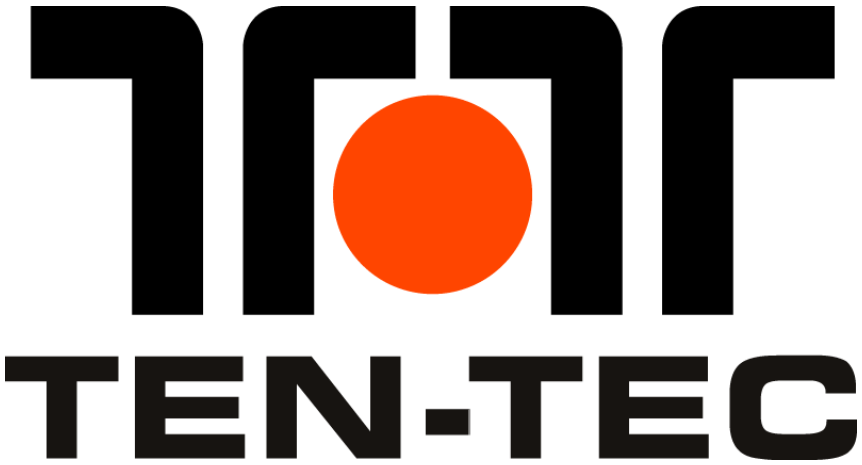

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Ten-Tec's service department can repair and service virtually everything we have built going back to our first transceivers in the late 1960's. It is our ability to continue offering service on these rigs that has led to their re-sale value remaining high and has made a major contribution to our legendary service reputation.

Printed and bound copies of all manuals are available for purchase through our service department if you would prefer not to use this copy as your transceiver manual.

We can repair or service your Ten-Tec equipment at our facility in Sevierville, TN. We also offer support via telephone for all products via during usual business hours of 8 a.m. to 5 p.m. USA Eastern time, Monday through Friday. We have a large supply of parts for obsolete products. Repairing a transceiver or amplifier yourself? Contact us for parts pricing information.

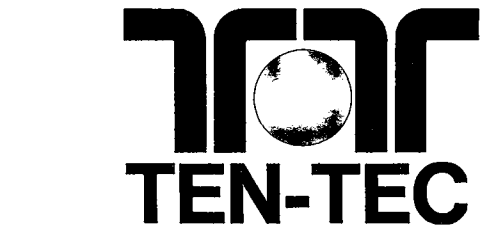
Service department direct line: (865) 428-0364
Ten-Tec office line: (865) 453-7172
Service department email: service@tentec.com
Address: 1185 Dolly Parton Parkway, Sevierville, TN 37862 USA

We have found it is most effective for us to help you troubleshoot or repair equipment with a consultation via telephone rather than by email.

Suggested contact methods are:

Troubleshooting or repairing equipment – call (865) 428-0364
Other inquiries – call (865) 428-0364 or email service@tentec.com

THANK YOU AND 73 FROM ALL OF US AT TEN-TEC



OWNER'S MANUAL

Model 280

TEN-TEC MODEL 280 POWER SUPPLY

GENERAL

The TEN-TEC Model 280 Power Supply is designed to deliver 18A at 13.5V from a 115 or 230 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 115 vac and 2 ampere fuse when wired for 230 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 guage 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 115 or 230 vac. As supplied, it is factory wired and fused for 115 vac. To change from 115 vac to 230 vac, the primary must be rewired using the wire nuts supplied and the fuse must be changed to 2A slo-blo (also supplied). See paragraph 9 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. 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 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 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.

for 115 vac operation:	4A	SLO-BLO	Type MDL-4
for 230 vac operation:	2A	SLO-BLO	Type MDL-2

NOTE: The unit is wired at the factory for 115 vac operation. If 230 vac operation is desired, the transformer primary and the fuse must be changed per the instructions in section 9 below. Failure to do this will result in serious damage to the unit.

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 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 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, its too hot.

9.) OPERATING VOLTAGE. The Model 280 is factory wired for 115 vac operation. To change for 230 vac operation: 1. Remove the top, 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 4A line fuse with the 2A fuse in the accessory package.

SPECIFICATIONS

Input Voltage: 105-125 vac, 50-60 Hz or 210-250 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.

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and your ideas for an even better ORION.

Reviewers raved about the original ORION's stellar receiver performance. Always reaching for that competitive edge, you asked for even more. The new ORION II adds:

- **Bright TFT color display with CCFL backlighting**
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***Shipping is additional. TN residents add 9.5% TN sales tax.**

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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 280 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 280 is a 723 integrated circuit voltage regulator. It contains a stable reference voltage source, feedback amplifier, over current shut-down, 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 currents.

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

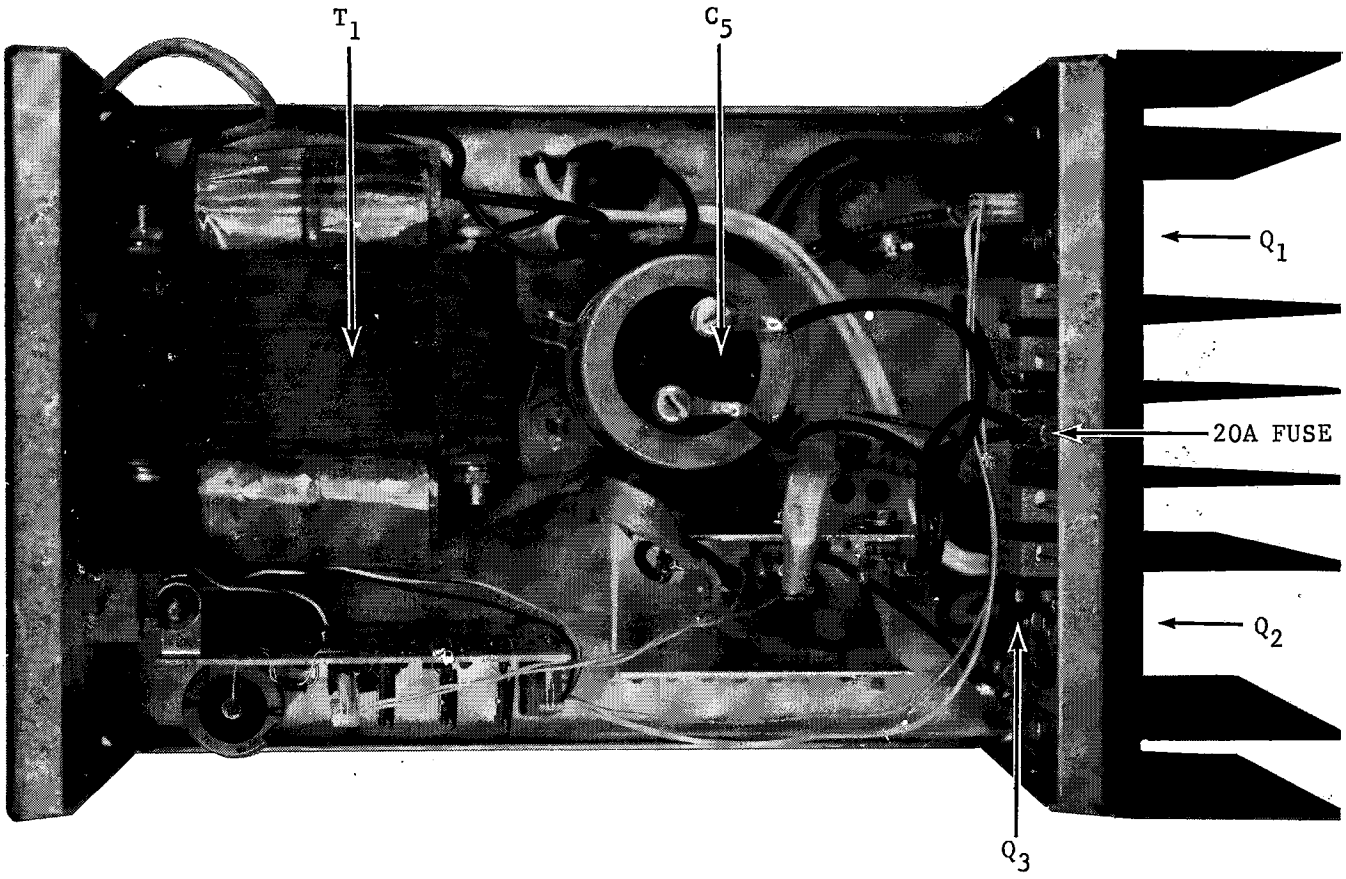
B (case)	14.2
E (emitter)	13.5
O (output)	13.5
M (meter)	13.5
AC--18 vac	
Transistors (scr)	

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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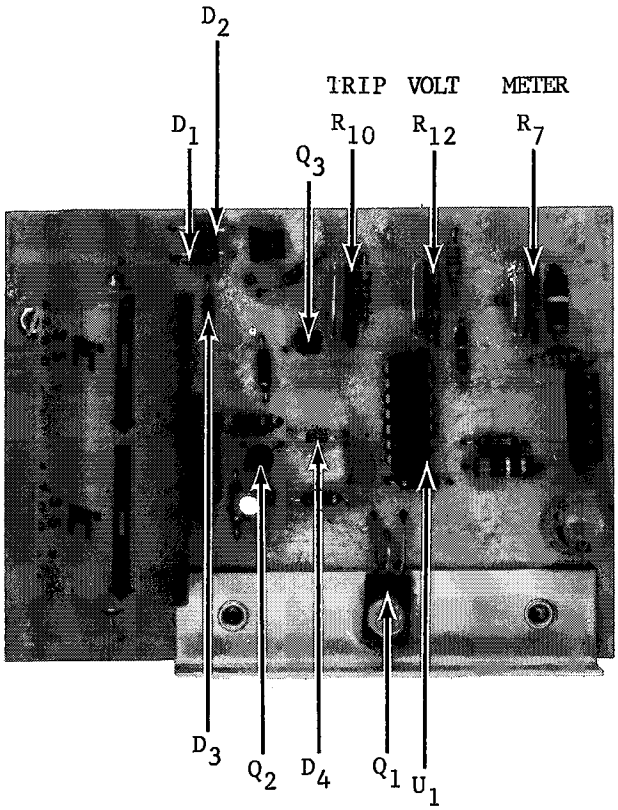
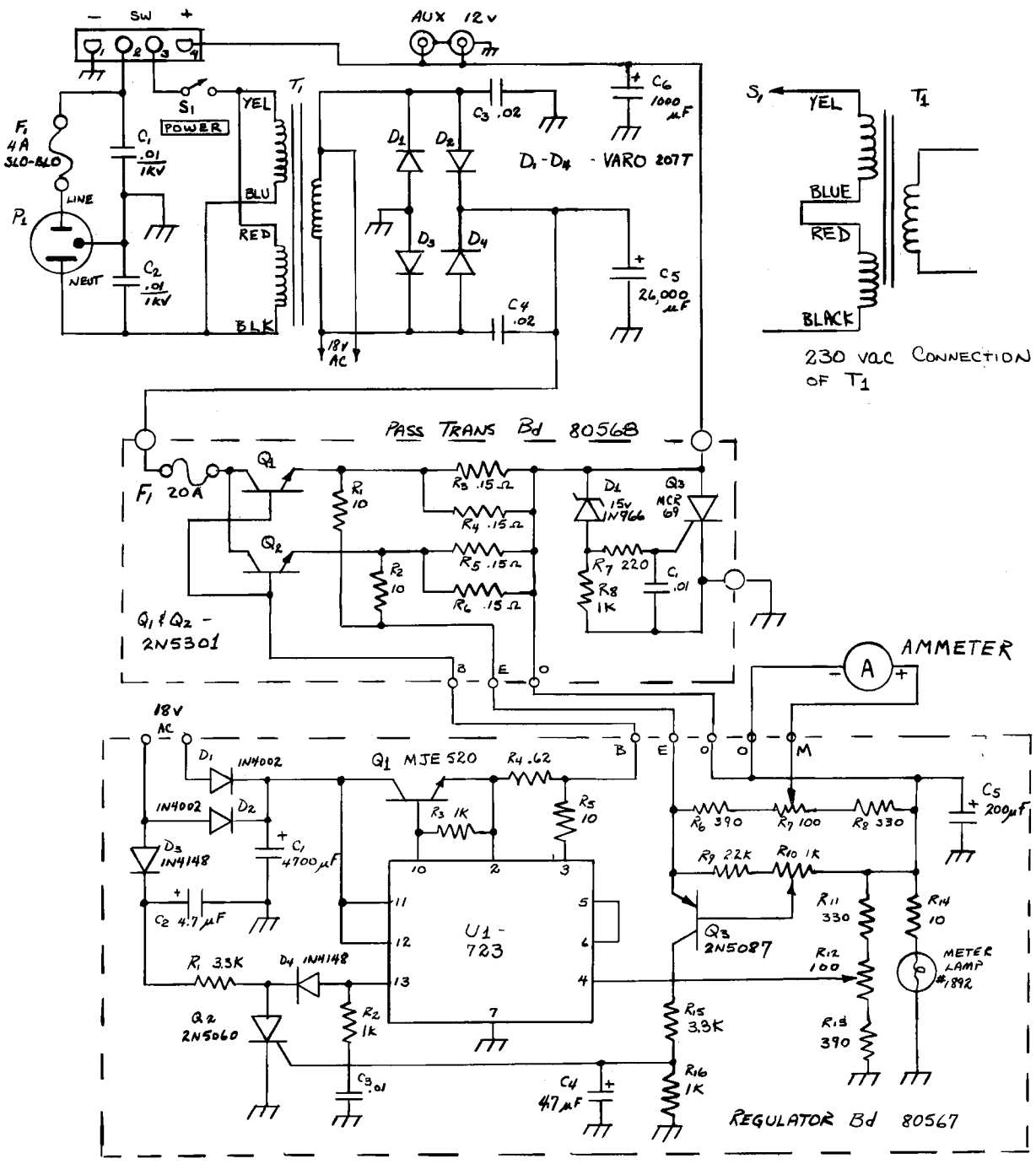




MODEL 280 POWER SUPPLY

29-1-80 RF

TEN-TEC, INC.
Sevierville, TN 37862

REPAIR DEPARTMENT TELEPHONE
615-428-0364

LIMITED WARRANTY AND SERVICE POLICY

GENERAL

TEN-TEC, Inc. warrants all products to be free from defects in material and workmanship for a period of one year after date of purchase, under these conditions:

1.) Registration: The warranty card must be returned promptly to establish the warranty period unless otherwise stated on the card. Our card file also serves as a check on stolen equipment which may be sent in for repair. Please notify us immediately if your TEN-TEC equipment is stolen.

2.) Original Purchaser: This warranty applies only to the original purchaser. Your warranty card listing from whom purchased establishes you as the original purchaser.

3.) Communication with the Factory: If trouble develops, contact the TEN-TEC dealer from whom you purchased the unit. He is obligated to try to correct the malfunction or return the unit to us. If he is unable to correct the fault, you or the dealer should contact the factory by mail or by telephone (615-428-0364), giving serial number if assigned, symptoms of fault and conditions under which they appear. You will be advised whether to return the unit to us or to try a replacement plug-in assembly that will be sent to you. To facilitate service calls, please use our direct Repair Department telephone number, 615-428-0364. (NO COLLECT CALLS, PLEASE.)

4.) In-Warranty Field Repairs: To expedite repairs TEN-TEC will send replacement assemblies prior to receiving the suspected defective one from you. The replacement will be billed on a 30 day memo, and credit will be issued when the defective unit is returned to us. No remittance or deposit is required. If the defective assembly is not returned within 30 days, you will be billed. Unit will be shipped to you, transportation paid by TEN-TEC. Shipping charges to the factory are to be borne by you.

5.) Return to Non-Selling Dealer: If you return the in-warranty unit to an authorized TEN-TEC dealer who did not sell the unit to you, he may, at his option, repair the unit or handle the return to the factory. Under these conditions TEN-TEC will repair or replace all defective components without charge, but reasonable labor charges may be levied by the servicing dealer. TEN-TEC is not liable for labor charges under these conditions.

6.) Proper Delivery: If the unit is returned to the factory, it must be adequately packed. A note should be included outlining the problem, conditions under which it appears, and attempted remedies. The more specific you are, the better the possibility of a complete fix. Shipping charges to the factory are to be borne by you. Unit will be returned transportation paid by TEN-TEC.

7.) Exclusions: This warranty does not apply to damage caused by mishandling, lightning, voltages in excess of rating, reverse polarity of DC supply, or changes in circuits. Claims for damage in transit should be filed with the carrier. This warranty, however, is NOT voided for attempted repairs of defective units or for incorporation of additional components such as switches, etc. when there is no change in the basic circuit. Under no circumstances is TEN-TEC liable for consequential damage to person or property by use of this unit.

8.) TEN-TEC reserves the right to make any improvements to its products which it may deem desirable without obligating itself to install such improvements in its previously manufactured products.

9.) This warranty is given in lieu of any other warranty, expressed or implied.

SERVICE OUTSIDE OF U.S.A.

1.) Service Centers: The policies listed in this warranty do not necessarily apply outside the U.S.A. Many overseas TEN-TEC dealers are qualified service centers. Contact the dealer nearest you for warranty service information.

2.) Transportation: In the event that you deal directly with TEN-TEC, Inc., all shipping charges to and from the factory are to be borne by you.

TRANSCEIVERS

1.) Extended Pro-Rata Warranty on Models 546/560 Output Transistors: The output transistors on these models are unconditionally guaranteed against damage for a period of one year after date of purchase, under any load condition or mode of operation, except for static discharge on the antenna or direct lightning strike. If they fail after the warranty period, the following replacement schedule will apply, provided that our service department makes the repair. (Prices listed are maximum and subject to reduction, depending on current transistor prices at time of repair.)

1 to 2 Years	2 to 3 Years	3 to 5 Years
$12.00 each	$15.00 each	$18.00 each

(Two transistors per transceiver. Labor not included.)

2.) Warranty on Models 515/525 Output Transistors: The output transistors on these models are unconditionally guaranteed against damage for a period of one year after date of purchase, under any load condition or mode of operation, except for static discharge on the antenna or direct lightning strike.

LINEAR AMPLIFIERS

1.) Model 444 Warranty Exceptions: The Amplifier and Power Supply units are both covered under the GENERAL conditions stated above, with the following exceptions:

A.) The warranty is void if the amplifier is powered by any source other than an approved TEN-TEC power supply.
B.) The warranty is void if any of the factory sealed internal adjustments are altered.
C.) The warranty is void if any of the protective circuits are disabled.
D.) If used with other than a TEN-TEC transceiver the warranty may not apply. A list of approved transceivers is included with the amplifier. If your transceiver is not listed, contact the factory.

2.) Extended Pro-Rata Warranty on Model 444 Output Transistors: The output transistors on this model are unconditionally guaranteed against damage for a period of one year after date of purchase, under any load condition or mode of operation, except for static discharge on the antenna or direct lightning strike. If they fail after the warranty period, the following replacement schedule will apply, provided that our service department makes the repair. (Prices listed are maximum and subject to reduction, depending on current transistor prices at time of repair.)

1 to 2 Years	2 to 3 Years	3 to 5 Years
$30.00 each	$35.00 each	$40.00 each

(Four transistors per amplifier. Labor not included.)

3.) Proper Delivery: If the unit is returned to the factory it must be adequately packed. If the power supply section is to be returned, remove the power transformer. The transformer may be retained or returned separately as indicated.

OUT-OF-WARRANTY REPAIRS

1.) Field Repairs: New circuit boards or discrete components can often be supplied to eliminate the cost and bother of shipping the complete unit to us. A nominal charge will be made for the material sent. Certain assemblies integral with the main chassis, such as VFO assemblies and rack tuning mechanisms, are not field replaceable.

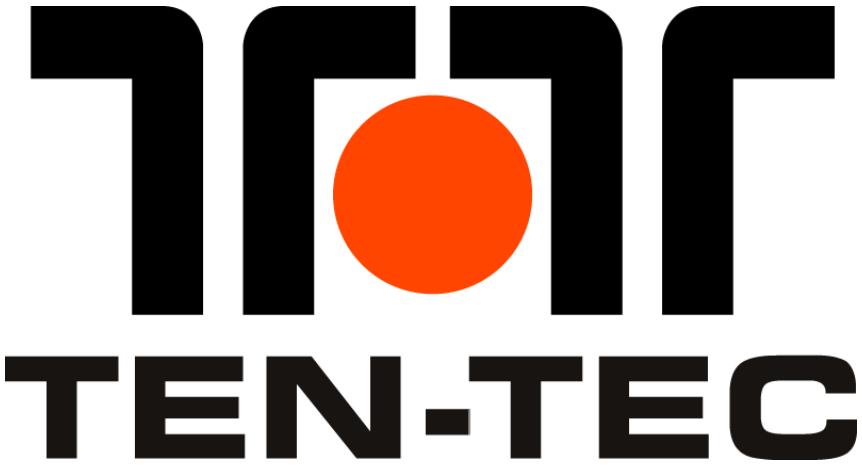
2.) Returned Units: Along with the unit, please submit a complete report on the nature of the malfunction and the conditions under which it occurs. This will enable our service department to pay special attention to your problem area and reduce overall labor costs. No matter what the malfunction is, every unit will be given a complete alignment and operational check before being returned.

3.) Quotations: Quotations on repair work will be given on request, after examination of the unit. The amount quoted will be firm for the specific work outlined in the quotation. Should additional material or labor requirements come to light after the repair is initiated, you will be contacted for approval before this phase of the repair is started.

4.) Repair Charge Payment: Charges below the $25.00 level will be billed to you after completion of the work and at the time of re-shipment. A report of all work done and parts used will accompany the bill. For charges greater than $25.00, prepayment will be required before the unit is returned. One of three methods of payment may be selected. 1.) Upon completion of the work the billing will be made but the unit will be held here. Upon receipt of the payment, the unit will be shipped. 2.) The unit will be returned to you on a COD basis, with COD charges borne by you. 3.) The repair charges may be paid by either MasterCharge or VISA.

Approval for COD or charge card options can be given either at the time the unit is submitted to us (in the accompanying letter) or when contacted upon completion of the repair. Please submit all raised information on your charge card when paying by this means.

5.) Transportation Charges: Units should be returned, transportation and insurance charges prepaid. Return transportation and insurance charges will be billed to you with other costs.



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