TEN-TEC MODEL 961 POWER SUPPLY/SPEAKER

GENERAL

The Model 961 Power Supply is designed to power the TEN-TEC models 560/561 and 585 transceivers. The supply delivers 20 Amps at 13.5 Vdc from a 115/230 Vac 50-60 Hz source. Circuit features include an electronic over-current sensor which shuts off the output if the current demand exceeds 22 Amps. The over-current shut down condition is reset by cycling the POWER switch from ON to OFF and back to ON. Output over-voltage protection is also included to prevent the output voltage from exceeding 16.0 Vdc.

The output voltage is available through a 4 x 14 gauge 3 foot cable and connector. The cable carries +13.5 Vdc, ground and the "hot" side of the ac primary and mates directly to the POWER jack on the 560/561 and 585 transceivers. Two RCA phono jacks on the back of the supply also provide +13.5 Vdc for low current (2 or 3 amps) auxiliary applications.

INSTALLATION

Any high current connections should be made at the 4 pin connector at the end of the output cable. Pin 1 (black wire) is the chassis ground and high current return. It is identified by a rib on the plastic shell of the connector. Pins 2 and 3 (white wires) are connected in series with the front panel POWER switch and carry the "hot" side of the the 115/230 Vac line. These two lines facilitate remote ON/OFF switching of the power supply. Pin 4 (red wire) is the +13.5 Vdc output.

If the supply is to be used with equipment other than TEN-TEC transceivers, pins 2 and 3 must be connected together to turn on the supply. These two pins are at 115/230 Vac and carry up to 3 Amps under full load. If the cable length must be extended for some application, a heavy gauge wire, at least #14, must be used. Significant voltage drops can occur even in heavy cable with a 20 Amp load. When using the supply with the 560/561 or 585, provide a good interchassis connection by running a separate heavy braid or wire between the ground posts on the rear panels. In rf communication systems, a connection from chassis to earth ground is simply good practice.

The phone jacks marked AUX +13.5 V are connected in parallel with the high current output cable. Each may be used to power auxiliary equipment that does not draw more than 3 Amps. The center terminal is positive, the shell is ground.

If you wish to use the built-in speaker, insert the 1/4" phone plug, cabled through the back of the supply, into the EXT SPKR jack of the transceiver.

230 Vac OPERATION

Before operating the supply from 230 Vac, the line voltage selector switch on the left side of the supply must be moved with a screwdriver blade to display "230". Replace the back panel line fuse with the MDL 2 type fuse included in the packing kit.

If the ac line plug is to be replaced for 230 Vac operation, preserve the original line, neutral and ground connections. In the line cord itself, the center green conductor is chassis ground and should be wired to pick up ground in the house wiring. The neutral side of the ac is carried on the side of the line cord which has small grooves along the length of the outer insulation. The "hot" ac line is carried in the conductor covered by the smooth insulation.

CAUTION

NEVER operate the power supply from 230 Vac when the line voltage selector switch is in the 115 position or vice versa.

OPERATING HINTS

1) Connect the line cord to a proper source of voltage. This is a three wire plug and is intended to pick up the ground of the ac house wiring. Do not defeat the ground connection by using an adapter plug.

2) Connect the load to the 4 pin connector as described above.

3) Turn on the unit and check that the front panel indicator lights. This LED is powered directly from the regulated output .

4) To reset the over-current trip out, turn off the unit with the front panel POWER switch, then turn it back on. If the over-current condition remains, the supply will again shut down .
   Remove the source of the overload and reset the supply as before.

5) If the over-voltage protection circuit detects an output over-voltage condition, it will short the output to ground. If the condition was caused by noise on the ac line (near-by lighting strike, etc.) the over-voltage circuit will trigger the over-current shut down and the supply must be reset as before. If, however, the over-voltage condition is the result of a component failure in the supply, the over-voltage circuit will blow the 25 Amp fuse mounted internally on the pass transistor board. If this fuse is blown, it indicates that possibly some internal part has failed and service may be required.

6) FUSES: If the line fuse or internal 25 Amp fuse must be replaced use the identical type fuse.

   Internal 25 A Fuse - AGC 25
   115 Vac line fuse - MDL 4
   230 Vac line fuse - MDL 2

7) HIGH CURRENT OPERATION: Do not place the power supply in a closed area or small space where air cannot circulate freely around the heat sink on the rear panel. This heat sink should have free access to normal air convection currents. Never set anything, books, magazines and so forth, on top of the heat sink or where they can cover the ventilation slots in the side of the supply.

With 20 Amp loads, some voltage drop at the load is unavoidable. The three foot cable and connector to connector interface can account for up to 0.30 Vdc of loss. If excessive voltage drop at the load is indicated, the connector should be inspected for dirty contacts and wear. After years of use, the contacts in the connector tend to spread and tarnish and may require cleaning or replacement.

SPECIFICATIONS

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

Output Voltage: 13.8 Vdc, internally adjustable from 11.5 to 15.0 Vdc.

Output Current: 20 Amps full load, 22 Amps maximum for 5 minutes.

Current Limiting: Electronically disables output. Factory set threshold at 22 Amps.

Regulation: - 3% at output connector for no load to 20 Amps full load.

Ripple: 20 mV peak to peak at 20 Amps.

Speaker Impedance: 8 ohms.

CIRCUIT DESCRIPTION

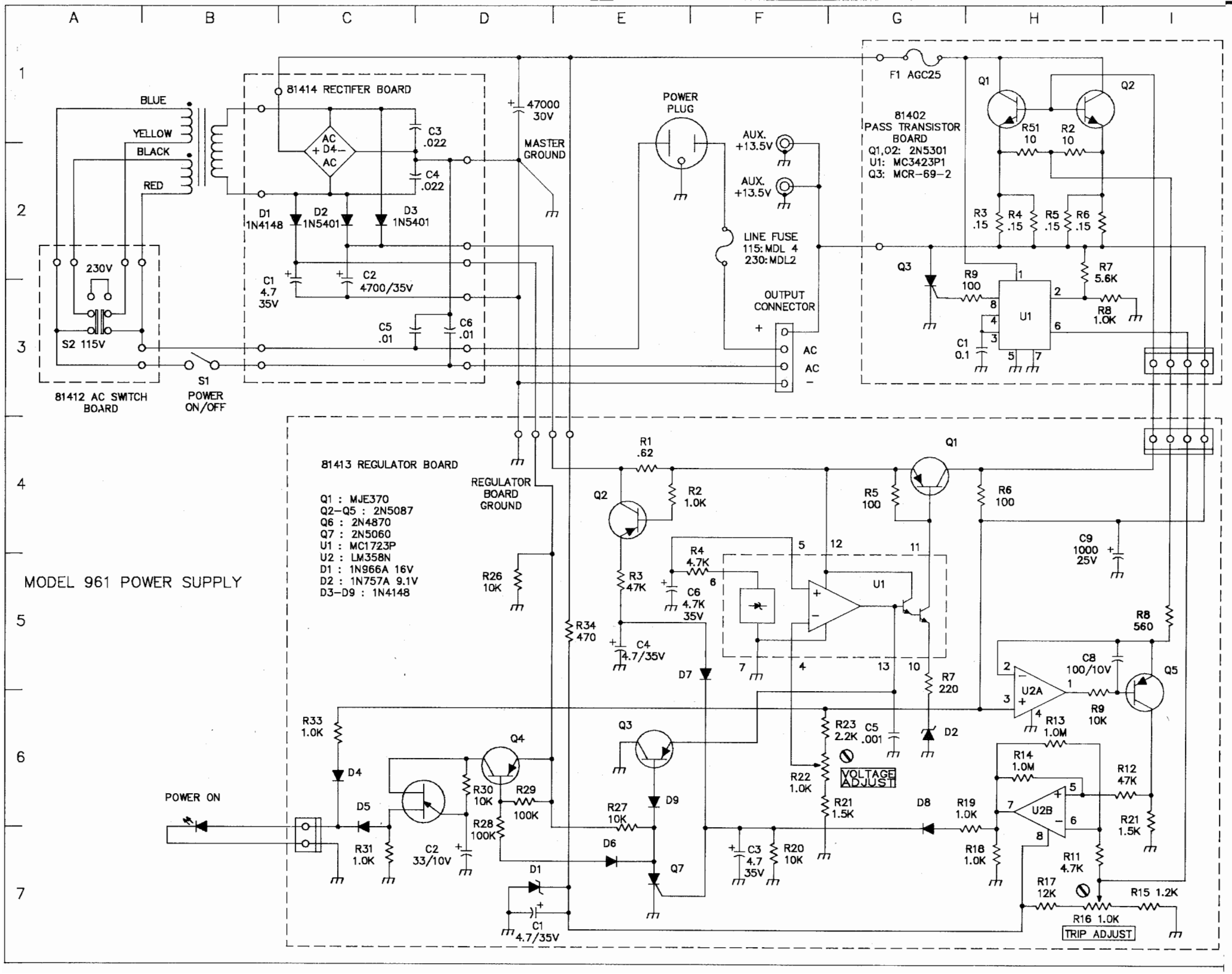
The Model 961 uses a linear series regulator type circuit based on the '723 regulator chip and two 2N5301 pass transistors.

The "hot" side of the AC mains is fused by the rear panel line fuse, then sent down the heavy 4 conductor cable where a jumper or switch at the load end of the cable connects pins 2 and 3. Pin 3 leads back to the POWER switch and on to the dual primaries of transformer T1. The voltage selector switch on the left side of the 961 configures the transformer primary windings for either 115 or 230 Vac.

The secondary of T1 feeds high current bridge rectifier D4 which develops unregulated dc for the pass transistors. Separate rectifiers D2 and D3 provide dc power for the regulator circuit. Regulator chip U1 compares a sample of the output voltage from R22 to an on-chip reference voltage. Any difference between the output and reference voltages is amplified and used to correct the bias on transistor Q1. Current from Q1 then drives the bases of pass transistors Q1 and Q2 on the pass transistor board.

The over current shut down circuit consists of a current to voltage converter U2A and Q5, a comparator U2B and SCR latch Q7. Output current is sampled across the .15 ohm emitter resistors on the pass transistor board. The 0-20 amp current sample is converted to 0-2.0 Vdc at the collector of Q5. Comparator U2B checks the current measurement against the trip-out setting at R16. When over current occurs U2B goes high and triggers Q7. The SCR shuts down the regulator by turning on Q3. To reset the supply the holding current through Q7 must be interrupted by turning off the POWER switch.

Over-voltage protection is implemented by U1 and Q3 on the pass transistor board. If the output voltage exceeds the preset limit of 16.0 Vdc, U1 will trigger SCR Q3 into conduction and either trip the over-current circuitry or blow the internal 25 Amp fuse F1.


MODEL 961 POWER SUPPLY
81414 RECTIFER BOARD
81412 AC SWITCH BOARD
81413 REGULATOR BOARD
81402 PASS TRANSISTOR BOARD
Q1,02: 2N5301
U1: MC3423P1
Q3: MCR-69-2
Q1 : MJE370
Q2-Q5 : 2N5087
Q6 : 2N4870
Q7 : 2N5060
U1 : MC1723P
U2 : LM358N
D1 : 1N966A 16V
D2 : 1N757A 9.1V
D3-D9 : 1N4148
BLUE
YELLOW
BLACK
RED
230V
S2 115V
S1
POWER ON/OFF
POWER PLUG
LINE FUSE
115: MDL 4
230: MDL2
F1 AGC25
AUX. +13.5V
AUX. +13.5V
OUTPUT CONNECTOR
MASTER GROUND
REGULATOR BOARD GROUND
POWER ON
VOLTAGE ADJUST
TRIP ADJUST
D1 1N4148
D2 1N5401
D3 1N5401
C1 4.7 35V
C2 4700/35V
C3 .022
C4 .022
C5 .01
C6 .01
C1 0.1
C2 33/10V
C1 4.7/35V
C3 4.7 35V
C4 4.7/35V
C5 .001
C6 4.7K 35V
C8 100/10V
C9 1000 25V
R1 .62
R2 1.0K
R3 47K
R4 4.7K
R5 100
R6 100
R7 220
R8 560
R9 10K
R11 4.7K
R12 47K
R13 1.0M
R14 1.0M
R15 1.2K
R16 1.0K
R17 12K
R18 1.0K
R19 1.0K
R20 10K
R21 1.5K
R22 1.0K
R23 2.2K
R26 10K
R27 10K
R28 100K
R29 100K
R30 10K
R31 1.0K
R33 1.0K
R34 470
R51 10
R2 10
R3 .15
R4 .15
R5 .15
R6 .15
R7 5.6K
R8 1.0K
R9 100
U1
U2A
U2B
Q1
Q2
Q3
Q4
Q5
D2
D4
D5
D6
D7
D8
D9

TEN-TEC, Inc.
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Sevierville, TN 37862

CUSTOMER SERVICE TELEPHONE
615-428-0364

LIMITED WARRANTY AND SERVICE POLICY, U.S.A.

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

1. THIS WARRANTY APPLIES ONLY TO THE ORIGINAL OWNER. It is important that the warranty registration card be sent to us promptly to establish you as the owner of record. This will also insure that any bulletins pertaining to this equipment will be sent to you.

2. READ THE MANUAL THOROUGHLY. This warranty does not cover damage resulting from improper operation. Developing a thorough understanding of this equipment is your responsibility.

3. IF TROUBLE DEVELOPS we recommend that you contact our customer service group direct. The selling dealer is not obligated by us to perform service in or out of warranty. It has been our experience that factory direct service is expeditious and usually results in less down-time on the equipment. Some dealers do offer warranty service and of course, have our complete support.

4. WE ENCOURAGE SELF HELP. Taking the covers off does not void the warranty. In many cases our customer service technicians, with your help, can identify a faulty circuit board. In these cases we will send you a replacement board which you can change out. This will be shipped on a 30 day memo billing and when the defective board is returned, we will issue credit.

5. EQUIPMENT RETURNED TO THE FACTORY must be properly packaged, preferably in the original shipping carton. You pay the freight to us and we prepay surface freight back to you.

5. EXCLUSIONS. This warranty does not cover damage resulting from misuse, lightning, excess voltages, polarity errors or damage resulting from modifications not recommended or approved by Ten-Tec. In the event of transportation damage a claim must be filed with the carrier. Under no circumstances is Ten-Tec liable for consequential damages to persons or property caused by the use of this equipment.

6. TEN-TEC RESERVES the right to make design changes without any obligation to modify equipment previously manufactured.

7. THIS WARRANTY is given in lieu of any other warranty, expressed or implied.

SERVICE OUTSIDE OF THE U.S.A.

Many of our dealers provide warranty service on the equipment they sell. Many of them also provide out of warranty service on all equipment whether they sold it or not. If your dealer does not provide service or is not conveniently located, follow the procedure outlined above. Equipment returned to us will be given the same attention as domestic customers but all freight expense, customs and broker fees will be paid by you.