

Automatic Remote Controlled Antenna Tuner for Balanced Antennas Model AT-515



Antenna Tuner System AT-515 Description

This tuner is designed to match remotely, balanced HF antennas. This unit features automatic selection of tuner settings based upon transmitted frequency. Unique to this tuner, no special cabling or adapters are required. The operator simply transmits into the antenna and the tuner detects the transmitted frequency and selects the correct settings from memory. The Ham bands are divided into 85 operator programmable memory locations. It will handle 1500 watts of SSB or CW power, and it can be used in either automatic or manual mode.

The matching circuit consists of a remotely tuned balanced π circuit. The balun is placed at the input of the tuner. The Output capacitor is a stepper motor controlled High Voltage variable capacitor.

The Control Cabinet contains the tuning controls, memory location selection, Automatic or Manual switching and a display that indicates the memory location in use, the frequency range as well as the span, and the tuner settings.

Refer to the Tuner System Block Diagram in this document for system inter-connect information.

Technical Description

Controller Unit:

Antenna matches are stored into a bank of 85 memory locations. Each memory location is a fraction of an amateur band. Refer to the technical section for the fractional segments for each band. As shown in the picture below, the upper line of the LCD shows the actual memory location chosen (lower edge frequency 7090 kHz) with its span (30 kHz). The control settings for this frequency are shown in the lower line of the LCD. In the Automatic Mode the memory location and its stored settings is selected by the transmitted input frequency. The input frequency is obtained from an RF probe. The memory location contents can be erased by a push button on the back of the controller.

The controller contains 3 rotary encoders that control the tuner elements TRX, L, and ANT. TRX controls the Input Capacitance, L controls the Inductance and ANT the output capacitance values. The lower line on the display shows these values.

A manual selector switch is provided for memory selection in the Manual mode.



Front View of the Controller

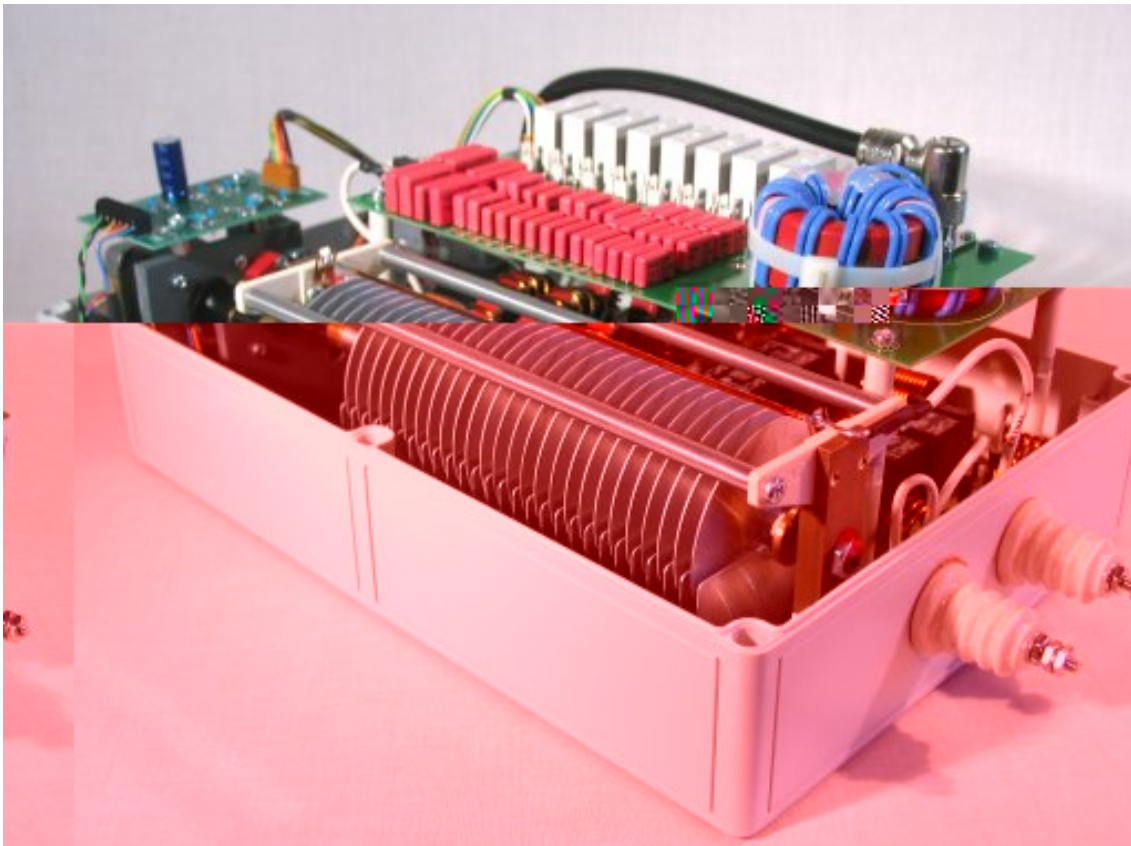
RF Unit:

The RF Unit is contained in a weather-protected cabinet (IP66) and is UV resistant. There are two feed-thru insulators to connect to the antenna elements. The coaxial cable and the control cable are connected via an N Type coax and a 24 pin control connector. There is no active circuitry inside the RF Unit. This is to insure reliable operation even under non-matched condition.

The LC network is known as Balanced PI. At the front end of the network there is a balun transformer that matches the unsymmetrical coax cable to the symmetrical tuner elements. This is the only place where the impedance of the system is purely resistive (when matched) and is the ideal place for the Balun. The regular station SWR meter (or the built-in meter in the TRX) is used as an indicator to match the antenna.

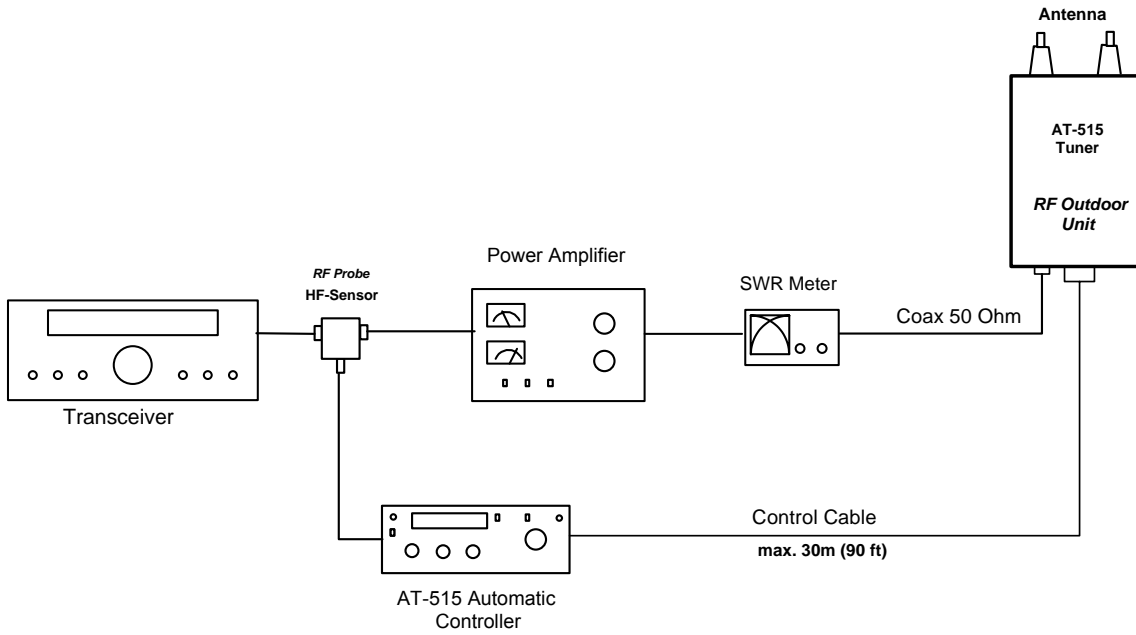
The capacitors at front end are switched in 256 steps of 17 pF per step. The capacitor at antenna side is a variable capacitor of 400 pF. The control of this capacitor is by a stepper motor with 0.9° per step. The inductive paths between the capacitors are switched in 31 steps from $0.2 \mu\text{H}$ to $35 \mu\text{H}$. Switching is done by power relays. With the circuit components used it is possible to match short antennas up to an unlimited antenna length within the RF range from 1.8 to 30 MHz.

A built-in lightning protection of 2500 Amps pulse current is provided.

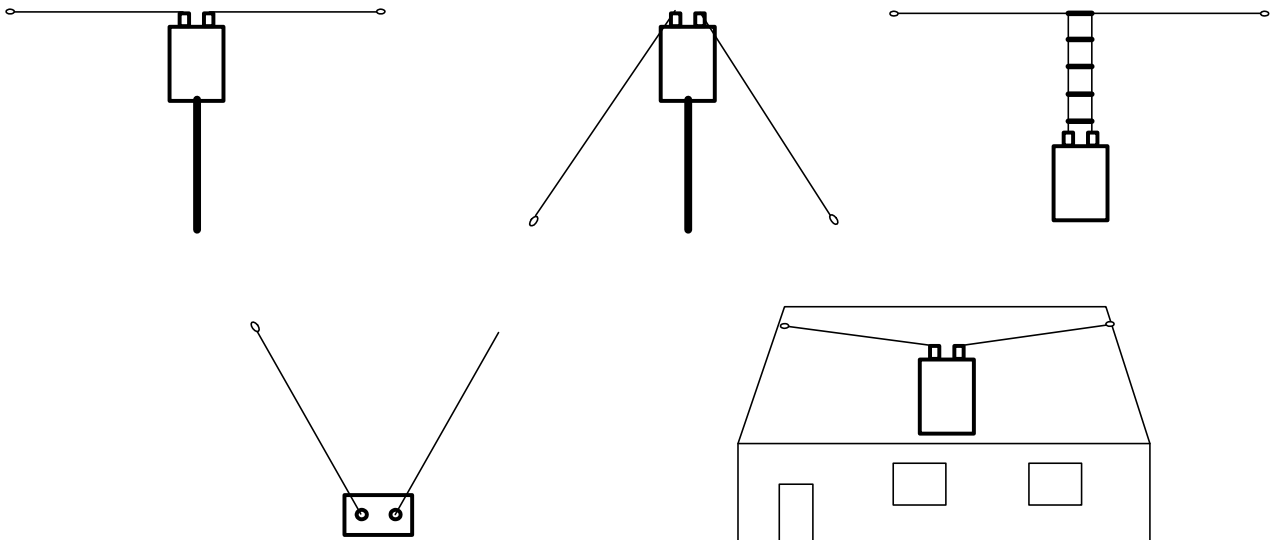


Interior view of the RF unit looking at the capacitor board, the inductor board is located below

Tuner System Block Diagram



Possible Tuner Applications



Technical Specifications

RF Unit

Frequency Range	Amateur Bands 1.8 to 30 MHz
Matching Circuit	balanced pi filter Input capacitance is 256 steps of 17 pF. ea. Inductance is 31 steps increasing from 0,2 µH to 35 µH Variable output capacitor 400 pF tuned by stepper motor with 200 steps of 0.9° ea.
Input	50 Ω, N-connector
RF Power	1500 Watts SSB/CW when tuned
Lightning Arrester	2-Electrode-Arrester 2.5 kAmps
Control Cable	24 x AWG22 (0,35mm ²), AMP plug
Outdoor Cabinet	Polycarbonate, water tight, UV resistant
Dimensions	L x W x H = 14"x 10" x 6.5" mm
Weight	6 kg (13 lbs)

Controller

	3 rotary encoders are used to adjust tuner elements
Tuning Memories	85, automatic or manual selectable
Automatic Mode	frequency dependent selection of the memory allocations. Frequency is sensed by RF probe
Displays	- LCD Display indicating single steps for input C, L and output C - Frequency cell - Service advices
Indicators	- Standby LED - LED while tuner is matching
Power	+15VDC, 1.5A and +36VDC, 0.5A
Metal Bench Cabinet	7.8"W X 3.2"H
Weight	1,8 kg (4 lbs)