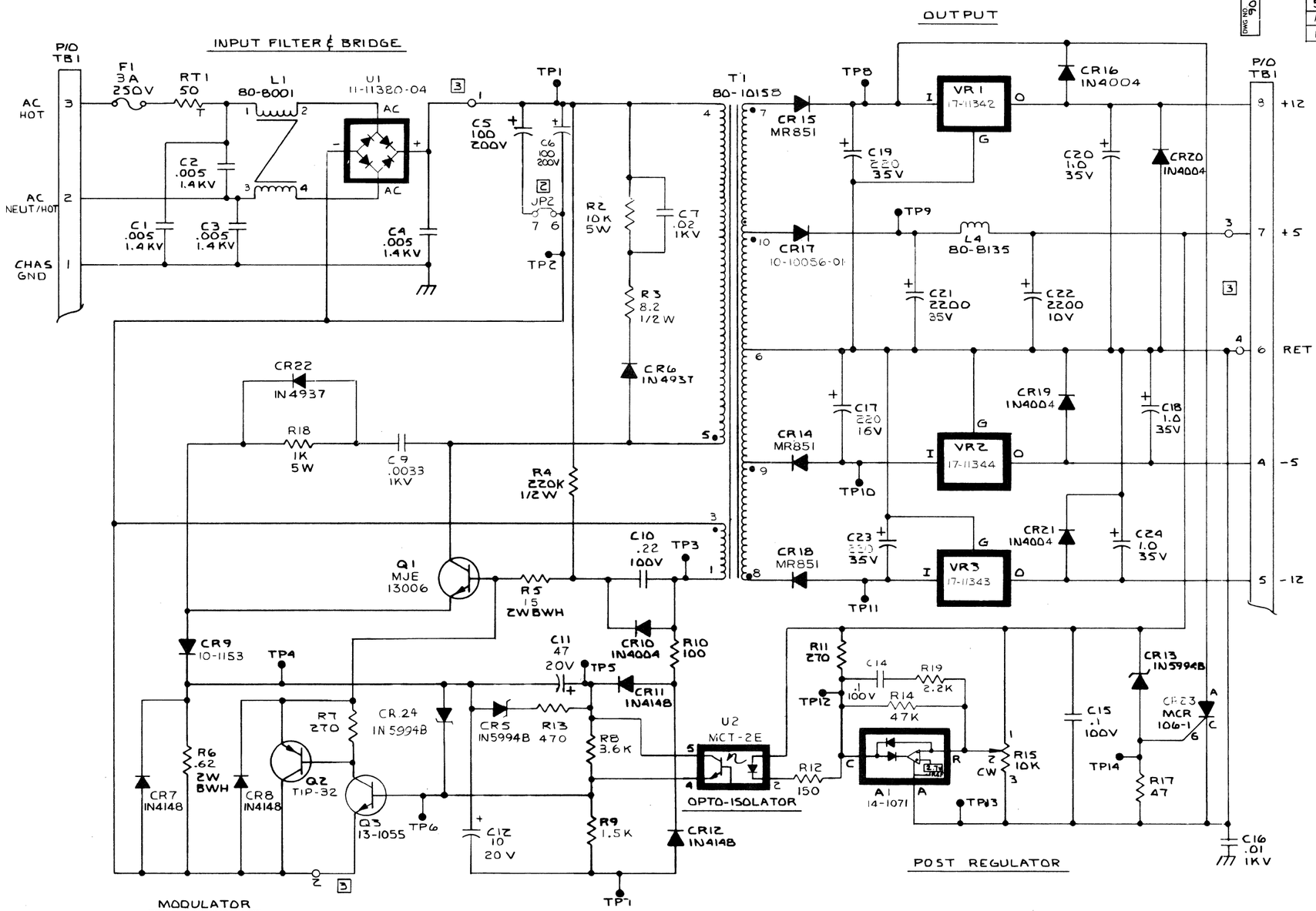
ASSEMBLY
XL25-3001/4001
110/220 V

SIZE D | DWG NO. 45-10152-01/-02 | REV B
SCALE 2:1 | SHEET 1 OF 1

DWG NO. 90-10155 REV

REV	DESCRIPTION	ECO	DATE	APPROVED
2	REVISED & REDRAWN			
3	ENG PROTOTYPE			
4	ENG PROTOTYPE			
5	PRE REL FOR PROD		10-27-79	
A	REL FOR PROD		1-4-80	
B	INCORPORATED	4241	3-27-80	



TP14	
VR3	
T1	
U2	
RT1	
R19	R1,18
Q3	
L4	L3,2
TB1	
F1	
JP2	JP1
CR24	CR1,2,3,4,
C24	C8,13
A1	
LAST USED	NOT USED
REFERENCE	DESIGNATOR

[3] STRAP POINTS 1 THRU 4 ARE FOR FLYING LEADS.

[2] BARE WIRE STRAP ACROSS STRAP POINTS, 6-7.

1. UNLESS OTHERWISE SPECIFIED:
   CAPACITORS ARE IN MICROFARADS
   RESISTORS ARE IN OHMS 1/4W

NOTES:

ITEM	QTY	PART NUMBER	DESCRIPTION	REF DESIGNATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES:
TOLERANCES:
DECIMALS (XX) ± .02 FRACTIONS ± 1/32
DECIMALS (XXX) ± .010 ANGLES ± 1°

NEXT ASSY	MOD NO.
45-10157-01	XL25-1001

DO NOT SCALE DRAWING

APPROVALS:		DATE
DRAWN	R Ge	3-27-79
CHECKED	[illegible]	4-3-79
ENG	[illegible]	1-24-80
ENG MGR	C Fo[illegible]	1-28-80
MFG MGR	[illegible]	2-6-80
QA MGR	[illegible]	2/7/80
RELEASED	[illegible]	2/7/80

boschert BOSCHERT ASSOCIATES SUNNYVALE, CALIFORNIA

SCHEMATIC XL25-1001 115V

SIZE	DWG NO.	REV
D	90-10155	B

SCALE NONE SHEET 1 OF 1

REV	DESCRIPTION	ECO	DATE	APPROVED
5	PRE REL FOR PROD		10/17/79	WJ
A	REL FOR PROD		11-4-80	
B	INCORPORATED	4023 4069 4241	3-27-80	
C	ADDED SUFFIX "R" TO MODEL NO.	4636	6-17-80	

DWG NO. 45-10157 REV

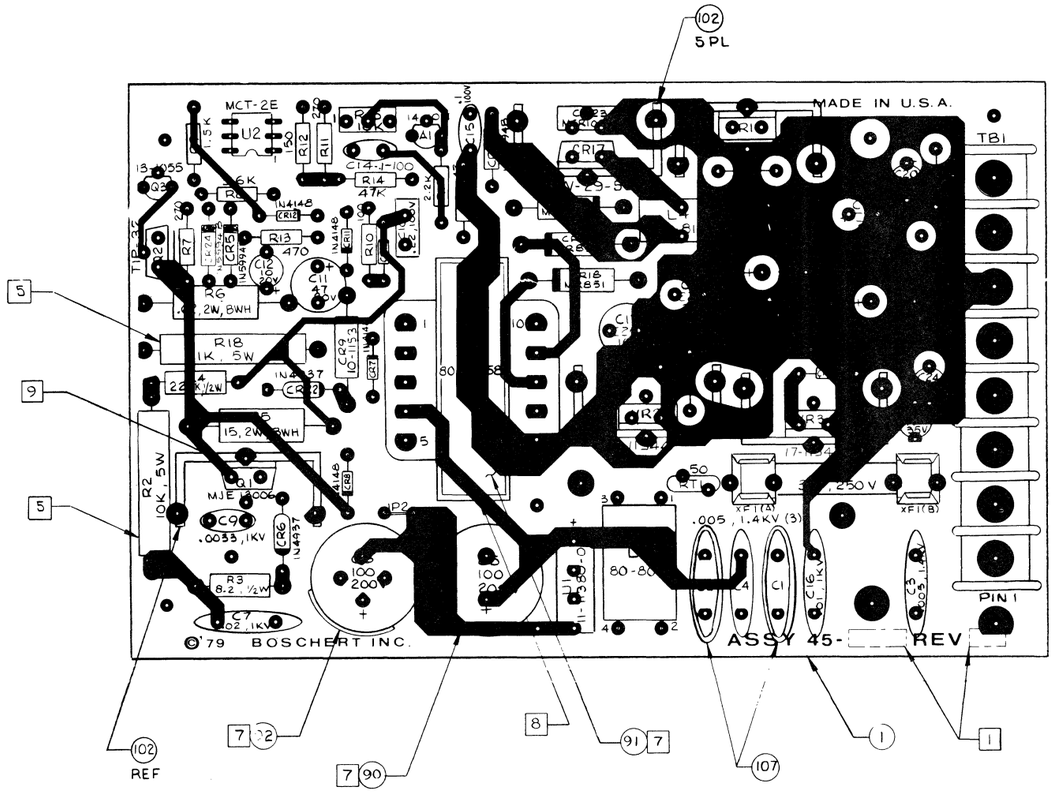


TABLE A

ASSY NO	MODEL NO	VOLT RATING
45-10157-01	XL25-1001R	115 V

10. UNLESS OTHERWISE SPECIFIED: RESISTORS ARE 1/4 W; DIODES ARE IN4004; CAPACITANCE IS IN μf.
9. APPLY A THIN COAT OF HEATSINK COMPOUND (P/N 74-7765) BEFORE ASSY.
8. CORE MUST BE .15 ABOVE BOARD.
7. APPLY LABELS IN APPROX POSITION SHOWN NOT COVERING THE COMPONENT IDENTIFICATION.
6.
5. R2 & R18 MUST BE MOUNTED .30 OFF BOARD.
4. ALL HEATSINKS MUST BE MOUNTED .10 IN. OFF THE BOARD.
3. ALL RESISTORS TWO (2) WATTS AND ABOVE MUST BE MOUNTED .15 IN. OFF THE BOARD UNLESS OTHERWISE SPECIFIED.
2. FOR REFERENCE DWG SEE LIST OF MATERIAL.
1. MARK ASSY IDENT NO & CURRENT REV LEVEL IN APPROX LOCATION SHOWN PER TABLE A

NOTES:

ITEM	QTY	PART NUMBER	DESCRIPTION	REF DESIGNATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES:
TOLERANCES:
DECIMALS (XX) ± FRACTIONS ±
DECIMALS (XXX) ± ANGLES °

NEXT ASSY	MOD NO.
FINAL	XL25-1001R

DO NOT SCALE DRAWING

APPROVALS: DATE
DRAWN LNH VO 10-16-79
CHECKED TOMLINSON 25 OCT 79
ENG
ENG MGR
MFG MGR 2-6-80
QA MGR
RELEASED

boschert BOSCHERT ASSOCIATES SUNNYVALE, CALIFORNIA

ASSEMBLY
XL25 - 1001R
115 V

SIZE D | DWG NO. 45-10157 | REV C
SCALE 2:1 | SHEET 1 OF 1