TEN-TEC

OWNER'S MANUAL

Model 255

TEN-TEC MODEL 255 POWER SUPPLY

GENERAL

The TEN-TEC Model 255 Power Supply is designed to deliver 18A at 13.5V from a 117 or 235 vac 50-60 Hz source. An electronic latching circuit breaker shuts off the output voltage when the current drawn from the supply exceeds 20 amperes. When this breaker trips, the meter lamp goes out indicating loss of output. The breaker is reset by cycling the POWER switch from ON to OFF and back to ON. The primary circuit is fused with a 4 ampere fuse on 117 vac and 2 ampere fuse when used for 235 vac. The output voltage is available through a four pin AMP connector at the end of a three foot power cord and at two phono type jacks for low current applications. The center two of the four AMP pins are used for remote power on-off switching, if desired. The front panel meter indicates current drawn.

The circuit consists of a bridge rectifier followed by a high capacitance filter. This in turn, is followed by two parallel transistors in a series regulator circuit whose base voltage is derived from an integrated circuit regulator and driver transistor. The circuit breaker consists of a SCR latching circuit which turns off the regulator when the current drawn exceeds the set limit. The SCR triggering signal is developed across a pair of low value resistors in series with the output, which also serve to assure sharing of the load current between the two pass transistors. Overvoltage protection of the output is provided by a SCR "Crow-Bar" circuit which short circuits the output if it should rise above 16 VDC.

INSTALLATION

Output Cable and Connectors: The high current output should be drawn from the four pin AMP connector at the end of the output cable. Pin 1 is GND (black) negative, and identified by the rib on the plastic shell of the output connector. Pins 2 and 3 (white) are connected in series with the front panel POWER switch and are used with a remote on-off switch, if desired. Pin 4 is +13.5 volts (red).

If the supply is to be turned on and off only by the front panel switch, pins 2 and 3 should be jumpered together at the connector or where the two white wires attach to the terminal strip inside the unit. Keep interconnecting cables carrying high current as short as possible and of a wire gauge greater than or equal to #14. Sizable cable voltage drop will be experienced if too long or if a small wire size is used.

Provide a good interchassis connection by running a separate heavy braid or stranded wire between them, using the ground lugs provided on the rear panels. In rf communication systems, a connection from chassis to a good earth ground is also recommended.

The phono jacks marked AUX 12V are connected in parallel with the output from the AMP socket and may be used to power auxiliary equipment that does not draw more than five amperes. Center terminal is positive, shell is negative.

The power transformer has a dual primary winding permitting operation on either 117 or 235 vac. A recessed slide switch is located on the bottom of the supply to select the desired voltage. CAUTION: BE CERTAIN THE SWITCH IS IN THE PROPER POSITION BEFORE APPLYING POWER. For 235 volt operation the internal 4 ampere fuse must be replaced with the supplied 2 ampere fuse.

Speaker Cable: If you wish to use the built in speaker, insert the phone plug on the cable into the transceiver's phone jack. Note that the Series C OMNI has phone jacks on both the front and rear panels. If the built in speaker is used, headphones must be plugged into the phones jack on the front of the Power Supply to disable the speaker.

OPERATION

1.) Connect the line cord to proper source of voltage. This is a three wire cable and the green center conductor should be connected to the main ground system. It is internally connected to the supply chassis.

2.) Connect load to AMP connector as described above.

3.) Turn unit on by pressing the top protruding edge of the POWER switch. The meter lamp should indicate that output voltage is present. If the lamp does not light, check load and cables for short circuit or excessive current situation.

4.) The lamp illuminating the current meter is powered from the regulated output of the supply and should not dim with the current loads up to the rated output. If pilot lamps in the driven equipment dim with increased load current, but the current meter lamp stays constant, it is an indication that a a loss of voltage is occuring in the interconnecting cables or connectors. To remedy use shorter cable and/or larger wire size.

5.) To reset the circuit breaker after it has shut down the output voltage as indicated by the meter lamp, turn the unit off and back on again. If the short or overload remains, the breaker will again shut down. Remove the cause of overload and reset again as before.

6.) If for some reason the crow-bar circuit should detect an over-voltage condition it will short the output voltage. If this was caused by a transient spike, the circuit breaker will trip out and must be reset as above. If the overvoltage condition is the result of a component failure, or the overcurrent breaker is inoperative, the internal 20 ampere fuse will open and reset will not be possible. If the internal fuse blows (mounted in fuse clips located on the heatsink circuit board), it indicates that some internal part has failed and service is required.

7.) Fuses: In the event that the line fuse blows, replace it with an identical type slo-blo. The line fuse holder is located on the rear panel next to the line cord strain bushing.

8.) Do not place the power supply in a closed area or in a small space where normal room air cannot circulate freely around the heat sink on the rear panel. This heat sink should have free access to normal air convection currents. For instance, do not place the supply on the floor in a corner. If this is the only available location, turn it around--fins out. Always operate the supply with the heat sink and fins vertical. Never put anything on top of the heat sink fins.

When operating near full load for relatively long periods of time, the heat sink will become quite hot. The bottom pan of the chassis will also become hot due to power dissipation in the bridge rectifier. The large heat sink is capable of maintaining this type of operation if the free air circulation requirements as above are met. If extended operation is anticipated, and/or the line voltage is above the mean values of 117 or 235, it's recommended that a small fan be used to circulate air around the heat sink. For normal CW or SSB Amateur applications, where the duty cycle is less than 60%, a fan should not be necessary. If there is any question as to whether there is enough air circulation around the heat sink, check the temperature of the heat sink. It should not be allowed to go above 100°C or 212°F. To do this, moisten the tip of your finger and touch lightly near one of the transistors on the heat sink. If it sizzles, it's too hot.

SPECIFICATIONS

Input Voltage: 105-125 vac, 50-60 Hz or 210-25° vac, 50-60 Hz.
Output Voltage: 13.5 vdc, adjustable 12.5 to 14.0 vdc.
Regulation: Better than 1% no load to full load @ 117 vdc.

Speaker: Ceramic Magnet, 8 ohm.
Output Current: 18 amperes, full load, 20 amperes, maximum.
Circuit Breaker: Electronic latching. Factory set at 20A.
Panel Meter: 0-25 amperes.
Ripple: Less than 60 mV peak-to-peak at 18A at 117 vac.
Construction: 16 ga. aluminum chassis and top.
Output Connectors: One 4 pin AMP MATE-N-LOC, two phono jacks for low current.
Size: HWD 5½" x 7" x 12".
Weight: 15 lbs.

CIRCUIT DESCRIPTION

Model 255 Power Supply uses a series regulator type circuit incorporating two 2N5301's as the pass elements. While either transistor could handle the 20A of output by itself, two are used with a generous heat sink to assure plenty of design margin. The .15 ohm resistors in each emitter assures that the load is equally shared between the two pass transistors. They are also used as the meter shunt and sense element for the over-current breaker.

The circuitry is divided into three assemblies. The chassis contains the transformer and associated ac wiring, bridge rectifier, and filter capacitor. The regulator board contains all the control and drive circuitry. The pass transistor assembly is mounted on the rear heat sink and contains the pass transistors, shunt resistors and the overvoltage crow-bar and its fuse. For ease of service, these three assemblies are interconnected with cable plugs where current requirements permit.

REGULATOR BOARD

The heart of the Model 255 is a 723 integrated circuit voltage regulator. It contains a stable reference voltage source, feedback amplifier, over current shutdown, and control circuits. The regulator board by itself is a 1 ampere current limited power supply and is used to drive the pass transistors on the heat sink for the required current output. The current sense voltage from the pass transistor board is returned to the regulator board between pins E and O. This signal is used to drive the output current meter and the over current breaker. Potentiometer R7 sets the meter calibration and R10 sets the current trip point. Output voltage is adjusted by R12.

The regulator board has its own rectifier and filter capacitor. Diode D3 and capacitor C2 supply the hold-in current for SCR Q2 when the over current circuit trips.

As received from the factory, the potentiometers are carefully adjusted for the following settings:

METER	Calibrated at 15A.
VOLTAGE	Set for 13.5V
TRIP	Set for 20A.

These should not require further adjustment unless service has been performed on the unit.

PASS TRANSISTOR BOARD

This board contains the series pass transistors. The two 2N5301 transistors are connected in parallel with the ballast resistors on each emitter. These resistors insure that the two transistors share the load current and also are used as current sensing shunts for both the meter and current trip circuits.

The crow-bar circuit occupies one corner of the board. If the output voltage should rise above 16 vdc, zener diode D1 will conduct and apply forward bias to the gate of SCR Q3. When Q3 latches, it shorts the supply output to ground, which will either cause the over-current circuit to trip or will blow F1, the 20A fuse.

IN CASE OF DIFFICULTY:

SYMPTOM	POSSIBLE CAUSE
No output when turned on (meter dark)	External AC switch not on. (switch between white wires of output cable) Line fuse blown
No output but meter jumps at turn on	Output shorted
Output voltage sags with load (meter lamp dims)	Low line voltage Blown 20A fuse
Blown 20A fuse	Shorted pass transistor or accidental ground wire contact to transistor case on heat sink.

VOLTAGE READINGS---PASS TRANSISTOR BOARD

	C (a)	B (g)	E (cath)	
Q1	24.5	14.2	13.5	
Q2	24.5	14.2	13.5	no load, untripped
Q3	13.5	0	0	
Q1	24.5	0	0	
Q2	24.5	0	0	tripped due to overcurrent breaker
Q3	0	0	0	

VOLTAGE READINGS---REGULATOR BOARD

(No load)

U1 Pin	723 Volt	I.C. Pin	Volt
1	NC	14	NC
2	14.2	13	16.0
3	14.2	12	24.5
4	7.1	11	24.5
5	7.1	10	14.8
6	7.1	9	NC
7	0	8	NC

NC=No Connection

PIN--INNER CONNECTION SOCKETS

B (case)	14.2
E (emitter)	13.5
O (output)	13.5
M (meter)	13.5

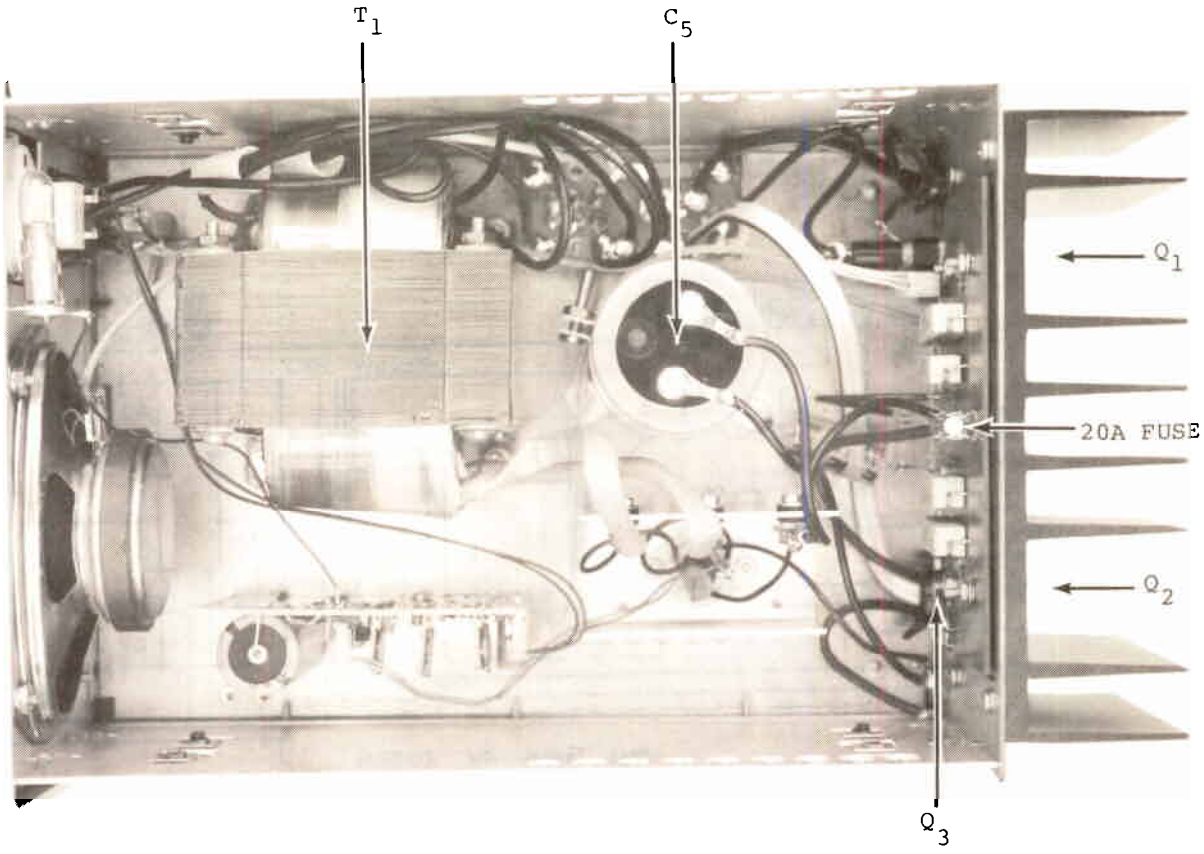
AC--18 vac
Transistors (scr)

NO LOAD

	C (A)	B (G)	E (cath)
Q1	24.5	14.8	14.2
Q2	24.5	0	0
Q3	0	13.5	13.5

Tripped by overcurrent

Q1	24.6	.45	.45
Q2	.7	.75	0
Q3	.5	0	0



REGULATOR BOARD

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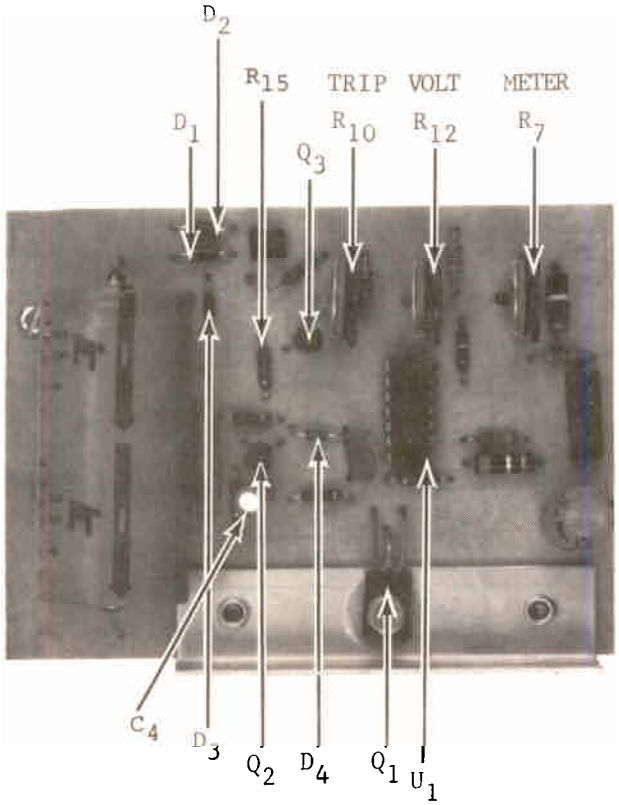

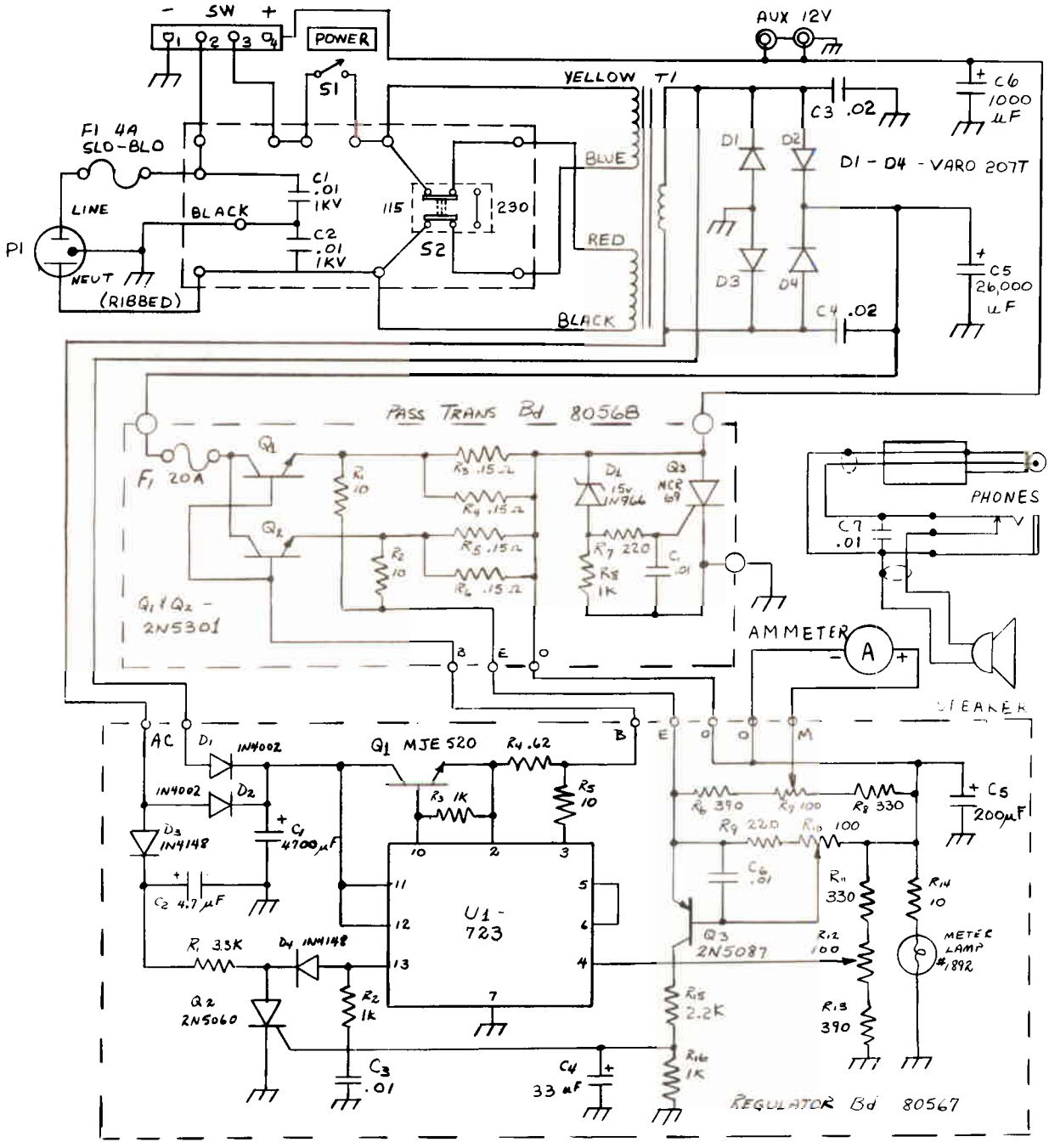

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