Service Notes

on

ENTRON MODEL PSR-2 POWER SUPPLY

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SPECIFICATIONS

Power Receptacles	3
Output Voltages	160 volts dc at 400 MA 6.3 volts ac at 8.5 A
DC Regulation	± .5%
Tube Complement	(1) 5AU4 (1) 0A3 (VR-75) (2) 6AS7 (1) 6CB6
Fuse Complement	(1) Primary 3AG 3 A (1) B Minus 3AG 0.6 A Slo-Blo (1) Bias 3AG 0.1 A Slo Blo (3) Output B+ 3AG 0.25 A
Power Requirements	185 Watts Max. 100-130 volts 60 cps
Weight	Net - 26 lb Shipping - 28 lb
Dimensions	Width - 6" Length - 19" Depth - 7"
Mounting	19" Rack
Finish	Black Wrinkle

The Entron PSR-2 Power Supply will supply all power for a maximum of three (3) converters (CHL, CUL, CLL) or three (3) APH preamplifiers in any combination.

SERVICE NOTES ON ENTRON MODEL PSR-2

POWER SUPPLY

GENERAL: The following information and service data is presented for use only by properly trained and qualified TV technicians or engineers. In no case should radical changes in circuit design or incorrect parts replacements be made. Proper performance is greatly dependent upon correct installation, operation, and use of standard replacement parts as specified in attached parts list.

FUNCTION: The PSR-2 is designed to provide the necessary operating voltages for one to three CHL or CUL or CLL converters or any combination up to a total of three units. The output ratings are given under Specifications.

INSTALLATION: The PSR-2 is designed for mounting in a standard 19" rack. Mounting should be secure, preferably near the base of the rack, where it will stabilize the weight distribution of the entire rack, since the PSR-2 is considerably heavier than other antenna site equipment, such as APL strips.

If repairs are required or a replacement is needed, use the original chassis wiring arrangement and replace all leads as they were before the removal of the PSR-2 from the rack.

An external ground to a pipe sunk in the earth, for protection of operating personnel in event of short circuits or charges induced by nearby lightning, is specified by most Fire Underwriters. Grounding cable of this kind should be a heavy conductor, #8 B & S or larger, insulated or bare copper. Avoid, in all grounding and wiring, rubbing or scraping of metal to metal which may cause an intermittent r-f noise or interference in signal circuits. Be sure the line plug connections are tight since arcing at this point might cause considerable noise.

DESCRIPTION: The PSR-2 is a carefully engineered power supply designed to provide satisfactory service with a minimum of service troubles. It utilizes five tubes as follows:

(1) 5AU4 Full-Wave Rectifier
(2) 6AS7G Electronic Regulators
(1) 6CB6 Electronic Control Amplifier
(1) 0A3 Gaseous Regulator

In addition, the PSR-2 uses a selenium half-wave rectifier which is the equivalent of an added tube without the space and bulk requirements. A reference setting of the output voltage at 160 volts dc may be made with the potentiometer in the grid circuit of the 6CB6.

CIRCUIT: Referring to Fig. 1, the line voltage of 115 volts is applied to the power transformer primary through the 3-amp. fuse (F-1) and the series connections of the 0A3. The circuit is arranged in this fashion to protect the power supply and prevent its being turned on with the gaseous regulator (VT-5) out of its socket. The fuse (F-1) affords protection against an

expensive power transformer burn-out in the event of short circuits or overloading. The .005 mfd. capacitors (C-2) in the line circuit prevent noise or stray signals from getting into the supply and also prevent noise or hum modulated r-f from leaking through the power transformer and line to other units in signal circuits, thus serving a two-fold purpose. The effectiveness of the filtering, however, is greatly dependent on a short, low resistance ground being connected to the PSR-2 chassis.

Additional fuse protection is afforded by a 1/2-amp. fuse (F-2) in the centertap of the high voltage winding, 1/4-amp. fuses (F-4, F-5, F-6) in the +160 volt output circuits and 0.1-amp. (Slo-Blo) fuse (F-3) in the selenium rectifier circuit.

PLATE SUPPLY: The high voltage rectifier VT-1 works into a brute force filter consisting of C-3a, C-3b, and L-1. The output of the filter is applied to the output jacks (J-1, J-2, J-3) via series regulator tubes VT-2 and VT-3 and the 1/4-amp. fuses, F-4, F-5, F-6.

If the line voltage becomes higher than normal or the output voltage at J-1, J-2, J-3, increases because of decreased current demand, the series regulator tubes (VT-2 and VT-3) restore the output to normal reference level.

As the output rises, the positive voltage from the J-1, J-2, J-3 circuit is applied to the grid of electronic control tube VT-4 and opposes the negative voltage applied via R-13 and potentiometer R-12 from VT-5 and C-6. The result is that the plate resistance of VT-4 drops, the grids of VT-2 and VT-3 effectively become more negative and the series regulator resistance of VT-2 and VT-3 goes up in value, thus reducing the output voltage to the proper reference level.

If the output voltage drops due to lowered line voltage or increased current demand, the effective series resistance of the VT-2 and VT-3 regulator combination is decreased, the plate resistance of amplifier VT-4 is increased and operating conditions are reversed compared with higher than normal output conditions described above.

A negative reference voltage is provided by the selenium rectifier circuit which is filtered by the r-c combination of R-15, C-4 and C-5.

OUTPUT ADJUSTMENT: With the desired number of CUL or CHL or CLL units connected to the PSR-2, (three maximum, in any combination), adjust R-12 for an output of +160 volts from jacks J-1, J-2, J-3.

TYPICAL TROUBLES: No matter how carefully designed and produced, electronic equipment may occasionally develop faults. The following is a summary of some usual and unusual troubles, with appropriate remedies.

TYPICAL SERVICE TROUBLES

NO OUTPUT: If the 6.3 volt ac circuit does not provide an output, and plate and screen voltages are zero, the entire supply is out of order and the trouble may be that it is not plugged in at the 115 volt ac outlet, fuse F-1 is open, or the gaseous regulator tube, VT-5, is not properly inserted in its socket. If a 6.3 volt ac output is obtained but not plate or screen outputs, the primary circuit of T-1 and T-2 is probably all right and the fault lies in the bias, filter or regulator circuits.

OPEN FUSES: An open fuse is caused by an overload. An opening of fuse F-1 prevents operation of the entire supply. Failure of F-1 occurs if the combined primary currents of T-1 and T-2 exceed 3-amperes. Before this condition develops, it is likely fuse F-2 or F-3 will fail. An opening in F-2 may be due to a gassy or shorted rectifier tube (VT-1), leaky filters (C-3a, or C-3b) and possibly due to shorted or gassy regulated tubes (VT-2 and VT-3).

If the bias supply failed to provide bias for VT-4, due to an opening of R-13 or R-12, or a defective selenium rectifier, VT-4 would not function normally and fuse F-2 would probably fail.

Failure of fuse F-3 might be due to shorted or leaky filters, C-4 or C-5, or a defective voltage regulator tube, VT-5.

RESISTANCE MEASUREMENTS: Ohmmeter measurements to check circuit conditions may be made with Power Off. Resistance values are indicated directly on the schematic, Fig. 1, and readings should agree with indicated values.

ERRATIC OR INTERMITTENT OPERATION: A defective potentiometer in which the arm makes intermittent contact with the resistance element may cause erratic or intermittent operation of the regulator and output circuits. The potentiometer (R-12) may be checked by carefully examining it and adjusting it during operation, noting the effect on output voltage as indicated on an 0-250 volt dc voltmeter. Tubes should be seated firmly in their sockets. Intermittent operation possibly may be caused by a defective selenium rectifier, particularly if the effect seems to occur only after warming up, and may be difficult to locate; a substitution check of the rectifier with one known to be good is recommended to correct this difficulty.

POOR VOLTAGE REGULATION: The most likely cause of this trouble would be a fault in the regulator system, or a fault in one or more of the units connected to the PSR-2 such that an excessive load is placed on the supply, thus limiting the ability of the PSR-2 to compensate for changes in load current occurring with AGC action or variations in line voltage.

ELECTRICAL TESTS

POWER OFF

1. Check power transformer primary with low range ohmmeter. Resistance should be 1 ohm or less but not zero ohms.

2. Check resistance from each rectifier plate of VT-1 at socket. Resistance should be about 25 ohms; if not, check fuse F-2. If fuse F-2 and wiring are ok but reading still is not obtained, secondary of T-1 may be open. Be sure fuse holder is not defective and is making proper contact.

3. Filter condensers in plate supply may be checked by unsoldering positive leads to C-3a and C-3b, and using ohmmeter or condenser bridge. If shorted or leaky, they would cause failure of the rectifier.

4. Filters in selenium rectifier circuit, similarly, may be tested by isolation technique using ohmmeter or capacitance bridge. High power factor, excessive leakage, or loss of capacitance, cause improper functioning of PSR-2.

5. Check individual resistances in control amplifier (VT-4) and potentiometer (R-12) circuits. They should agree with values on circuit diagram (Fig. 1).

ELECTRICAL TESTS

POWER ON

TEST EQUIPMENT REQUIRED:

1. A.C. Voltmeter 0-150V. AC
2. D.C. Voltmeter (0-250V)
3. D.C. Milliammeter 0-500 MA
4. General Radio Variac (ac line voltage control) or equivalent
5. Test Load Fixture (See Specifications Sheet)

TESTS TO BE MADE:

1. Line voltage normal (115V) with Maximum Load.
2. Line voltage normal (115V) with Minimum Load.
3. Line voltage low (105V) with Maximum Load.
4. Line voltage high (125V) with Maximum Load.
5. Line voltage high (125V) with Minimum Load.

TEST 1

1. Connect maximum load to output (see load fixture specifications).
2. Set regulator potentiometer (R-12) to about one-half scale on PSR-2.
3. Connect 8.5-amp. load to 6.3 volt filament supply of PSR-2.
4. Apply 115V ac to primary of PSR-2 power transformer via Variac and check with ac voltmeter.
5. Adjust PSR-2 regulator potentiometer to give output voltage of 160 volts dc as checked by dc voltmeter.

TEST 2

1. Disconnect maximum load. Connect minimum load. Output voltage should be 160 volts $\pm$ 1%.

TEST 3

1. Adjust line to 105V ac.
2. Connect maximum load.
3. Check dc voltage across load. It should be 160 volts dc ± 1%.

TEST 4

1. Adjust line voltage to 125 volts.
2. Leave maximum load connected.
3. Measure output voltage which should be 160 volts dc ± 1%.

TEST 5

1. Adjust line voltage to 125V.
2. Remove load.
3. Connect minimum load.
4. Measure output voltage which should be 160 volts dc ± 1%.

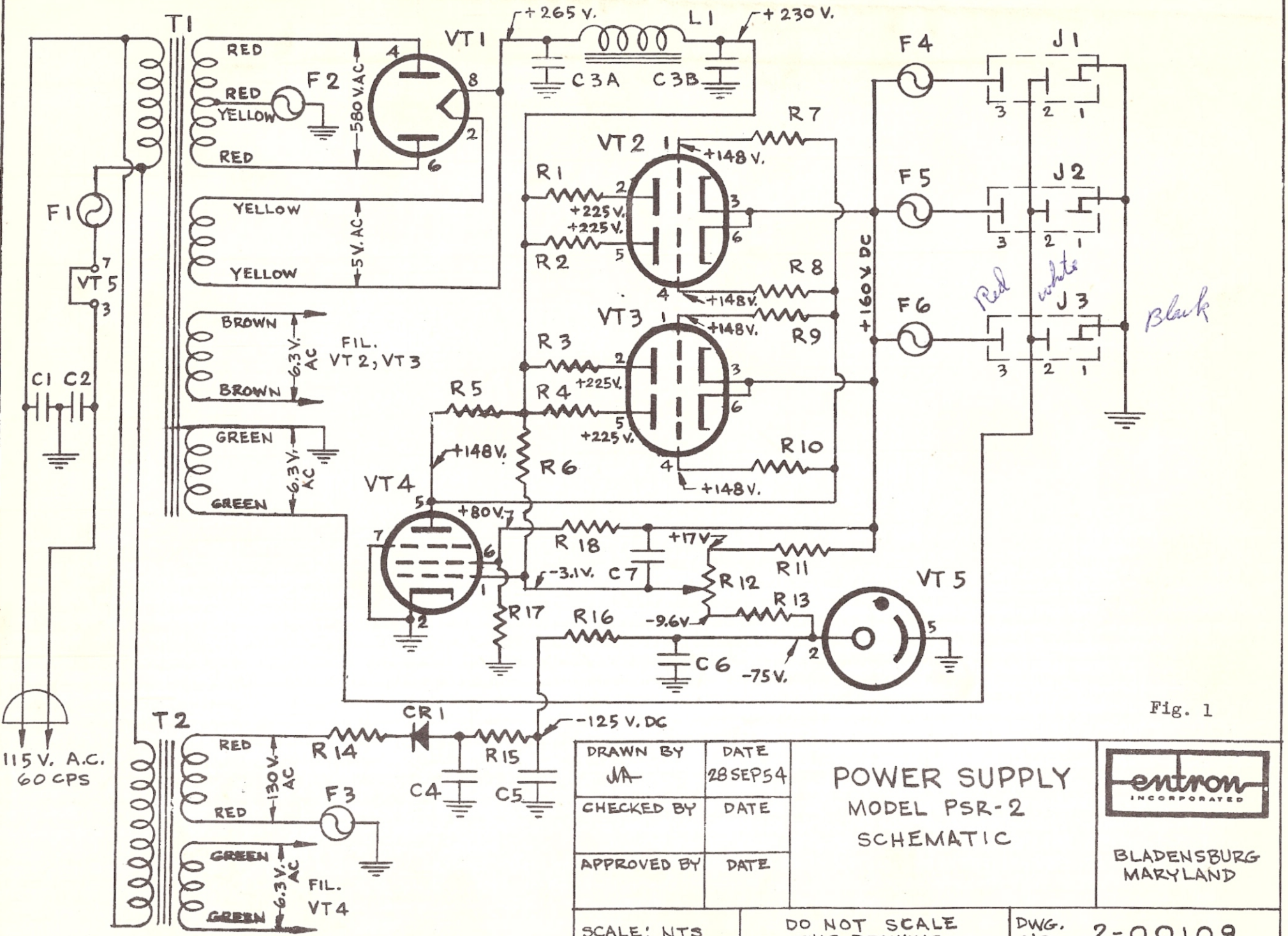
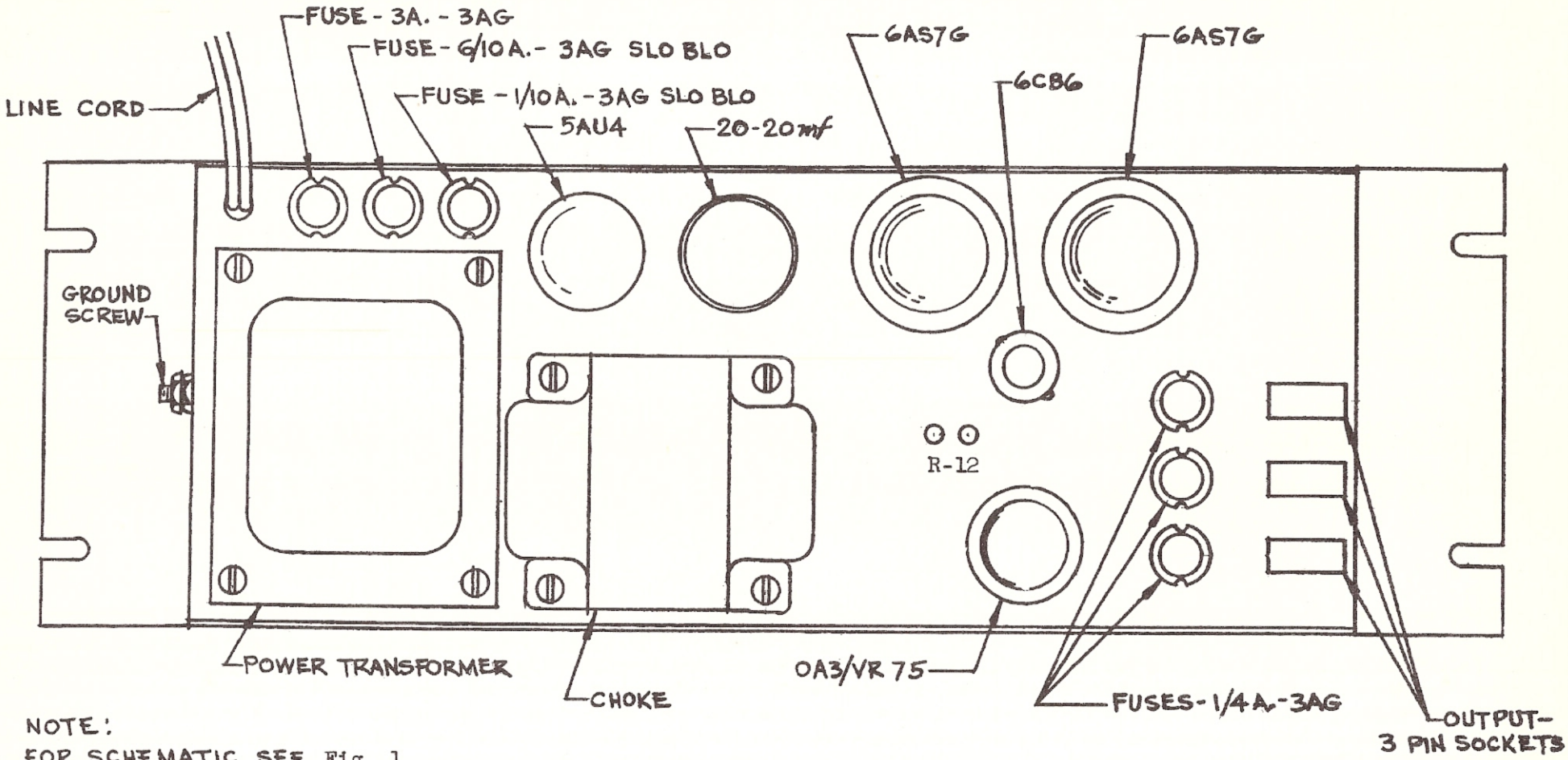


Fig. 1

DRAWN BY JA	DATE 28 SEP 54	POWER SUPPLY MODEL PSR-2 SCHEMATIC	entron INCORPORATED BLADENSBURG MARYLAND
CHECKED BY	DATE		
APPROVED BY	DATE		
SCALE: NTS	DO NOT SCALE THIS DRAWING	DWG. NO. 2-00109	



NOTE:

1. FOR SCHEMATIC SEE Fig. 1
2. FOR COMPONENT PARTS LIST SEE P.9 and P. 10

Fig. 2

DRAWN BY MA	DATE 13OCT54	OUTLINE DRAWING TOP VIEW POWER SUPPLY MODEL PSR-2	entron INCORPORATED
CHECKED BY	DATE		
APPROVED BY	DATE		
SCALE: 1/2	DO NOT SCALE THIS DRAWING	DWG. NO. 1-00297	

PSR-2
ELECTRICAL PARTS LIST

CIRCUIT DESIGNATION	COMPONENTS	ENTRON PART NO.
C-1, C-2	Ceramic Disc Cap .005 3000V	
C-3A, C-3B	Electrolytic 20/20mf 450V	
C-4, C-5	Electrolytic 40 mf 150V	
C-6	Ceram. Disc .01 1000V	
C-7	Paper 1mf 400V	
CR-1	Selenium Rectifier 20mA/125V	
F	Prim. Fuse 3A 3AG	
F-2	B minus Fuse .6A Slo Blo 3AG	
F-3	Bias Fuse 1/10A Slo Blo 3AG	
F-4, F-5, F-6	Output Fuse 1/4A 3AG	
J-1, J-2, J-3	Output Socket	
L-1	Filter Choke	
R-1, R-2, R-3, R-4	47 ohms 2W 10%	
R-5	330K ohms 1W 10%	
R-6	12M ohms 1/2W 10%	
R-7, R-8, R-9, R-10	100 ohms 1/2W 10%	
R-11	470K ohms 1/2W 10%	
R-12	100K ohms 2W	
R-13	200K ohms 1/2W 10%	
R-14	22 ohms 1/2W 10%	
R-15, R-16	2.2K ohms 2W 10%	
R-17, R-18	68K ohms 1/2W 10%	

PSR-2
ELECTRICAL PARTS LIST (Cont'd)

CIRCUIT DESIGNATION	COMPONENTS	ENTRON PART NO.
T-1	Power Transformer	
T-2	Transformer	
VT-1	5AU4	
VT-2, VT-3	6AS7G	
VT-4	6CB6	
VT-5	0A3	