

TEN-TEC

**OWNER'S
MANUAL**

**Model
225**

TEN-TEC MODEL 225 POWER SUPPLY

GENERAL

The TEN-TEC Model 225 Power Supply delivers 9 A at 13.5V from a 115 or 230 V ac 50-60 Hz source. An electronic latching circuit breaker removes the output voltage when the current drawn from the supply exceeds 10 amperes. When the breaker trips, the power LED will remain on. The breaker is reset by cycling the POWER switch from ON to OFF and back to ON. As supplied from the factory, the primary circuit is fused with a 2 ampere fuse for 115 V ac operation. It should be changed to a 1 ampere fuse when wired for 230 V ac. The output voltage is available through a four pin AMP connector at the end of a three foot power cord and at a phono type jack for low current applications. The center two of the four AMP pins are used for remote power on-off switching, if desired.

The circuit consists of a bridge rectifier followed by a high capacitance filter. This is followed by a transistor in a series regulator circuit whose base voltage is derived from an integrated circuit regulator and driver transistor. The circuit breaker is a SCR latching circuit which turns off the regulator when the current exceeds the set limit. The SCR triggering signal is developed across a low value resistor in series with the output. Overvoltage protection of the output is provided by a SCR "Crow-Bar" circuit.

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 its 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 the power supply and the powered device 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 jack marked AUX 12V is connected in parallel with the output from the AMP socket and may be used to power auxiliary equipment that does not draw more than four amperes. Center terminal is positive, shell is negative.

The power transformer has a dual primary winding permitting operation on either 115 or 230 V ac. As supplied, it is factory wired and fused for 115 V ac. To change from 115 V ac to 230 V ac, the primary must be rewired using the wire nuts supplied and the fuse changed to 1 A. slo-blo (also supplied). See paragraph 8 of the OPERATION section.

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. If the POWER LED comes on but no power is applied to the load, check load and cables for short circuit or excessive current.

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- 4.) To reset the circuit breaker after it has shut down the output voltage, 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.
- 5.) 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 10 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.
- 6.) Fuses: In the event that the line fuse blows, replace it with an identical type slo-blo. The line fuse holder is located inside on the rear heatsink above the line cord strain relief bushing.

115 V ac operation: 2 A. SLO-BLO Type MDL-2
 230 V ac operation: 1 A. SLO-BLO Type MDL-1

NOTE: The unit is wired at the factory for 115 V ac operation. If 230 V ac operation is desired, the transformer primary and the fuse must be changed per the instructions in Section 8 below. Failure to do this will result in serious damage to the unit.

- 7.) 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 cover the 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 chassis will also become hot due to power dissipation in the bridge rectifier. The heat sink is capable of maintaining this type of operation if the free air circulation requirements as outlined above are met. If extended operation is anticipated, and/or the line voltage is above the mean values of 115 or 230, 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 is not 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.

- 8.) OPERATING VOLTAGE. The Model 225 is factory wired for 115 V ac operation. To change for 230 V ac operation: 1. Remove the top and locate the two yellow wire nuts securing the primary wires. 2. Remove the wire nut from the connection containing the RED wire, remove the RED wire and then replace the wire nut. 3. Remove the other wire nut, untwist the BLUE wire and replace the wire nut. 4. Using the spare wire nut from the accessory pack, twist the RED and BLUE wires together. 5. Replace the 2 ampere fuse with the 1 ampere fuse from the accessory package.

SPECIFICATIONS

Input Voltage: 105-125 V ac, or 210-250 V ac, 50-60 Hz.
 Output Voltage: 13.5 V dc.
 Regulation: Better than 1% no load to full load @ 117 V dc.
 Output current: 9 amperes, full load, 10 amperes, maximum.
 Circuit Breaker: Electronic latching. Factory set at 10 amperes.
 Ripple: Less than 50 mV peak-to-peak at 9 amperes at 117 V ac.
 Construction: 16 Ga. aluminum chassis and top.
 Output Connectors: One 4 pin AMP MATE-N-LOC, phono jack for low current.
 Size: HWD 3-1/2" x 4" x 10-1/2".
 Weight: 9 pounds.

CIRCUIT DESCRIPTION

Model 225 Power Supply uses a series regulator type circuit incorporating a 2N5301 transistor as the pass element.

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 transistor 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 225 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 1/2 ampere power supply and is used to drive the pass transistor on the heat sink for the required output current. Potentiometer R1 sets the current trip point.

The regulator board has its own rectifier and filter capacitor. Diode D5 and capacitor C4 supply the hold-in current for SCR Q2 when the over current circuit trips.

As received from the factory, the trip point is set at 10A. This should not require further adjustment unless service has been performed on the unit.

OVERVOLTAGE PROTECTOR

The crow-bar circuit occupies one end of the heatsink. If the output voltage should rise above 16 V dc, zener diode D10 will conduct and apply forward bias to the gate of SCR Q4. When Q4 latches, it shorts the supply output to ground, which will either cause the over-current circuit to trip or will blow F2, the 10 ampere fuse.

IN CASE OF DIFFICULTY:

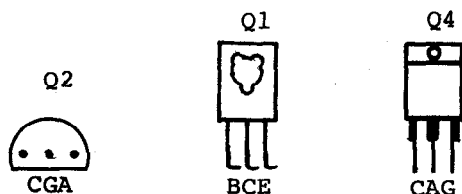
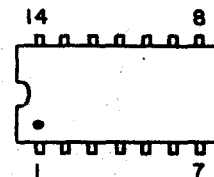
<u>SYMPTOM</u>	<u>POSSIBLE CAUSE</u>
No output when turned on. (LED does not come on)	External AC switch not on. (switch between white wires of output cable) Line fuse blown.
No output but LED comes on. Output voltage sags with load.	Output shorted. Low line voltage. Blown 10 ampere fuse.
Blown 10 ampere fuse.	Shorted pass transistor or inoperative breaker.

VOLTAGE READINGS---NO LOAD

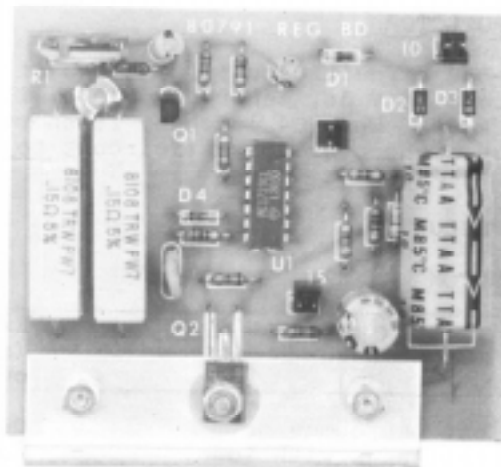
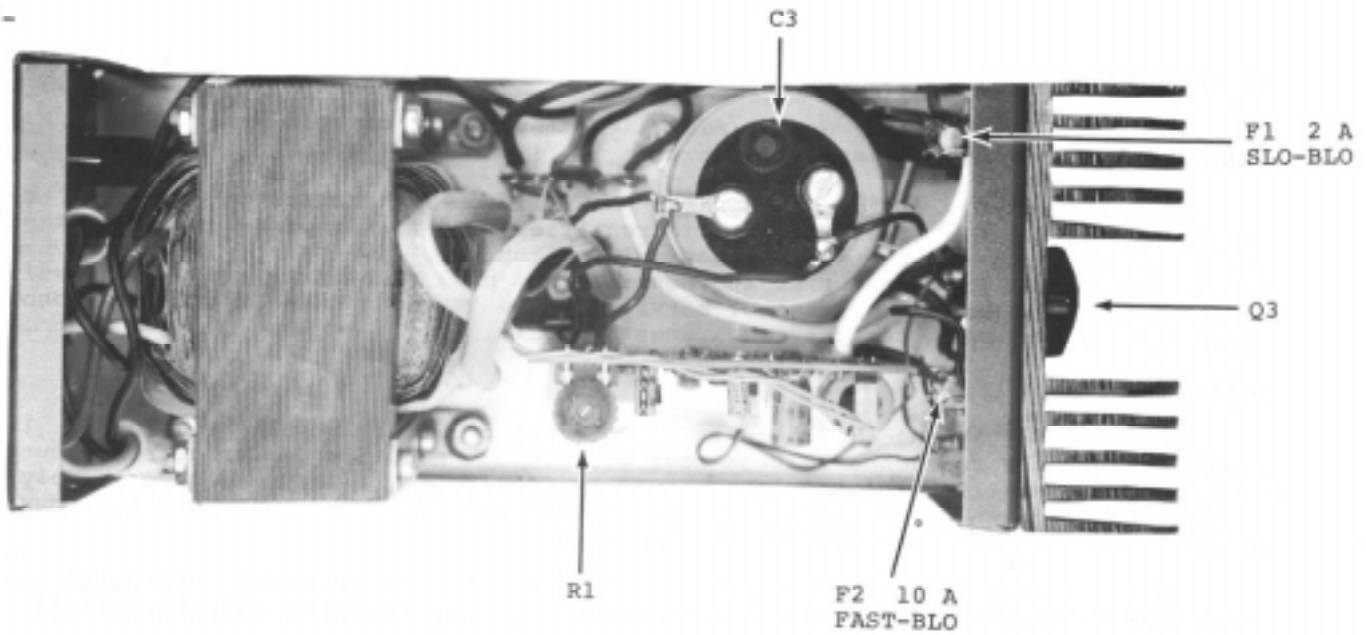
(SCR's) TRANSISTORS	(Anode) COLLECTOR	(Gate) BASE	(Cathode) EMITTER
Q1 MJE370	14.2	23.8	24.5
Q2 2N5060	24.5	0	0
Q3 2N5301	24.5	14.2	13.5
Q4 MCR 69	13.5	0	0

IC-1

PIN	VOLT
1	NC
2	NC
3	NC
4	7.1
5	7.1
6	7.1
7	0
8	NC
9	NC
10	7.6
11	23.8
12	24.5
13	8.3
14	NC



NC=No Connection



80791 REGULATOR BOARD

PARTS LIST

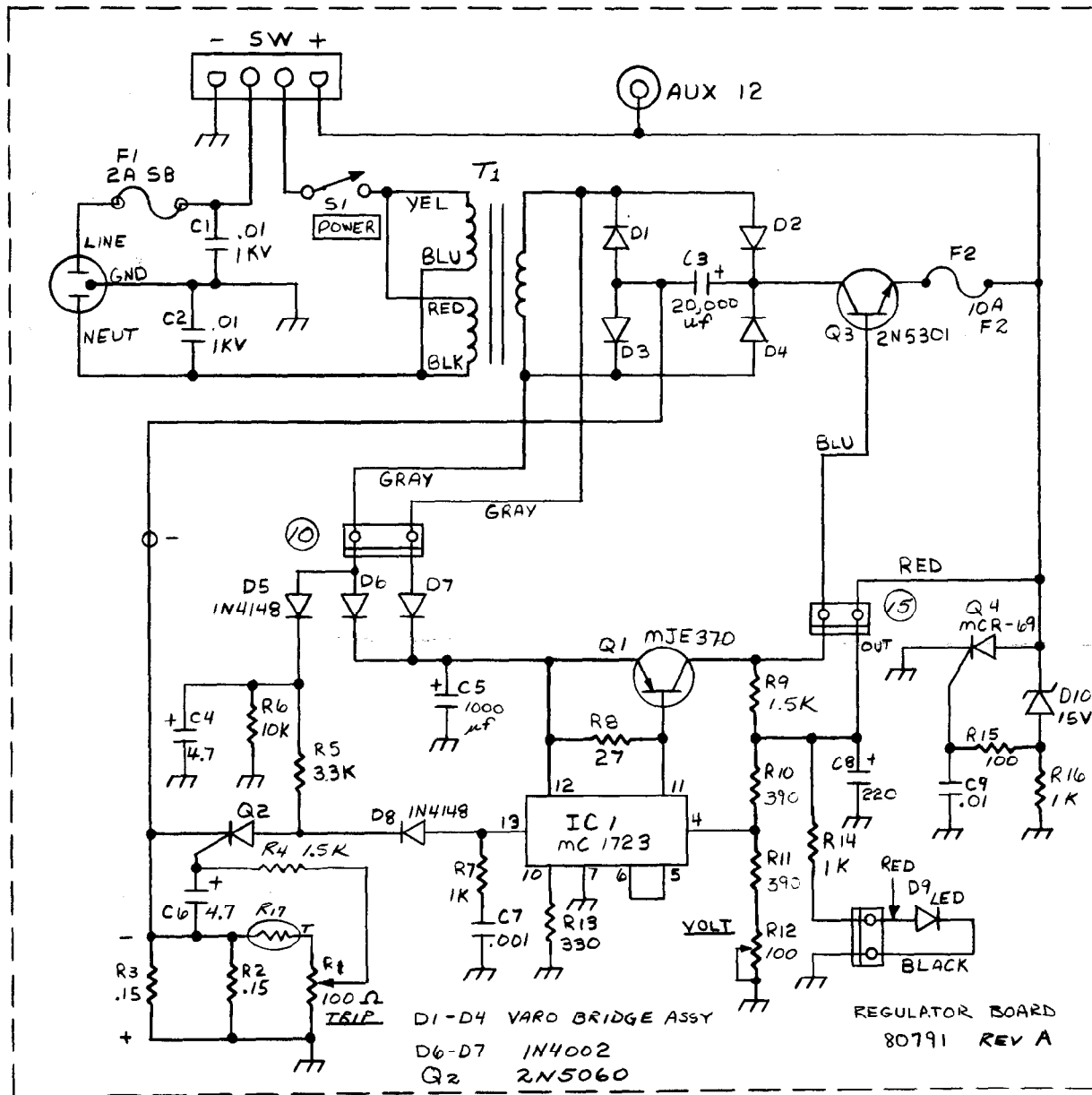
C5	23042	CAP-FXD,1000MF,25V,EL
C7	23133	CAP-FXD.001MF 500V CER 10%
C6	23181	CAP-FXD,1 MF 50V EL VERT
C4	23188	CAP-FXD,4.7 MF,25V EL VERT
C8	23202	CAP-FXD,220MF,16V,EL,VERT
Q2	25039	SCR-2N5060/C1034
IC1	25050	IC,MC-1723 CL
Q1	25105	TRANSISTOR-MJE 370
D6,7	28000	DIODE-POWER, 1N4002, SIL
D5,8	28001	DIODE-1N4148/1N914,SIL
R1	30071	RES-VAR,100,LIN,PC VERT,30%

80532 OVP BOARD

C9	23132	CAP-FXD, .01MF,100V,CER
Q4	25086	SCR MCR 69-2
D10	28035	DIODE,ZENER-15V 10%

CHASSIS MOUNTED PARTS

C1,2	23013	CAP-FXD, .01MF,1KV,CER
C3	23223	CAP-FXD,20000 MF,30V,EL
Q3	25041	TRANSISTOR-2N5301



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