Field Support Manual
Power Supply P5020

Data
Systems

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Chapter 1: GENERAL DESCRIPTION

1.1. INTRODUCTION

This manual provides the information necessary for the field service engineer to understand the operation of, and troubleshoot and repair the Astec model AA115A10 Power Supply.

1.2. GENERAL

The Power Supply, shown in Figure 1-1, is a single printed circuit board (PCB) which provides four regulated DC outputs from a 115 Vac, 60 Hz or 230 Vac, 50 Hz input. The AC input is strap selectable and is fused. The four regulated DC outputs are +5V, +12V, -12V, and +85V. There are no adjustments on the Power Supply.

1.3. PHYSICAL DESCRIPTION

The PCB measures 10.5 inches long by 5.0 inches wide by 2.5 inches high (267 mm x 127 mm x 64 mm). There are six 0.125 inch (3 mm) holes around the edges of the PCB, allowing the PCB to be mounted on a metal frame (standoffs isolate the PCB from the metal frame). There are two connectors on the PCB, one for AC input and one for DC outputs.

Figure 1-1 POWER SUPPLY

1.4. TECHNICAL DATA

1.4.1. PHYSICAL

Length:	10.5" (267 mm)
Height:	2.5" (64 mm)
Width :	5.0" (127 mm)

1.4.2. AC INPUT VOLTAGE

100-127 Vac ±10%, 60 Hz ±2%

or

200-240 Vac ±10%, 50 Hz ±2%

1.4.3. AC INPUT PROTECTION

2.5A, 250V, 3AG, Slow-Blow Fuse

1.4.4. POWER FACTOR

0.6 (system level)

1.4.5. DC OUTPUTS

Refer to Table 1.1

1.4.6. ENVIRONMENTAL

Temperature:

Operating:	+5°C to +55°C
Non-operating:	-40°C to +70°C

Humidity:

Operating:	15 to 85% R.H.
Non-operating:	5 to 95% R.H.

Air Pressure:

Operating:	840 to 1100 millibar
Non-operating:	450 to 1100 millibar

Table 1.1 DC OUTPUTS

VOLTAGE			MAXIMUM CURRENT	MAXIMUM RIPPLE
MIMIMUM	NOMINAL	MAXIMUM		
+4.85V	+5.00V	+5.15V	7.0A	50 mVp-p
+11.4V	+12.0V	+12.6V	3.0A	120 mVp-p
-11.52V	-12.00V	-12.48V	0.5A	120 mVp-p
+80.0V	+85.0V	+94.0V	0.5A	2.55 Vp-p

1.5. INTERFACES

The Power Supply interfaces with external devices via two connectors, shown in Figure 1-1. Pin assignments for the connectors are given in Tables 1.2 and 1.3.

Table 1.2 AC INPUT CONNECTOR

PIN NUMBER	ASSIGNMENT
1	AC HIGH
2	NOT USED
3	GROUND RETURN
4	AC LOW

Table 1.3 DC OUTPUT CONNECTOR

PIN NUMBER	ASSIGNMENT
1	+5V
2	+5V
3	GROUND
4	GROUND
5	+12V
6	+12V
7	GROUND
8	GROUND
9	-12V
10	GROUND
11	KEY POSITION
12	+85V

1.6. APPLICATION NOTES

The Power Supply is used in the M3003 Word Processor System, which is a self-contained desktop console consisting of a System Controller PCB, a video CRT, and one or two mini-floppy disk drives. The system has a detachable keyboard and supports a serial daisy wheel printer.

1.7. INSTALLATION DATA

The following steps provide pertinent installation information for the Power Supply. See Figure 1-1.

- The 115V/230V strap must be in the correct position, corresponding to the AC input voltage being used.
- The fuse must be 2.5A, 250V, 3AG, Slow-Blow.
- The PCB is secured to the console mounting plate using six bolts, standoffs and nuts.

Chapter 2: DETAILED DESCRIPTION

2.1. INTRODUCTION

This chapter is divided into two subsections. The first subsection is a block diagram description of the Power Supply and the second subsection is a detailed description to the schematic diagram level.

2.2. BLOCK DIAGRAM DESCRIPTION (Figure 2-1)

The AC input is routed, via a 2.5 amp slow-blow fuse and 115/230V strap, to the transformers. Line transients are removed and any other line-conducted interference is suppressed on the AC input. The output from the transformers is rectified, producing approximately 300 Vdc, which is applied to the switching circuit. With a 115 Vac input, the rectifier acts as a voltage doubler.

The switching circuit consists basically of a switching transistor and a transformer, providing an AC output to the rectifiers and filters. The crowbar circuit monitors the +5V and +12V outputs and controls the output of the transformer in the switching circuit. In an overload condition the crowbar circuit shorts the secondary windings of the transformer, causing the Power Supply to shut down. The crowbar limit for the +5 volts is 6.175 to 6.825V and the limit for the +12V volts is 13.02 to 14.98V. The feedback circuit monitors the +5V output and controls the switching rate of the switching transistor in the switching circuit. This ensures that the +5V and +12V outputs remain within tolerance independent of line variations, temperature changes and load fluctuations.

The rectifiers and filters accept the AC from the switching circuit and provide the filtered DC outputs. Specifications of the outputs are given in Table 1.1. These DC outputs are not adjustable.

2.3. SCHEMATIC DIAGRAM DESCRIPTION

Refer to the schematic diagram in Chapter 3.

The Power Supply is a switching Power Supply which provides four regulated DC outputs from a 115 Vac or 230 Vac input. The DC out specifications are provided in Table 1.1.

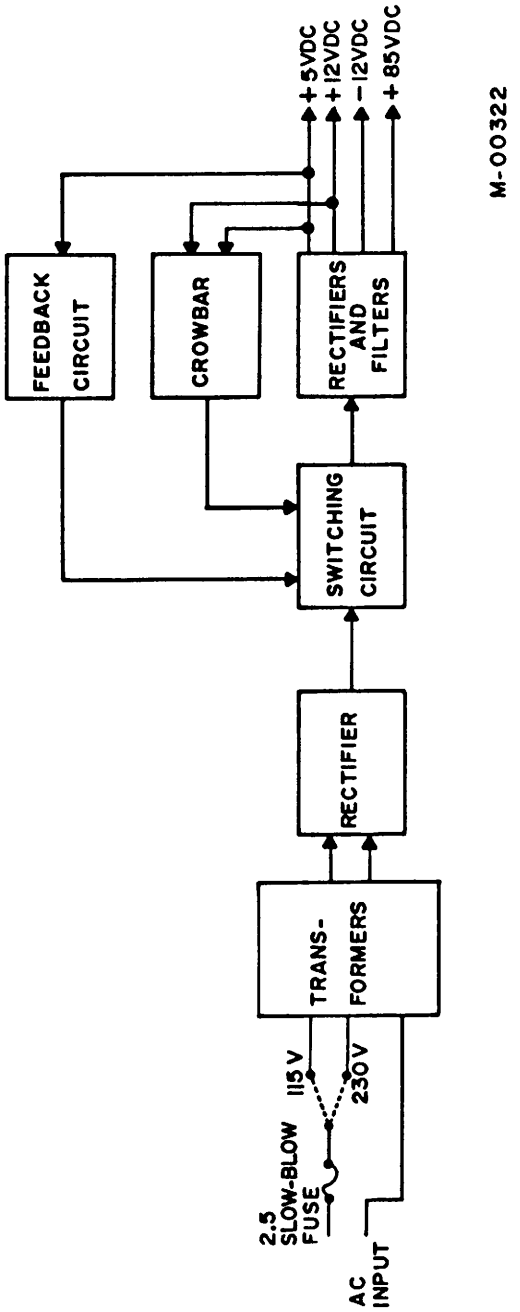


Figure 2-1 POWER SUPPLY BLOCK DIAGRAM

2.3.1. PRIMARY CIRCUITS

The primary circuits consist of the components between the AC input and transformers T2 and T3. The AC input is connected to L (line) and N (neutral). The 115/230 Vac jumper is placed to correspond to the AC input voltage being used. When a 115 Vac input is used, bridge rectifier DB1 and average storage capacitors C10-C13 act as a voltage doubler.

Fuse F1 provides protection against excessive current and VDR1 suppresses line transients. Line induced interference is suppressed by components C2, T1, C8, C5, and C6.

The AC input is rectified by DB1 and filtered by C10-C13 and L1-L2, to produce approximately 300 Vdc. Resistors R10 and R11 limit the current when power is first turned on.

Transistor Q5 is a switching transistor controlled by the current through R19 and by Q3. The current through R19 causes Q5 to conduct, putting the 300V across the primary winding of T3. Additional base drive to Q5 (7V) is provided from a winding of T2 through D1, R4, Q2, and D4.

Transistor Q5 is switched off by Q3 switching on. Transistor Q3 can be switched on by either the current limit circuitry formed by R26, R21, R23 and Q4, or by feedback transformer T2. Under no load or light load conditions the switching of Q5 is performed by the oscillator formed by Q1 and Q2. Under normal to heavy load conditions the switching of Q5 is performed by the clock action resulting from the interaction of the fields of T3 and T2. The collector waveforms of switching transistor Q5 is shown in Figure 2-2.

2.3.2. SECONDARY CIRCUITS

The secondary circuits take the AC voltages from the secondaries of T3 and perform rectification, filtering and regulation, providing the +5V, +12V, -12V, and +85V outputs. For specifications regarding the outputs refer to Table 1.1.

The +5V output is provided by rectifiers D17 and D14. Filtering is provided by C28, C26, L7, L8, C31, and C38.

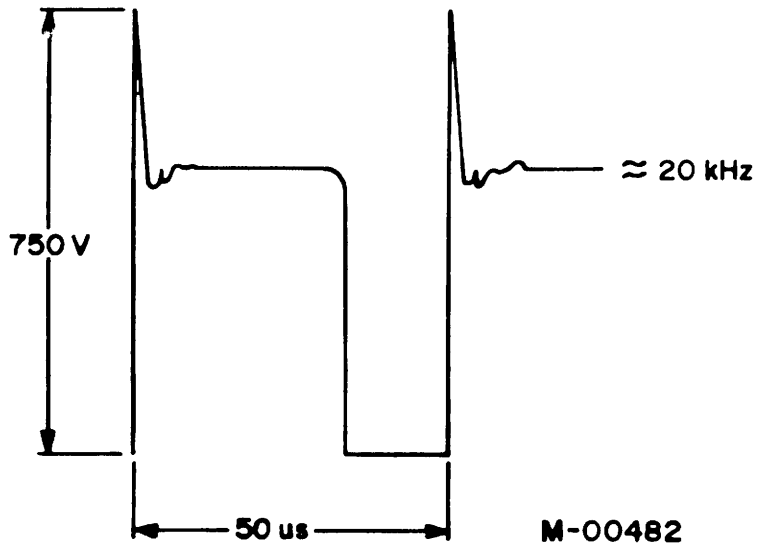


Figure 2-2 WAVEFORM AT COLLECTOR OF Q5

The +12V output is provided by rectifiers D15 and D17. Filtering is provided by C23, L6, C32, and C37.

The -12V output is provided by rectifier D18 and is filtered by C27, C33 and C39. Regulation is performed by IC2.

The +85V output is provided by rectifiers D12 and D13 and C35 provides filtering.

A crowbar circuit is formed by Z2 and Z3, which senses an overvoltage condition on the +5V and +12V outputs respectively. With an overvoltage condition, Q7 conducts which causes Q8 to conduct and current flows through R55 and R56. The voltage drop across R55 causes SCR1 to conduct and short the secondary windings of T3, causing the Power Supply to shut down. The crowbar limits of the +5V supply are 6.175 to 6.825V and the limits of the +12V supply are 13.02 to 14.98V. Zener diode Z2 is a 12.1V zener and Z3 is a 5.1V zener.

2.3.3. FEEDBACK CIRCUIT

The feedback circuit monitors the +5V output and controls the switching rate of Q5 through T2. The circuit monitors the +5V output through R44 and R46, and the set-up voltage is determined by the divider network of R45, R47 and R48. Any change in the set-up voltage, caused by a change in the +5V, is amplified by IC1 and applied to the base of Q6, which controls the current through the winding of T2. As the emitter of Q6 is also connected to a secondary of T3, any change in the +5V level causes a change in the fields of T2, which controls the switching rate of Q5. Thus, the feedback circuit ensures that the +5V and +12V outputs remain within tolerance, independent of line variations, temperature changes and load fluctuations.

Chapter 3: DIAGRAMS

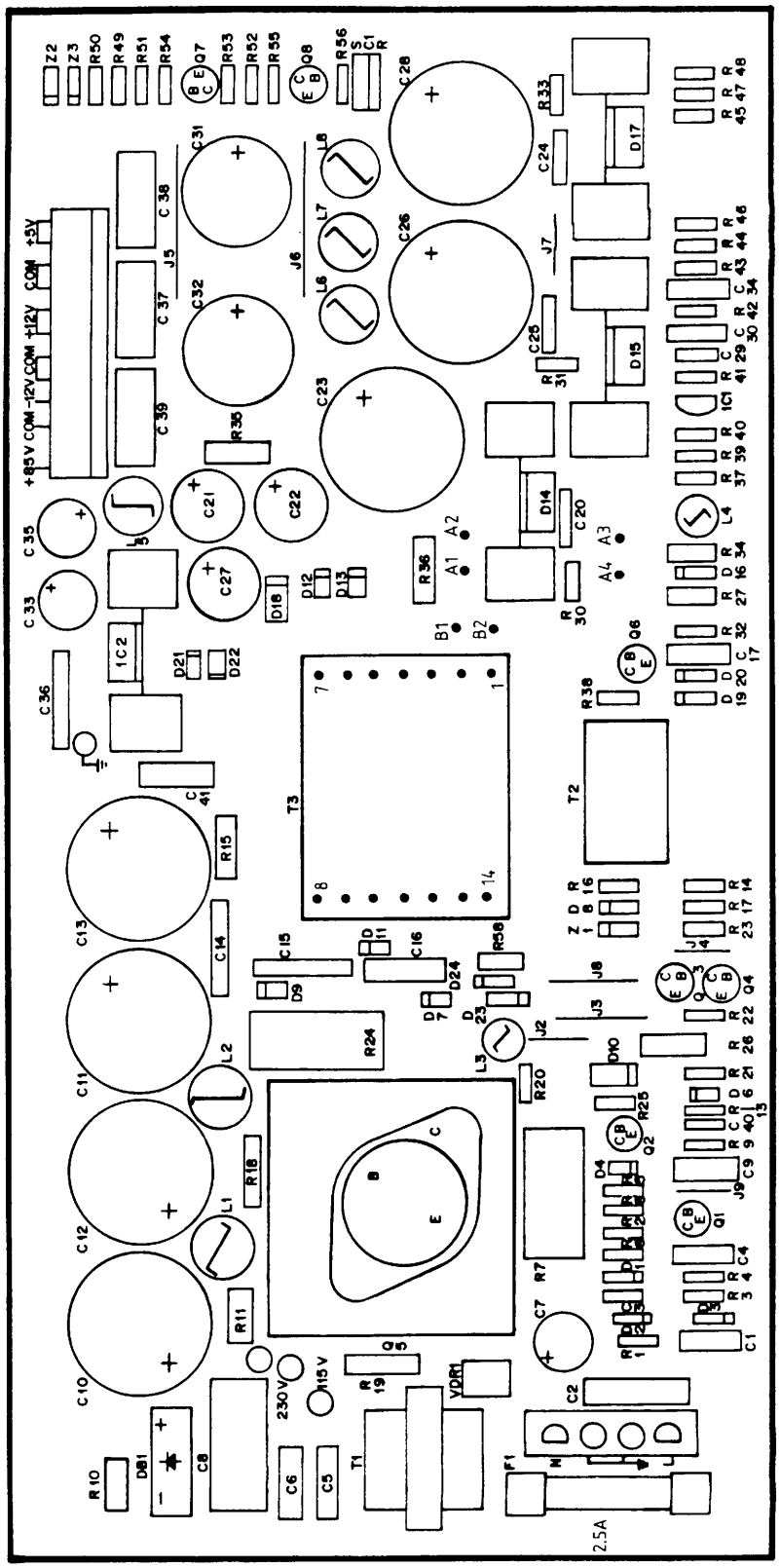


Figure 3-1 POWER SUPPLY COMPONENT LAYOUT

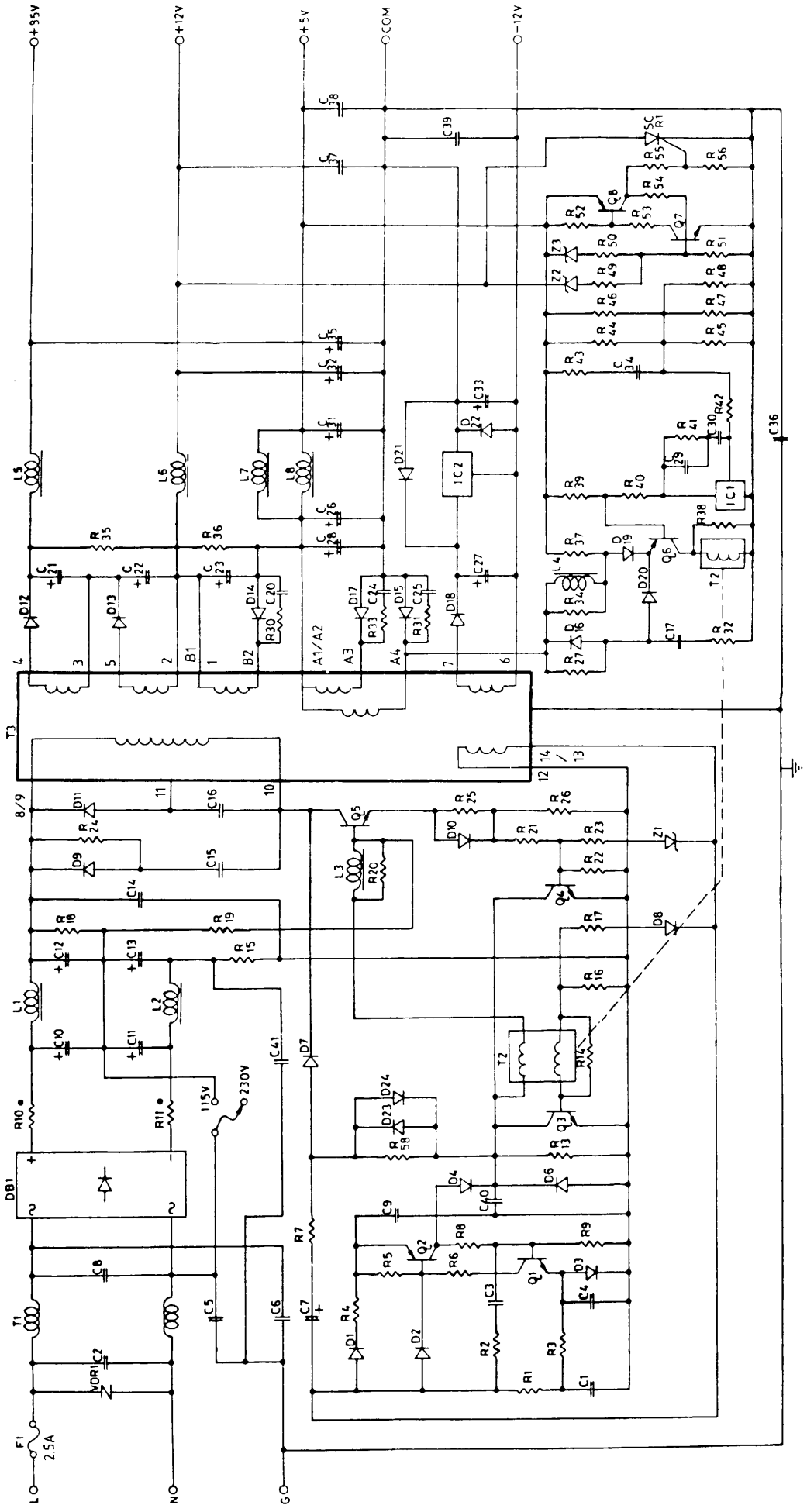


Figure 3-2 POWER SUPPLY SCHEMATIC DIAGRAM

Chapter 4: PARTS LIST

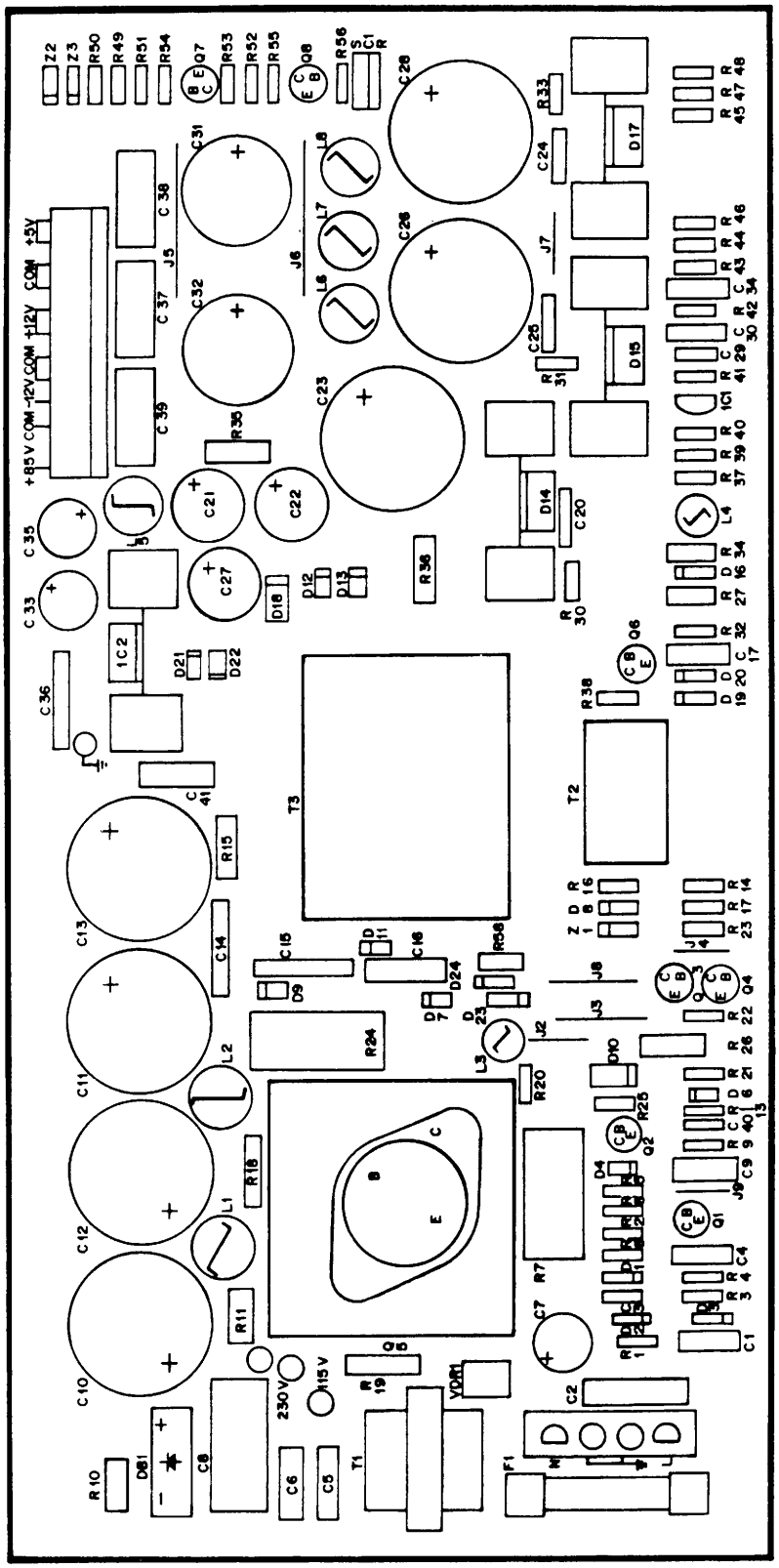


Figure 4-1 POWER SUPPLY COMPONENT LAYOUT

4.1. INTRODUCTION

This chapter lists all replaceable parts of the Power Supply. Refer to Figure 4-1 for component locations.

Table 4.1 POWER SUPPLY REPLACEABLE PARTS

REF DES	PART NUMBER	DESCRIPTION
	5207 299 90321	POWER SUPPLY (COMPLETE)
C1	058-47300090	CAPACITOR, POLY, 0.047 uF, 250V, ±10%
C2	068-10300010	CAPACITOR, 0.01 uF, 250V, ± 20%
C3	058-10200020	CAPACITOR, MYLAR, 1000 pF, 50V, ±20%
C4	058-47300090	CAPACITOR, POLY, 0.047 uF, 250V, ±10%
C5	068-47200010	CAPACITOR, 4700 pF, 250V, ±20%
or C5	055-47220001	CAPACITOR, 4700 pF, 400V, ±20%
C6	068-47200010	CAPACITOR, 4700 pF, 250V, ±20%
or C6	055-47220001	CAPACITOR, CERAMIC, 4700 pF, 400V, ±20%
C7	057-22120220	CAPACITOR, ELECTROLYTIC, 220 uF, 25V, ±20%
C8	068-22400010	CAPACITOR, 0.22 uF, 250V, ±10%
C9	058-22400120	CAPACITOR, 0.22 uF, 100V, ±10%
C10	057-22120200	CAPACITOR, ELECTROLYTIC, 220 uF, 250V, +100-10%
C11	057-22120200	CAPACITOR, ELECTROLYTIC, 220 uF, 250V, +100-10%
C12	057-22120200	CAPACITOR, ELECTROLYTIC, 220 uF, 250V, +100-10%

Table 4.1 POWER SUPPLY REPLACEABLE PARTS (Cont'd)

REF DES	PART NUMBER	DESCRIPTION
C13	057-22120200	CAPACITOR, ELECTROLYTIC, 220 uF, 250V, +100-10%
C14	055-10388925	CAPACITOR, CERAMIC, 0.01 uF, 1KV, +80-20%
C15	055-10267728	CAPACITOR, CERAMIC, 1000 pF, 1KV, ±20%
C16	055-10388925	CAPACITOR, CERAMIC, 0.01 uF, 1KV, +80-20%
C17	058-22400120	CAPACITOR, POLY, 0.22 uF, 100V, ±10%
C18		NOT USED
C19		NOT USED
C20	055-10365331	CAPACITOR, CERAMIC, 0.01 uF, 50V, ±20%
C21	057-10120180	CAPACITOR, ELECTROLYTIC, 100 uF, 50V, +100-10%
C22	057-10120180	CAPACITOR, ELECTROLYTIC, 100 uF, 50V, +100-10%
C23	057-28220010	CAPACITOR, ELECTROLYTIC, 2800 uF, 25V, +70-10%
C24	055-10365331	CAPACITOR, CERAMIC, 0.01 uF, 50V, ±20%
C25	055-10365331	CAPACITOR, CERAMIC, 0.01 uF, 50V, ±20%
C26	057-28220010	CAPACITOR, ELECTROLYTIC, 2800 uF, 25V +70-10%
C27	057-22120070	CAPACITOR, ELECTROLYTIC,200 uF, 25V, +100-10%
C28	057-28220010	CAPACITOR, ELECTROLYTIC, 2800 uF, 25V, +70-10%
C29	055-33153616	CAPACITOR, CERAMIC, 330 pF, 50V, +10%
C30	058-22300080	CAPACITOR, POLY, 0.022 uF, 100V, ±20%

Table 4.1 POWER SUPPLY REPLACEABLE PARTS (Cont'd)

REF DES	PART NUMBER	DESCRIPTION
C31	057-22220020	CAPACITOR, ELECTROLYTIC, 2200 uF, 16V, +50-10%
C32	057-22220020	CAPACITOR, ELECTROLYTIC, 2200 uF, 16V, +50-10%
C33	057-33020030	CAPACITOR, ELECTROLYTIC, 33, uF, 25V, +100-10%
C34	058-22400120	CAPACITOR, POLY, 0.22, uF, 100V, ±10%
C35	057-33920010	CAPACITOR, ELECTROLYTIC, 3.3 uF, 100V, +100-10%
C36	055-10388925	CAPACITOR, CERAMIC, 0.01 uF, 1KV, +80-20%
C37	058-68400040	CAPACITOR, POLY, 0.68 uF, 100V, ±10%
C38	058-68400040	CAPACITOR, POLY, 0.68 uF, 100V, ±10%
C39	058-68400040	CAPACITOR, POLY, 0.68 uF, 100V, ±10%
C40	055-10363620	CAPACITOR, CERAMIC, 0.01 uF, 50V, ±20%
C41	068-47200010	CAPACITOR, 4700 pF, 250V, ±20%
or C41	055-47220001	CAPACITOR, CERAMIC, 4700 pF, 400V, ±20%
D1	212-10700210	DIODE, 1N4606
D2	212-10700210	DIODE, 1N4606
D3	212-10700210	DIODE, 1N4606
D4	226-10400050	RECTIFIER, RGP10A
D5		NOT USED
D6	226-10400050	RECTIFIER, RGP10A

Table 4.1 POWER SUPPLY REPLACEABLE PARTS (Cont'd)

REF DES	PART NUMBER	DESCRIPTION
D7	226-10100050	RECTIFIER, RGP15M
D8	212-10700210	DIODE, 1N4606
D9	226-10400060	RECTIFIER, RGP10J
D10	226-10700010	RECTIFIER, RG3B
D11	226-10100050	RECTIFIER, RGP15M
or D11	226-10400200	RECTIFIER, MRF1000
D12	226-10100060	RECTIFIER, RGP15D
D13	226-10100060	RECTIFIER, RGP15D
D14	212-31100020	DIODE, S10SC4M
D15	212-31100020	DIODE, S10SC4M
D16	212-10700210	DIODE, 1N4606
D17	212-31100020	DIODE, S10SC4M
D18	226-10700010	RECTIFIER, RG3B
D19	212-10700210	DIODE, 1N4606
D20	212-10700210	DIODE,1N4606
D21	226-10400080	RECTIFIER, 1N4001GP
D22	226-10400080	RECTIFIER, 1N4001GP
D23	226-10400050	RECTIFIER, RGP10A

Table 4.1 POWER SUPPLY REPLACEABLE PARTS (Cont'd)

REF DES	PART NUMBER	DESCRIPTION
D24	226-10400050	RECTIFIER, RGP10A
DB1	226-30800010	BRIDGE RECTIFIER, KBL08
F1	084-00200060	FUSE, 2.5A, 250V, 3AG
IC1	211-10800100	IC, TL431CLP
IC2	211-10300080	IC, REGULATOR, LM340T-12
L1	852-20100021	CHOKE
L2	852-20100021	CHOKE
L3	852-20100270	CHOKE
L4	328-00100010	CHOKE, 1.5 mH
L5	852-20100020	CHOKE
L6	852-20100020	CHOKE
L7	852-10100370	CHOKE
L8	852-10100370	CHOKE
Q1	209-11700460	TRANSISTOR, NPN, SD467
or Q1	209-11700400	TRANSISTOR, NPN, SD592NC

Table 4.1 POWER SUPPLY REPLACEABLE PARTS (Cont'd)

REF DES	PART NUMBER	DESCRIPTION
Q2	210-11700350	TRANSISTOR, PNP, SB561
or Q2	210-17700330	TRANSISTOR, PNP, SB621NC
Q3	209-11700460	TRANSISTOR, NPN, SD467
or Q3	209-11700400	TRANSISTOR, NPN, SD592NC
Q4	209-11700460	TRANSISTOR, NPN, SD467
or Q4	209-11700400	TRANSISTOR, NPN, SD592NC
Q5	209-10200040	TRANSISTOR, NPN, 2SC1325A
Q6	210-11700350	TRANSISTOR, PNP, SB561
or Q6	210-11700330	TRANSISTOR, PNP, SB621NC
Q7	209-11700460	TRANSISTOR, NPN, SD467
or Q7	209-11700400	TRANSISTOR, NPN, SD592NC
Q8	210-11700350	TRANSISTOR, PNP, SB561
or Q8	210-11700330	TRANSISTOR, PNP, SB621NC
R1	240-27106022	RESISTOR, 270 Ohm, 1/4W, ±5%
R2	240-47206022	RESISTOR, 4K7, 1/4W, ±5%
R3	240-82106022	RESISTOR, 820 Ohm, 1/4W, ±5%
R4	240-15006022	RESISTOR, 15 Ohm, 1/4W, ±5%
R5	240-15106022	RESISTOR, 150 Ohm, 1/4W, ±5%

Table 4.1 POWER SUPPLY REPLACEABLE PARTS (Cont'd)

REF DES	PART NUMBER	DESCRIPTION
R6	240-10106022	RESISTOR, 100 Ohm, 1/4W, ±5%
R7	257-15006127	RESISTOR, WIRE-WOUND, 15 Ohm, 5W, ±5%
R8	240-47106022	RESISTOR, 470 Ohm, 1/4W, ±5%
R9	240-47106022	RESISTOR, 470 Ohm, 1/4W, ±5%
R10	258-40970015	THERMISTOR, 4 Ohm, ±10%
R11	258-40970015	THERMISTOR, 4 Ohm, ±10%
R12		NOT USED
R13	240-82106022	RESISTOR, 820 Ohm, 1/4W, ±5%
R14	240-10106022	RESISTOR, 100 Ohm, 1/4W, ±5%
R15	247-04786054	RESISTOR, 0.47 Ohm, 1/4W, ±5%
R16	240-27006022	RESISTOR, 27 Ohm, 1/4W, ±5%
R17	240-10106022	RESISTOR, 100 Ohm, 1/4W, ±5%
R18	247-10036054	RESISTOR, 100K, 1W, ±5%
R19	247-10036054	RESISTOR, 100K, 1W, ±5%
R20	240-10060022	RESISTOR, 10 Ohm, 1/4W, ±5%
R21	240-47006022	RESISTOR, 47 Ohm, 1/4W, ±5%
R22	240-47006022	RESISTOR, 47 Ohm, 1/4W, ±5%
R23	240-33106022	RESISTOR, 330 Ohm, 1/4W, ±5%

Table 4.1 POWER SUPPLY REPLACEABLE PARTS (Cont'd)

REF DES	PART NUMBER	DESCRIPTION
R24	257-51106127	RESISTOR, 510 Ohm, 5W, ±5%
R25	240-10006022	RESISTOR, 10 Ohm, 1/4W, ±5%
R26	247-04786065	RESISTOR, 0.47 Ohm, 2W, ±5%
R27	240-27106033	RESISTOR, 270 Ohm, 1/2W, ±5%
R28		NOT USED
R29		NOT USED
R30	240-10006022	RESISTOR, 10 Ohm, 1/4W, ±5%
R31	240-10006022	RESISTOR, 10 Ohm, 1/4W, ±5%
R32	240-27006022	RESISTOR, 27 Ohm, 1/4W, ±5%
R33	240-10006022	RESISTOR, 10 Ohm, 1/4W, ±5%
R34	240-22106033	RESISTOR, 220 Ohm, 1/2W, ±5%
R35	248-10306052	RESISTOR, 10K, 1W, ±5%
R36	248-56006052	RESISTOR, 56 Ohm, 1W, ±5%
R37	240-12006022	RESISTOR, 12 Ohm, 1/4W, ±5%
R38	240-18106022	RESISTOR, 180 Ohm, 1/4W, ±5%
R39	240-56006022	RESISTOR, 56 Ohm, 1/4W, ±5%
R40	240-82006022	RESISTOR, 82 Ohm, 1/4W, ±5%
R41	240-12306022	RESISTOR, 12K, 1/4W, ±5%

Table 4.1 POWER SUPPLY REPLACEABLE PARTS (Cont'd)

REF DES	PART NUMBER	DESCRIPTION
R42	240-47106022	RESISTOR, 470 Ohm, 1/4W, ±5%
R43	240-12106022	RESISTOR, 120 Ohm, 1/4W, ±5%
R44	247-27014022	RESISTOR, 2K7, 1/4W, ±1%
R45	247-27014022	RESISTOR, 2K7, 1/4W, ±1%
R46	240-10406022	RESISTOR, 100K, 1/4W, ±5%
R47	240-15406022	RESISTOR, 150K, 1/4W, ±5%
R48	240-27406022	RESISTOR, 270K, 1/4W, ±5%
R49	240-12106022	RESISTOR, 120 Ohm, 1/4W, ±5%
R50	240-10106022	RESISTOR, 100 Ohm, 1/4W, ±5%
R51	240-18106022	RESISTOR, 180 Ohm, 1/4W, ±5%
R52	240-56006022	RESISTOR, 56 Ohm, 1/4W, ±5%
R53	240-22106022	RESISTOR, 220 Ohm, 1/4W, ±5%
R54	240-12106022	RESISTOR, 120 Ohm, 1/4W, ±5%
R55	240-22006022	RESISTOR, 22 Ohm, 1/4W, ±5%
R56	240-10106022	RESISTOR, 100 Ohm, 1/2W, ±5%
R57		NOT USED
R58	240-27006033	RESISTOR, 27 Ohm, 1/2W, ±5%

Table 4.1 POWER SUPPLY REPLACEABLE PARTS (Cont'd)

REF DES	PART NUMBER	DESCRIPTION
SCR1	227-13000010	SILICON CONTROLLED RECTIFIER, C122U or C122F
T1	852-20100310	COMMON MODE TRANSFORMER
T2	852-10200680	CONTROL TRANSFORMER
T3	852-10201020	POWER TRANSFORMER
VDR1	256-26100014	VDR, 260 VAC
Z1	222-10095002	ZENER DIODE, 10V, ±0.1V, 1mA
Z2	222-12195001	ZENER DIODE, 12.1V, ±0.1V
Z3	222-05195001	ZENER DIODE, 5.1V, ±0.1V

Chapter 5: TROUBLESHOOTING & REPAIR

5.1. INTRODUCTION

This chapter provides troubleshooting and repair instructions for the Power Supply. Also refer to the schematic diagram and component layout drawing provided in Chapter 3.

WARNING

This Power Supply contains high voltages.

5.2. EQUIPMENT REQUIRED

- Standard Tool Kit
- Oscilloscope
- Digital Multimeter
- Isolation Transformer (500 VA rating)
- 0-140V (or 0-280V) Variac (10 Amp, 1.4 KVA rating)

5.3. TROUBLESHOOTING

These troubleshooting procedures provide instructions for testing the Power Supply when it is installed in the Word Processor System or connected to a separate test fixture. The test set-ups are described in Paragraph 5.3.2.

5.3.1. PRELIMINARY VISUAL INSPECTION

Check the Power Supply for any broken, burned, or obviously damaged components. Check the fuse and check that the 115/230V strap is in the correct position.

5.3.2. TEST SET-UPS

The two test set-ups are shown in Figure 5-2.

5.3.3. START-UP

- If the test fixture is used select the minimum load, as defined in Figure 5-2.
- Connect a multimeter and oscilloscope to the +5V output (J2-1).

- Bring the AC supply up slowly with the variac. The Power Supply should start with approximately 50 (100) Vac supplied. It should regulate when 90 (180) Vac is supplied.
- Check each output as per Table 5.1. If there are no outputs go to Paragraph 5.3.4. If there are low outputs go to Paragraph 5.3.5. If the crowbar circuit does not operate go to Paragraph 5.3.6.

Table 5.1 DC OUTPUTS

J2 PIN NUMBER	VOLTAGE			MAXIMUM RIPPLE	MAXIMUM CURRENT
	MINIMUM	NOMINAL	MAXIMUM		
1/2	+4.85V	+5.00V	+5.15V	50 mVp-p	7.0A
5/6	+11.4V	+12.0V	+12.6V	120 mVp-p	3.0A
9	-11.52V	-12.00V	-12.48V	120 mVp-p	0.5A
12	+80.0V	+85.0V	+94.0V	2.55 Vp-p	0.5A

+5V Crowbar Limits: +6.175 to +6.825V
+12V Crowbar Limits: +13.02 to +14.98V

The maximum current ratings of the Power Supply must not be exceeded.

5.3.4. NO OUTPUTS

- Check the fuse.
- Check that the 115/230V strap is connected.
- Check bridge rectifier DB1, switching transistor Q5, and catch diode D11 for short circuits.
- Disconnect output connector J2. Check for shorts from each output pin of J2 to ground. Also check for shorted rectifiers and capacitors on the output circuits. If the +12V output is shorted also check crowbar SCR1 and R22 and R23.
- Monitor the B+ on the cathode of D2 while slowly increasing the AC input with the variac. With an AC input of 95 (190) Vac, the B+ voltage should be 260-270 Vdc. If not, check R10, R11, T1, DB1, and VDR1. If R10 is open check Q5, D11, D9, Q4, Q3, and D6.

- Check the waveform at the collector of Q5; it must be as shown in Figure 5-1. If the waveform is not present check Q5. The base voltage of Q5 should be approximately 7V; if not, check L3, T2, Q3, Q4, and R26.

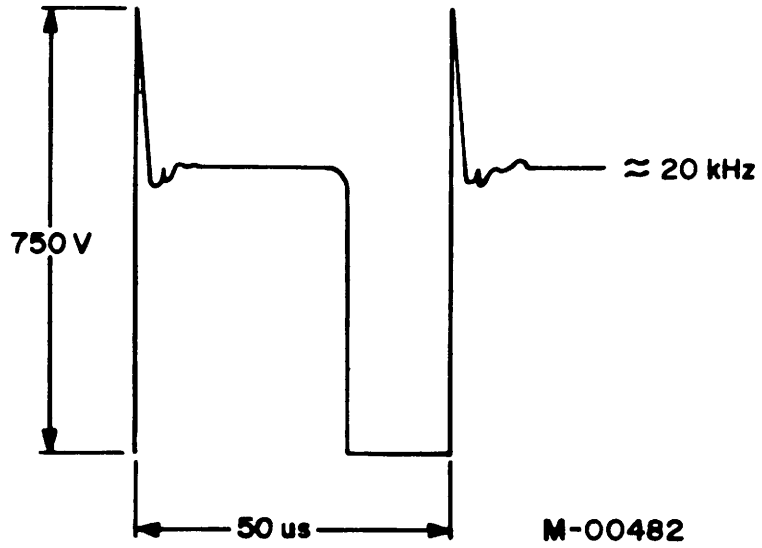


Figure 5-1 WAVEFORM AT COLLECTOR OF Q5

5.3.5. LOW OUTPUTS

- All outputs are low. Check the 115/230V strap. Check R26, D11, Q5, Q4, and DB1.
- +5V and +12V outputs are low. The Power Supply regulates off these two outputs. If these outputs are low, other outputs could also be low. The +5V output can be adjusted by selecting the value of R45 (R45, R47 and R48 are in parallel).
- +12V output low. This output is regulated by IC1. Replace IC1. It can also be adjusted by selecting the value of R45.
- -12V output low. Replace IC2.
- If any one output is not present, first check the associated rectifier, then the rest of the associated components.

5.3.6. CROWBAR CIRCUIT

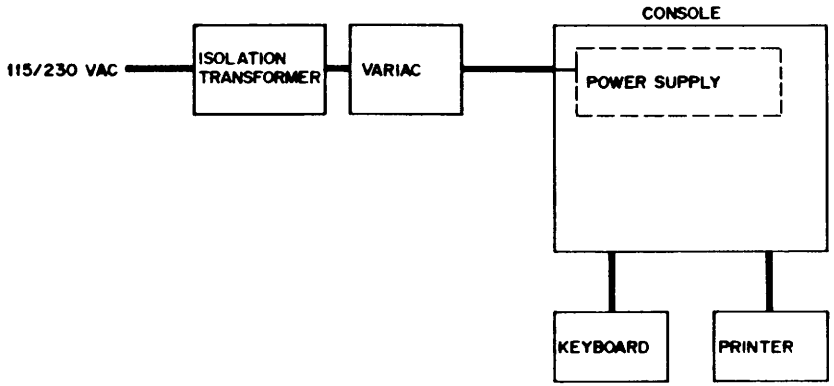
- If the crowbar is not operating, check Z2, Z3, Q7, Q8, and SCR1.
- If the crowbar is not triggering within the specified limits change Z1 and check R40.

5.4. REPAIR INSTRUCTIONS

After a Power Supply has been repaired:

- Perform a visual inspection for shorts, cold solder joints, etc.
- Check that the fuse is the correct rating and that the 115/230V strap is in the correct position.
- Check the Power Supply for correct operation as per Paragraph 5.3.3.

POWER SUPPLY INSTALLED IN CONSOLE



POWER SUPPLY INSTALLED IN TEST FIXTURE

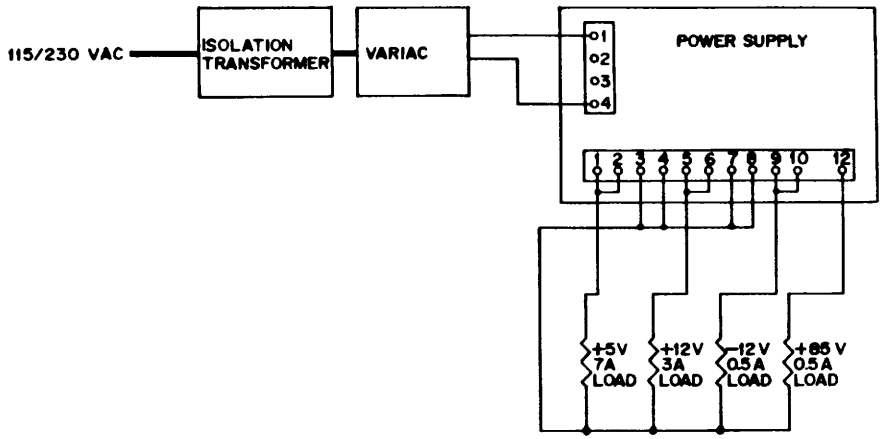


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Figure 5-2 TEST SET-UPS

TEST FORMAT

STEP	INPUT VAC	+5V/7A LOAD	+12V/3A LOAD	-12V/0.5A LOAD	+85V/0.5A LOAD
1	90/180	Max.	Max.	Max.	Max.
2	139.7/279.4	Max.	Max.	Max.	Max.
3	115/230	Max.	Min.	Min.	Min.
4	115/230	Min.	Min.	Max.	Min.
5	139.7/279.4	Min.	Min.	Min.	Min.
6	TEST CROWBAR LIMITS ON +5V AND +12V OUTPUTS.				

LOAD VALUES

OUTPUT	MIN. LOAD	LOAD R (OHMS)	SAFE LOAD POWER (WATTS)	MAX. LOAD	LOAD R (OHMS)	SAFE LOAD POWER (WATTS)
+5V	2.45A	2.04	12.3	7.0A	7.2	352
+12V	0.6A	20	7.2	3.0A	4	36
-12V	1.0A	120	1.2	0.5A	24	6
+85V	0.2A	425	17	0.5A	120	42.5

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3-2
3-3

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3-2
3-3

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DATE April 1982

Great care has been taken to ensure that the information contained in this handbook is accurate and complete. Should any errors or omissions be discovered, however, or should any user wish to make a suggestion for improving this handbook, he is invited to send the relevant details to:

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Chapter 3: DIAGRAMS

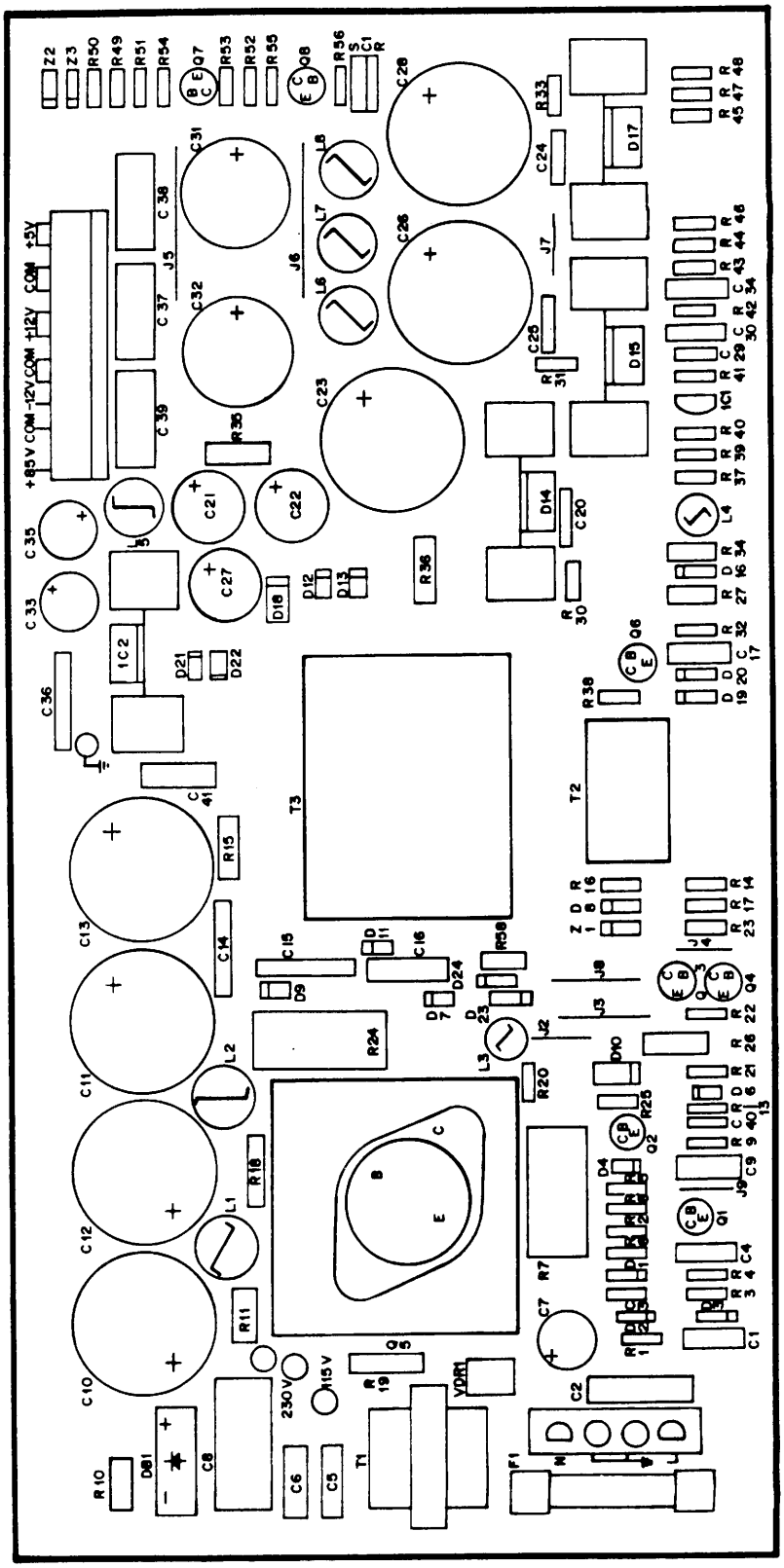

Figure 3-1 POWER SUPPLY COMPONENT LAYOUT

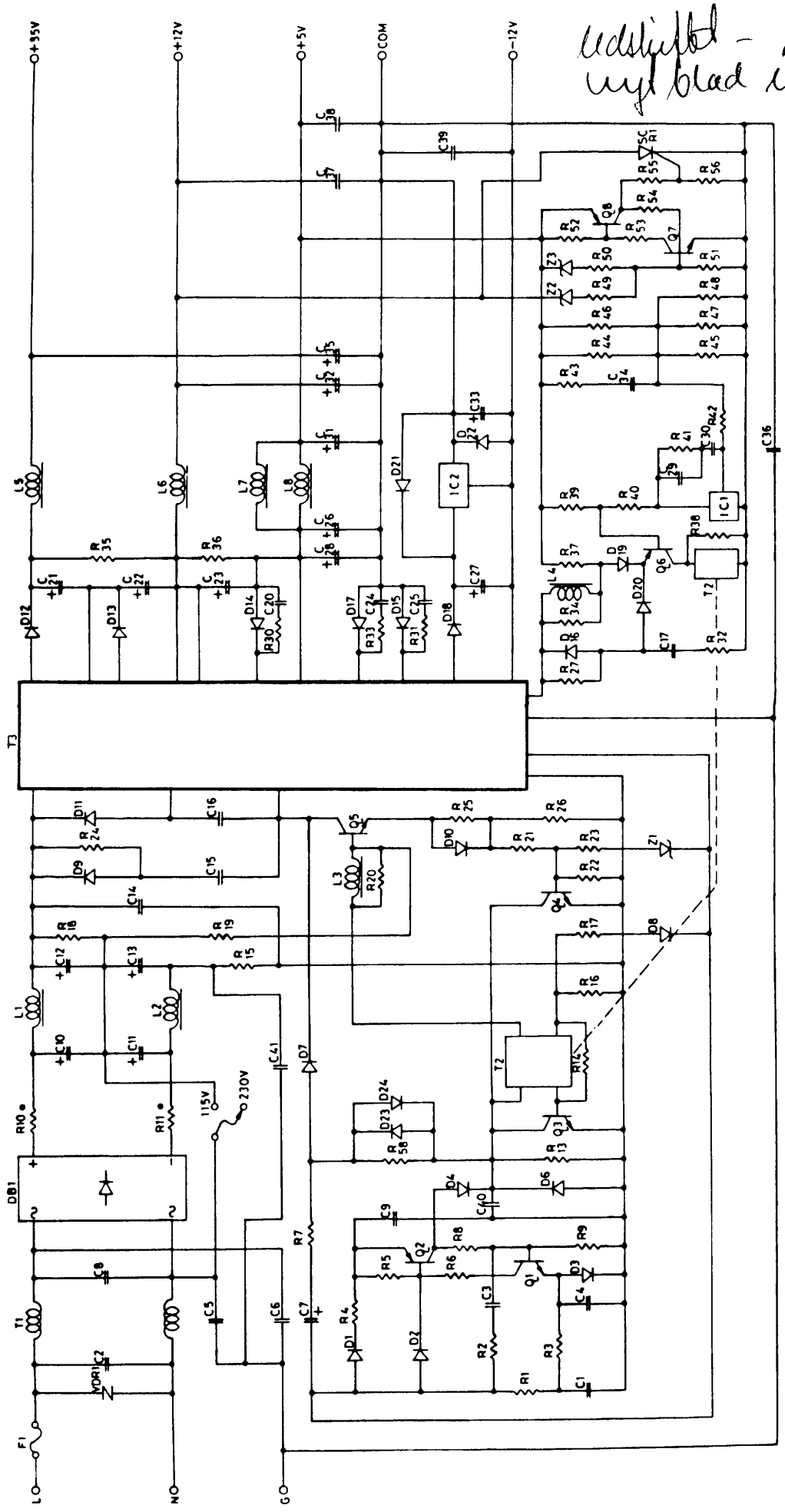

Figure 3-2 POWER SUPPLY SCHEMATIC DIAGRAM

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PUB. NO. 12th digit	UPDATE PACKAGE	SI. NO.	PAGES AFFECTED	DATE	REMARKS
1				8204	first issue
2	1		3-2 3-3	8311	changed : - schematic - locator