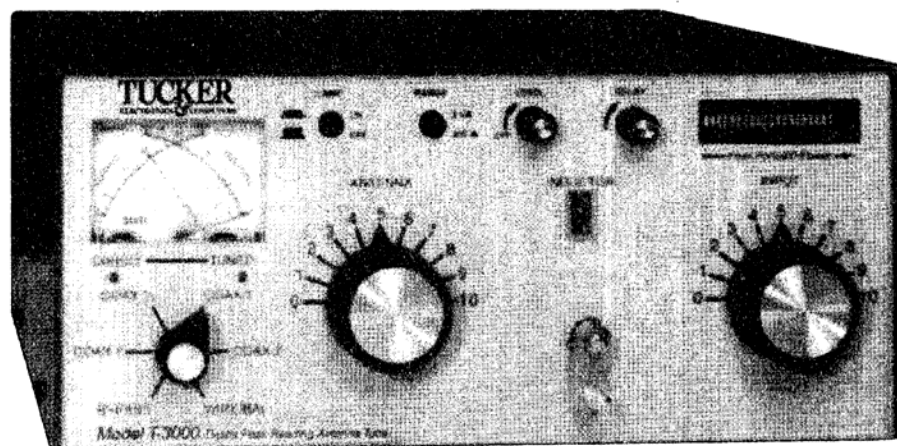


# T-3000

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## *Digital Antenna Tuner With Roller Inductor*

## *Owner's Manual*



**TUCKER**  
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## 1. Features

The T-3000 optimizes the performance of your antenna and transmitter or SWL receiver by providing adjustable impedance matching. The T-3000 also measures the power and Voltage Standing Wave Ratio (VSWR or SWR) which allows you to tune the SWR to the lowest ratio possible for the selected transmission frequency. The T-3000 also features a precision-frequency compensated dual-movement SWR meter. Included with the tuner is a revolutionary new digital bar graph display that enables you to see real peak SSB power measurements. Levels and delay are front panel adjustable.

## 2. Specifications

### FRONT PANEL INDICATORS AND CONTROLS

Meter	Dual movement D'Arsonval cross needle power and SWR meter
Bar Graph Display	21 segment LED display

### CONTROLS

Input Tuning	Continuous rotation capacitor
Antenna Tuning	Continuous rotation capacitor
Inductance	28 $\mu$ H Delrin roller inductor
Antenna Selector	6 position: Coax 1 tuned and tuner bypass, coax 2 tuned and tuner bypass, bypass and balanced antenna
Range Switch	2 position 300 W / 3000 W

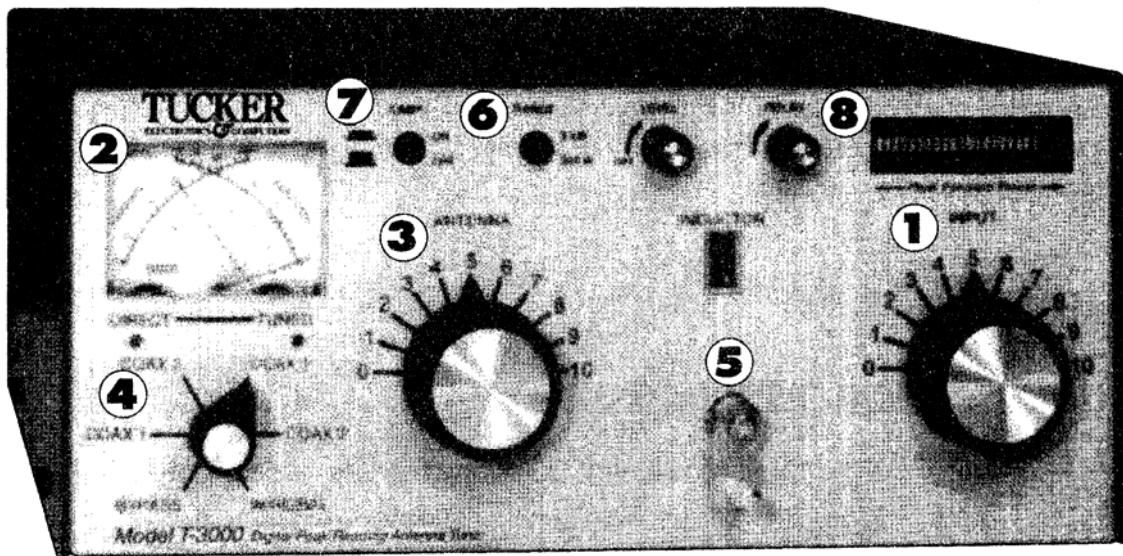
### REAR PANEL CONNECTORS

Coax 1	S0239 connector
Coax 2	S0239 connector
Bypass	S0239 connector
RF INPUT	S0239 connector
Balanced Line	Dual High Voltage Delrin terminal post
End-Fed Wire	Dual High Voltage Delrin terminal post

### OTHER

Frequency Coverage	1.8 - 30 MHz
Power Maximum	1000 W single tone continuous, 2 kW PEP
Dimensions	5.5" H x 12.5" W x 12" D (incl. terminals)
Weight	10 lbs.

### 3. Controls / Connectors



#### FRONT PANEL CONTROLS

##### 1. INPUT

Continuously adjustable input capacitor.

##### 2. POWER / SWR METER

Dual needle meter displays FORWARD and REFLECTED power in watts. SWR is measured where the two needles intersect on the red scale.

##### 3. ANTENNA

Continuously adjustable output capacitor.

##### 4. ANTENNA SELECTOR

Six-position rotary switch selects an output coaxial connector.

BYPASS COAX selects BYPASS COAX connector bypassing the impedance matching circuit but providing SWR, FORWARD and REFLECTED power meter readings.

DIRECT COAX 1 selects COAX 1 connector bypassing the impedance matching circuit but providing SWR, FORWARD and REFLECTED meter readings.

DIRECT COAX 2 selects COAX 2 connector bypassing the impedance matching circuit but providing SWR, FORWARD and REFLECTED meter readings.

TUNED COAX 1 selects COAX 1 connector through the impedance matching circuit.

TUNED COAX 2 selects COAX 2 connector through the impedance matching circuit.

TUNED WIRE selects the END FED WIRE connector through the impedance matching circuit. For balanced antennas, the wire antenna post is externally connected to the balanced line.

5. INDUCTOR

28  $\mu$ H continuously variable Delrin roller inductor driven by a crank handle. Coupled to the crank handle is a gear-driven precision mechanical counter.

6. RANGE SWITCH

Two-position switch selects the range of FORWARD and REFLECTED power displayed on the power meter.

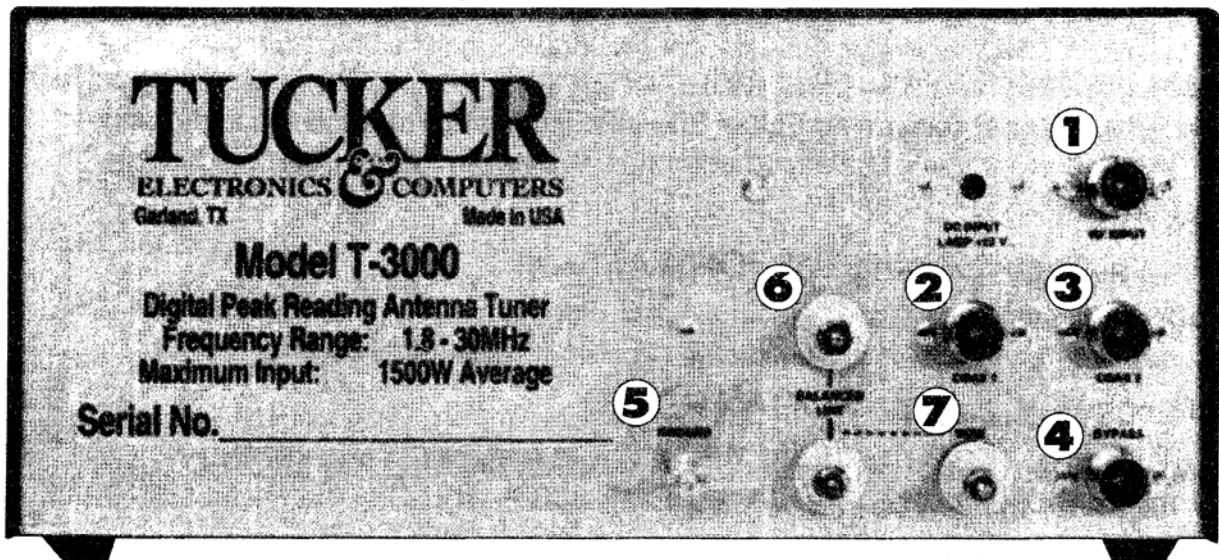
When the METER button is out, the FORWARD meter scale reads 300 watts full scale and the REFLECTED meter scale reads 60 watts full scale. When the METER button is in, the FORWARD meter scale reads 3000 watts full scale and the REFLECTED meter scale reads 600 watts full scale.

7. LAMP

A two position button selects whether the meter is illuminated.

8. DIGITAL BARGRAPH DISPLAY

A 21-digit LED bargraph display capable of responding to SSB signals or CW. The sensitivity of the display is controlled by the LEVEL control on the front panel. The delay of the SSB signal is continuously variable by the DELAY control.



### REAR PANEL CONNECTORS

1. RF INPUT  
Coaxial connector for input from SWL receiver or transmitter
2. COAX 1  
Coaxial connector for output to Antenna One.
3. COAX 2  
Coaxial connector for output to Antenna Two.
4. BYPASS  
Coaxial connector for output to dummy load or third coax output. Bypasses tuner, but meter circuits and digital bargraph remain active if AC adapter is connected to the jack located on rear panel.
5. GROUND  
Post/wing-nut type ground connector.
6. BALANCED OUTPUT  
Two Delrin High Voltage post connectors for output to RF balanced twin-lead antennas. (Note that jumper must be used as shown by the dotted line.)
7. END FED WIRE  
Delrin High Voltage post for output to a single-wire antenna. (Do not use jumper).

## 4. Installation

Carefully unpack your T-3000 from the packing carton and inspect it for signs of damage. If any damage is apparent, notify the transportation carrier or Tucker immediately. We recommend keeping the packing carton for moving, storing or reshipping the tuner.

Select a location for the T-3000 that allows the connectors to be free from any possible contact during operation.

**WARNING:** SOME BALANCED OR END-FED ANTENNAS WILL PRODUCE HIGH RF VOLTAGES AT THE OUTPUT POST CONNECTORS. RF BURNS MAY RESULT IF TOUCHED DURING TRANSMISSION.

### INSTALLATION PROCEDURES

1. Connect a coax cable from your transmitter or receiver to the RF INPUT connector on the rear panel. Keep the cable as short as possible. If you use a linear amplifier, connect your transmitter to the linear amplifier input and the linear amplifier output to the T-3000. **Do not transmit more than 1000 watts average (single tone) through the tuner.**
2. Connect coax cable(s) from your antenna to COAX 1 or COAX 2 connectors on the rear panel. These connectors are either direct from the transmitter or through the tuned circuit depending on the setting of the OUTPUT SELECTOR switch on the front panel.
3. If you are using a balanced feed antenna, connect a balanced line to the BALANCED OUTPUT connectors and jumper Delrin post (6) with lower post (7) as shown by dotted line.
4. If using a single wire antenna, connect it to post (7) without installing jumper.
5. Connect a dummy load to the BYPASS (4) connector using a coax cable. This lets you select the dummy load from the OUTPUT SELECTOR switch. Any antenna that does not require the use of an antenna tuner may be connected to the BYPASS connector, if desired.

### BEFORE OPERATING

1. To avoid possible damage to the T-3000, set INPUT, ANTENNA, INDUCTOR and POWER RANGE switches as outlined in the table located in the next section before applying transmitter power.
2. Begin tuning with your transmitter into the tuner set at a low output power setting (50 to 100 W).

**WARNING:** DO NOT OPERATE THE T-3000 WITH THE COVER OFF.

## 5. Tuning

1. Select the band and frequency of desired operation.
2. **Set INPUT, ANTENNA and INDUCTOR controls to the suggested setting before applying transmitter power. Actual settings may vary from antenna to antenna.**

BAND/ FREQUENCY	ANTENNA		INDUCTOR		INPUT	
	Sug.	Actual	Sug.	Actual	Sug.	Actual
160 M / 1.8 MHz	9.0		70		8.5	
75 M / 3.75 MHz	7.0		280		7.0	
40 M / 7.15 MHz	3.0		325		3.0	
30 M / 10.125 MHz	2.5		350		2.5	
20 M / 14.175 MHz	1.5		360		1.5	
17 M / 18.118 MHz	1.0		380		1.2	
15 M / 21.225 MHz	1.0		380		1.0	
12 M / 24.940 MHz	1.0		390		0.6	
10 M / 28.850 MHz	0.6		390		1.0	

3. Set your transmitter to a low power output. If your transmitter has a TUNE position, select that position.
4. If you use a linear amplifier, set it to Standby. Do not use the linear amplifier until the T-3000 is tuned. Do not exceed 1000 watts average (single tone).
6. Set OUTPUT SELECTOR switch to BYPASS or the position matching your antenna connection. To tune your antenna, the switch selection must be set to: COAX 1 TUNED, COAX 2 TUNED or WIRE (BALANCED ANTENNA). Selecting COAX 1 DIRECT, COAX 2 DIRECT or BYPASS bypasses the tuning section.
5. Set POWER RANGE switch in to 300 W (with meter button out).
7. Rotate the INPUT, ANTENNA and INDUCTOR controls for maximum noise or signal as heard on your receiver.
8. Key your transmitter and adjust the power level for a reading of 50-100 watts on the FORWARD scale. Adjust the INPUT, ANTENNA and INDUCTOR controls for a minimum REFLECTED reading while maintaining a FORWARD reading of 50-100 watts using your transmitter power control.
9. Read the SWR on the red scale at the point where the two needles intersect. Repeat step eight until the lowest SWR reading is obtained. The SWR should be 2:1 or lower.



**NOTE:** THIS PROCEDURE TAKES PATIENCE THE FIRST TIME. THE INPUT AND ANTENNA CONTROLS VARY THE CAPACITORS AND PROVIDE FINE ADJUSTMENTS. THE ROLLER INDUCTOR CRANK CONTROL PROVIDES COARSE ADJUSTMENT.

10. When you have tuned your antenna to the best SWR, record the settings of the INPUT, ANTENNA and INDUCTANCE controls on the chart above for future reference. When you retune, use these settings as your starting point.

## **6. How to use your digital bargraph display**

1. Plug in the AC adapter provided with your tuner into the jack located on back panel.
2. In section 5 after completing the tune-up sequence, key your transmitter through the tuner into a dummy load (e.g. Tucker T-250, T-275). Adjust for a meter reading of 100 Watts Forward (at this time the SWR will have been adjusted for minimum value as outlined in Section 5).
3. Rotating LEVEL control activates bargraph and the segments will illuminate progressively as the LEVEL control is increased. If your cross-needle meter is reading 100 Watts as indicated in (2) rotate LEVEL control so that the last LED (red) illuminates. This signifies that the 100 Watt average single tone reading on the cross-needle meter display is identical to the power reading of 100 Watts single tone on the digital display. Without any further adjustment of the level control, switch your transmitter to SSB and speak normally into the microphone and you will notice that the cross-needle meter will read approximately 30-40 Watts and the digital display will show an output of 100 Watts PEP when red LED illuminates while you are speaking. This will confirm that the cross-needle meter reads 30-40 Watts average assuming you started with the 100 Watts single-tone as described above and the digital display will read voice peaks of 100 Watts (100 W PEP).

**NOTE:** All cross-needle meters read average power when you are using the transmitter in the SSB mode. Some cross-needle meter displays are capable of peak-readings but will read 20% low because of directional coupler driver impedance problems.

4. Once satisfied you are getting the right results in (3), while you are speaking into the microphone with the DELAY control fully counter-clockwise, the forward peak indication on the meter will be as quick in response as the delay. If this is not a desirable condition, rotate the DELAY control clockwise until the desired amount of DELAY is introduced in the display. The forward fast attack time is not affected by the DELAY control.

## 7. Notes

1. An SWR of 1:1 is best, but an SWR as high as 2:1 may be acceptable. Check your transmitter manual for details.
2. If you cannot get an acceptable SWR, lengthen or shorten your antenna and/or feedlines and retune.
3. If you get low SWR readings at more than one setting, use the setting that gives:
  - The highest FORWARD power reading
  - The lowest REFLECTED power reading
  - Uses the largest capacitance (highest number) on the INPUT and ANTENNA controls.
4. Any time a new or different antenna is connected, it is necessary to repeat the tuning procedure for each antenna.

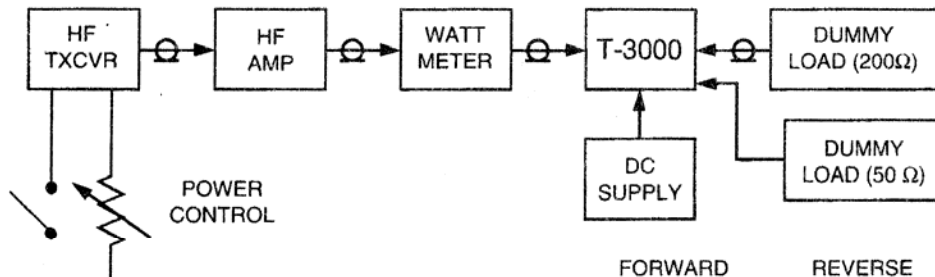


Figure 8.1

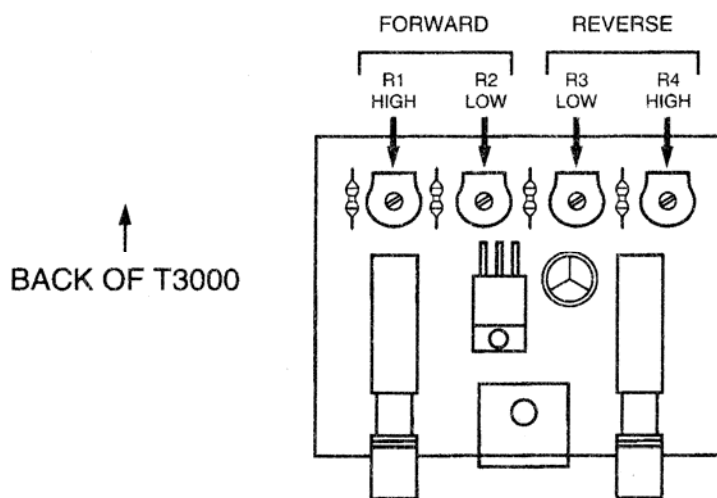


Figure 8.2

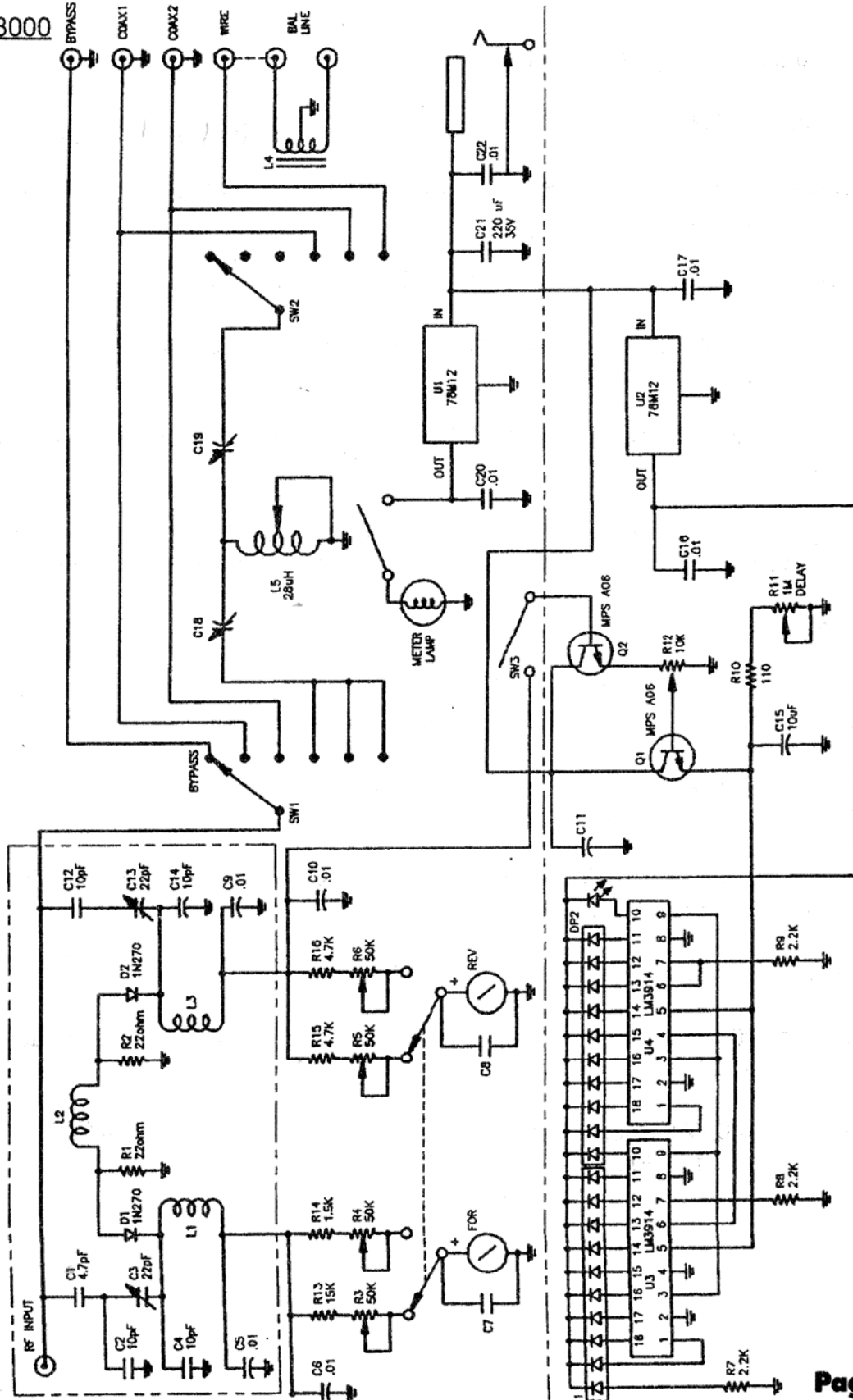
## 8. METER CALIBRATION

### METER CALIBRATION PROCEDURE

1. Connect the T-3000 as depicted in Figure 8.1.
2. Connect the 50  $\Omega$  load to the COAX 1 connector and the HF amplifier to the RF INPUT connector.
3. Select the COAX 1 DIRECT position on the selector switch.
4. Set to mid range the two capacitors on the RF sampler board and the four potentiometers on the switch board.
5. Select the 300 W range on the RANGE button and zero the two meters using a small slot screwdriver.
6. Apply 100 W of RF power at 14.0 MHz from the transceiver. By adjusting the trimmer capacitor closest to the rear panel, null the reflected power needle.
7. Reverse the connections on RF INPUT and COAX 1.
8. Apply 100 W of RF power at 14.0 MHz from the transceiver. Adjust the trimmer capacitor closest to the front panel to null the forward power needle.
9. Depress the RANGE button to select the 3000 W range and adjust R4 (in Figure 8.2) until the reflected power reads 100 W.
10. Reduce the power to 10 W, release the RANGE button and adjust R3 until the reflected power reads 10 W.
11. Reverse the connections on RF INPUT and COAX 1.
12. Select the 300 W range on the RANGE button, apply 100 W of RF power at 14.0 MHz and adjust R2 for a forward reading on 100 W.
13. Select the 3000 W range, apply 800 W of RF power at 14.0 MHz and adjust R1 for a forward reading of 800 W.

# 9. Schematic Diagram

MODEL T-3000



# **WARRANTY**

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All goods sold hereunder are warranted to be free from defects in material and workmanship, for a period of 12 months from date of shipment. This expressed warranty is in lieu of and excludes all other warranties, whether expressed or implied by operation of law or otherwise, including any warranty on the merchantability or fitness for a particular purpose. Defective material may be returned to the seller after inspection by the seller and upon definite shipping instructions by the seller. Goods so returned will be replaced or repaired without charge, but the seller shall not be liable for loss, damage or expense directly or indirectly arising from the use of material or from any other cause, the exclusive remedy against the seller being to require the replacement or repair of defective material. Every claim on account of defective material, workmanship or any other cause shall be deemed waived by the purchaser unless made in writing prior to the expiration date of the warranty.

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