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## AT-500 600 Watt Antenna Tuner

### Specifications Summary

- 600 W PEP SSB, 500 W CW
- 160 m to 6m
- Differential capacitor with 6:1 vernier drive
- Dual movement cross needle meter
- 5.5" H x 10" W x 11.3" D

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## AT-500 600 Watt Antenna Tuner Technical Manual



**Designed and Manufactured in the USA**  
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## AT-500 SPECIFICATIONS

- **METERING:** Dual movement cross-needle power and frequency compensated coupler
- **INPUT & ANTENNA TUNING:** Variable capacitor 360-14-360pF  
2.5 kV with 6:1 Vernier Drive
- **INDUCTANCE:** 15  $\mu$ H roller inductor; 12 ga. wire wound on steatite ceramic core, plated bar and wheel, fixed 15  $\mu$ H coil relay switched
- **ANTENNA SELECTOR SWITCH:** 6 position:  
*Coax 1* - tuned and tuner bypass  
*Coax 2* - tuned and tuner bypass  
Switch wafers are 3 kV rated
- **POWER RANGE SWITCH:** 2 position 300 W / 3000 W
- **REAR PANEL CONNECTORS:**  
*SO239:* RF Input, Coax 1 & 2, Bypass  
*END FED WIRE:* High Voltage Nylon66™ terminal post & ground post for Balanced Line and End-Fed wire  
*12 VDC INPUT:* 14mm connector, 2.1mm ID, 5.5mm OD, center positive, 200 ma
- **FREQUENCY COVERAGE:** 1.8 - 54 MHz
- **POWER MAXIMUM:** 600 W PEP SSB, 500 W CW
- **IMPEDANCE RANGE:** 20 to 1500  $\Omega$ , 160m to 6m  
(assuming resistive load)  
Reduce power for lower Z-range
- **BALANCED OUTPUT:** 4:1 current balun
- **DIMENSIONS:** 5.5" H x 10" W x 11.3" D
- **WEIGHT:** 8 LBS, 4 Kg
- **CHASSIS & COVER:** 11 ga., .090 gold Iridite Treated Aluminium

## AT-500 GENERAL DESCRIPTION



The American-made Palstar AT-500 Antenna Tuner. The AT-500 optimizes the performance of your antenna and transmitter by providing adjustable impedance matching using a T-type circuit configuration.

The AT-500 also measures the power (upgraded to include a PEAK/PEAK HOLD function) and Voltage Standing Wave Ratio (VSWR or SWR), which allows you to tune the SWR to the lowest possible for the selected transmission frequency.

The AT-500 also features a precision steatite ceramic core roller inductor with a plated roller wheel and roller shaft. The smaller size permits operation on 6 meters.

A high voltage ceramic wafer switch allows selection between coax feedlines or wire-fed antennas. DIRECT switch positions bypass the impedance matching circuit but allow for the SWR, FORWARD, and REFLECTED and PEAK power meter FUNCTIONS.

Tuning is achieved with the front panel mounted controls. The 6:1 ratio Vernier dials allow for tuning with precision and accuracy, while the Inductor crank handle facilitates coarse adjustments. The range of the meter (300W/3000W) is selected by a push button switch located on the front panel.

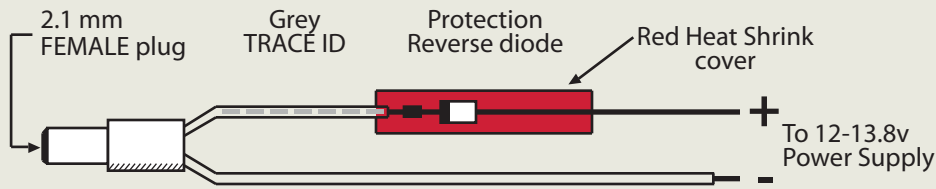
# INSTALLATION

## UNPACKING

Carefully remove the AT-500 from the shipping carton and inspect it for signs of damage. If any damage is apparent, notify the transportation carrier or dealer immediately. **KEEP THE PACKING CARTON for moving, storing, or reshipping the tuner to us for repair if required.**

## LOCATION

Select a location for the AT-500 that allows the connectors to be free from any possible contact with people, pets, or objects during operation and with unrestricted air flow for cooling.



**AT-500 DC POWER CORD**

## INSTALLATION PROCEDURE

Connect a coax cable from your transmitter 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 AT-500.

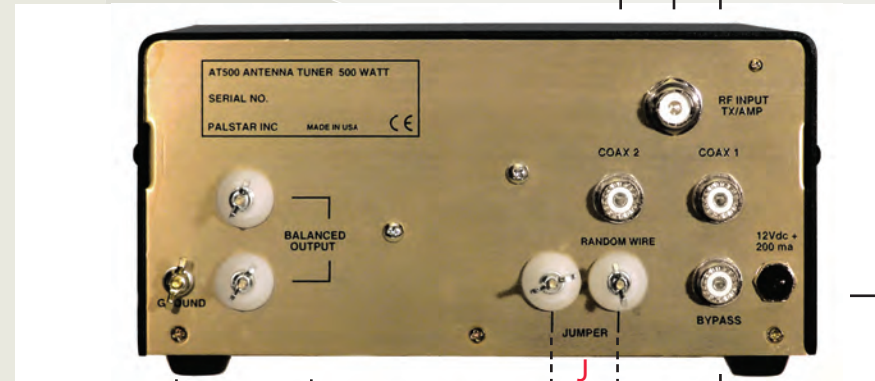
**DO NOT USE MORE THAN 500 Watts CW (600 Watts PEP SSB) through the tuner.**

# REAR PANEL

**COAX 1** coaxial connector for output to Antenna 1

**RF INPUT** coaxial connector for input from transmitter or amplifier

**COAX 2** coaxial connector for output to Antenna 2



**GROUND** post/wing nut ground connector

**JUMPER** post connector. Connect the jumper between this post and the wire post when using the Balanced Output terminals to feed a ladder line antenna

**12 VDC INPUT** (2.1 mm plug, center pin +) 12 VDC adapter 200 mA to power the meter lamp

**BALANCED OUTPUT** for balanced wire feed antennas. Jumper strap must be connected between the END FED WIRE post and the JUMPER post

**BYPASS** coaxial connector for output to dummy load or third coax output. Bypasses tuner. Meter circuits on if AC adapter is connected to rear panel

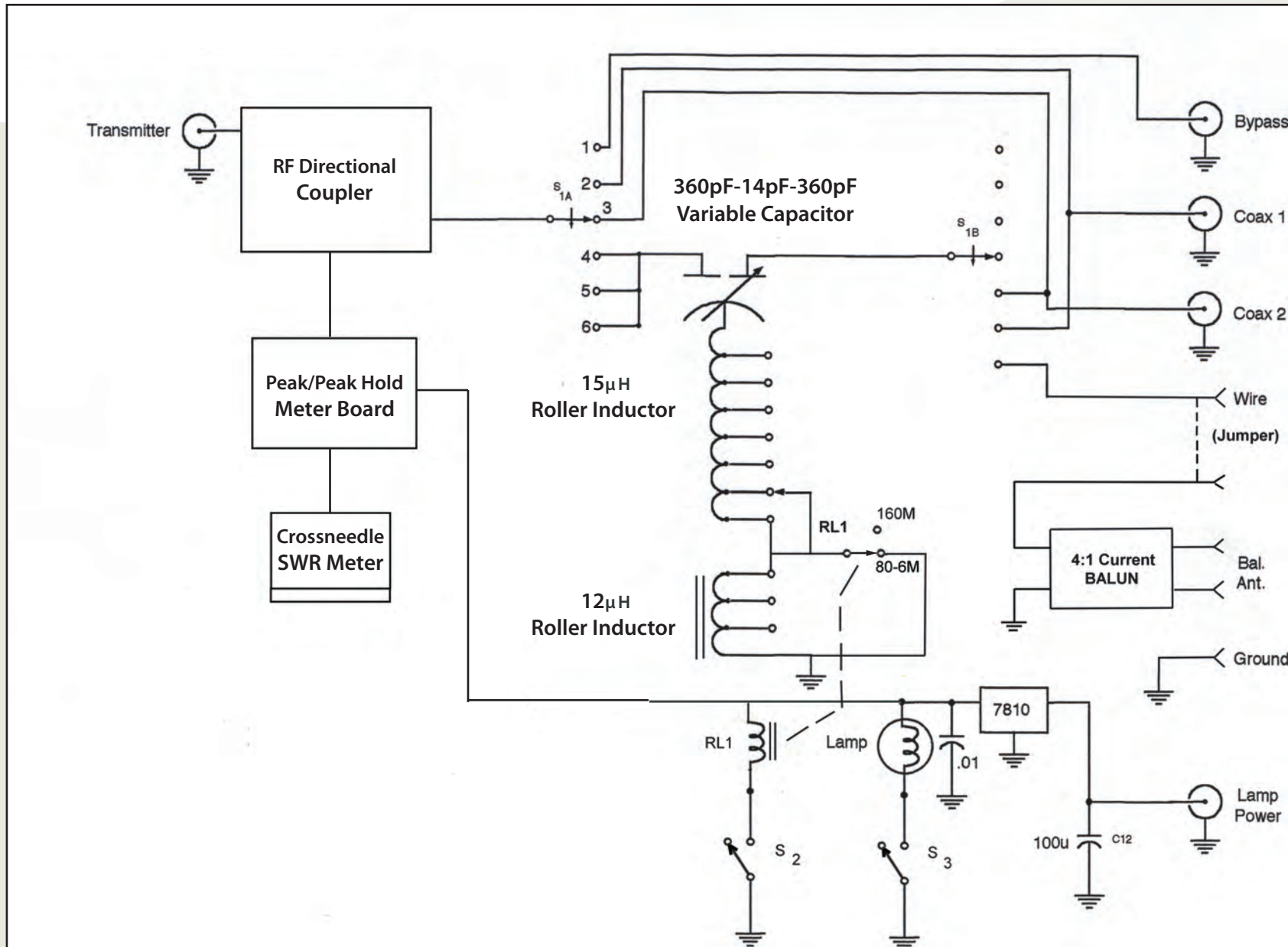
## FRONT PANEL DESCRIPTION



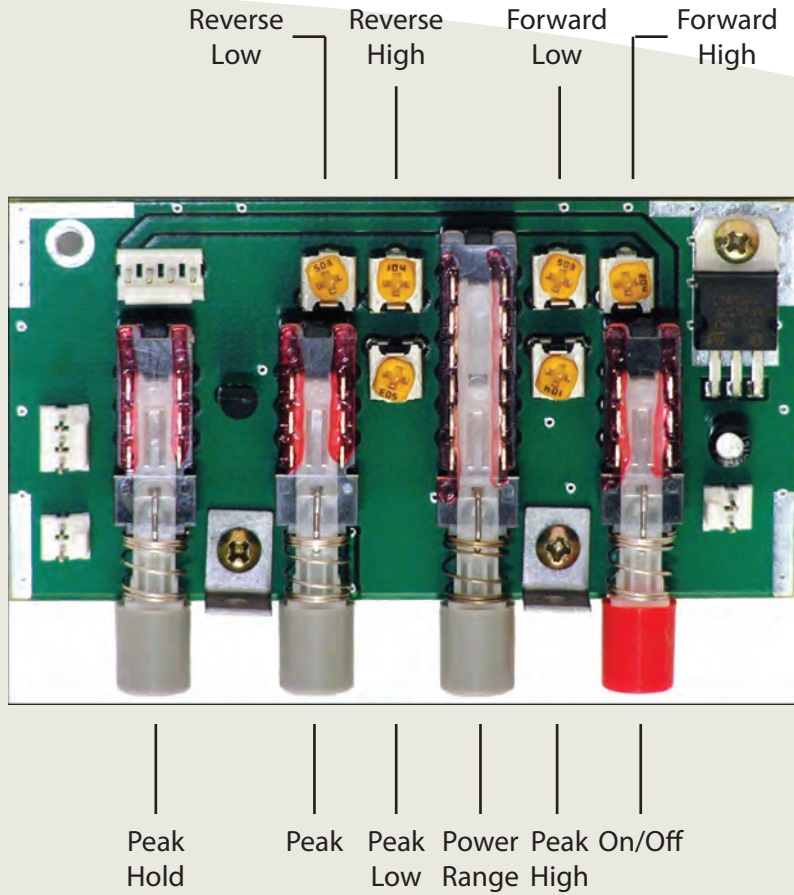
1. **POWER/SWR METER** Dual needle meter displays FORWARD and REFLECTED power in watts. SWR is measured where the two needles intersect on the red scale. SWR is printed on meter face.
2. **PEAK HOLD** Select to read Peak Hold on the SWR meter. Peak switch [3] must be in PEAK position.
3. **PEAK** Selects between PEAK and AVERAGE power metering display.
4. **RANGE** Two-position switch selects the range of FORWARD and REFLECTED power displayed on the power meter. When the RANGE button is OUT, the FORWARD meter scale reads 300 watts full scale and the REFLECTED meter scale reads 60 watts full scale. When the RANGE button is IN, the FORWARD meter scale reads 3000 watts full scale and the REFLECTED meter scale reads 600 watts full scale.
5. **ON** Select to turn on the backlight in the meter and enable metering, and 160 meter functions. The jack on the back panel must be supplied with 12 VDC for these functions to work.
6. **DIRECT-TUNED MODE SWITCH** Six-position rotary switch selects an output connector as follows:

- a. **DIRECT BYPASS** selects BYPASS COAX CONNECTOR bypassing the impedance matching circuit, but providing SWR, FORWARD, and REFLECTED power meter readings.
  - b. **DIRECT COAX 1** selects COAX 1 CONNECTOR bypassing the tuner matching circuit, but providing SWR, FORWARD, and REFLECTED meter readings.
  - c. **DIRECT COAX 2** selects COAX 2 CONNECTOR bypassing the tuner matching circuit, but providing SWR, FORWARD, and REFLECTED meter readings.
  - d. **TUNED COAX 1** selects COAX 1 CONNECTOR through the impedance matching T circuit.
  - e. **TUNED COAX 2** selects COAX 2 CONNECTOR through the impedance matching T circuit.
  - f. **BALANCED OUT** selects the balanced and End Fed Wire output connectors located after the impedance matching circuit.
7. **160 METER SWITCH** Pushing this button to the IN position switches in extra inductance for the 160 Meter Band. The button should be in the OUT position for use on all other bands - 80m - 6m (requires 12 VDC).
  8. **TUNE** Continuously adjustable differential capacitor.
  9. **INDUCTOR** 15  $\mu$ H continuously variable ceramic roller inductor driven by a crank handle. Coupled to the crank handle is a gear-driven precision mechanical counter. The end stop readings on the turns counter are ZERO and 288. Zero is maximum inductance and 288 is minimum inductance.

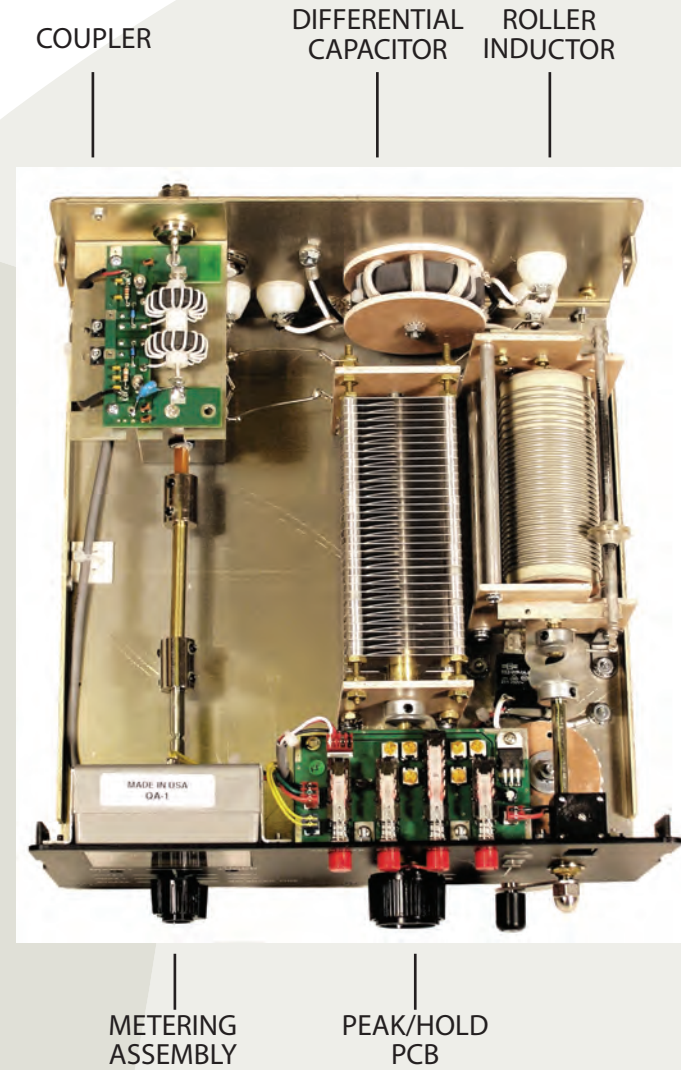
# AT-500 SCHEMATIC



# METER BOARD ADJUSTMENTS



# INSIDE VIEW



## OPERATING YOUR AT-500

### BEFORE OPERATING

1. To avoid possible damage to the AT-500 set INPUT, OUTPUT, INDUCTOR, and POWER RANGE switches as outlined in the chart below before applying transmitter power.
2. Begin tuning with your transmitter/amp feeding the tuner set at a low output power setting (50-100 Watts max).

WARNING: DO NOT OPERATE THE AT-500 WITH THE COVER OFF.

### TUNING

1. Select the band and frequency of desired operation.
2. Set TUNE and INDUCTOR controls to the suggested setting before applying transmitter power (see chart). Actual settings will vary from antenna to antenna.
3. Set your transmitter/amplifier 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 AT-500 is tuned.**

BAND	TUNE		INDUCTOR	
	SUGGESTED	ACTUAL	SUGGESTED	ACTUAL
160 M	52		68	
80 M	52		160	
40 M	52		240	
20 M	52		277	
17 M	52		284	
15 M	50		286	
12 M	50		282	
10 M	52		280	
6 M	85		281	

## OPERATING YOUR AT-500

### DO NOT EXCEED 500 WATTS AVERAGE

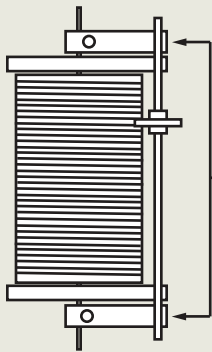
5. Set RANGE switch to 300 W (button out).
6. Set the DIRECT/TUNED mode switch to the TUNED position matching your antenna connection. To tune your antenna, the switch selection must be set to: COAX 1 TUNED, COAX 2 TUNED, or BALANCED LINE. Selecting COAX 1 DIRECT, COAX 2 DIRECT, or BYPASS bypasses the tuning circuitry and tuning is not possible.
7. Rotate the INPUT, ANTENNA, and INDUCTOR controls for maximum noise or signal as heard on your receiver. Refer to Preset Tuning Chart on lower left side of this page.
8. Key your transmitter and adjust the power level for a reading of 50-100 watts on the FORWARD scale. Adjust the INPUT, OUTPUT, 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 TUNING the input and antenna controls until the lowest SWR reading is obtained. The SWR should be 2:1 or lower.
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.

This procedure takes patience the first time. The input and antenna controls vary the capacitors and provide fine adjustments, while the roller inductor crank provides coarse adjustment.



## RESTORING THE INDUCTOR WHEEL

When approaching the end stops of the roller inductor (readings of Zero or 279) **SLOW DOWN**. Slamming the roller wheel into the mechanical end stops on either end of the roller inductor *will decrease the pressure of the wheel* against the wire wound on the ceramic form.



**To RESTORE wheel pressure on the inductor push down on the flat springs soldered to the wheel shaft located on each end of the shaft.**

## NOTES:

1. A SWR of 1:1 is best, but an SWR as high as 2:1 may be acceptable. Check your transmitter/amplifier 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:
  - highest FORWARD power reading
  - 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 turning procedure for each antenna.
5. Once every 4-6 months clean the roller coil with Deoxit D5 contact cleaner and a clean cotton cloth. Do not remove the conducting grease on the rod that guides the roller wheel. Do not transfer any of the conducting grease from the rod to the roller coil body, as this will contaminate the windings.