

# AT-11MP

## Automatic Antenna Tuner

### Manual

Version 2.3G



## LDG Electronics

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**Introduction:** The AT-11MP is a full-featured auto or semi automatic antenna tuner designed for HF (1.8 to 30 MHz) transceivers using between 5 to 150 watts. The tuner uses a switched “L” configuration with 256 capacitor, 256 inductor and Hi/Lo-Z settings to provide over one hundred and thirty thousand tuning combinations. The tuning range is 0 to 3900 pf and 0 to 20 uH. The “L” network works great with just about any coax fed antenna (dipole, vertical, beam, etc). Users with long wires can install a balun between the tuner and the antenna. Tuning time is between 0.1 and 6.0 seconds with the average being about 2.5 seconds.

A cross reading dual needle meter will provide an indication of SWR while RF is present and DC power is on. Since the power is actually calculated in the processor, the meter does not function with the power off.



**Operation:** Connecting the unit to 12 Volts DC will initialize the microprocessor. The unit will draw a small amount of power even if the main power switch is moved to the standby position. This is to provide power to the memory circuits that will allow the last tuned position to be recalled. Placing the Power/Standby switch to the on (up) position will light the red LED and the meter backlighting. The unit is now ready for operation. Turning the unit off by the front panel Power switch places the tuner into Standby. During standby, the tuning section is in bypass. Turning the unit back on will set the tuning section to the settings acquired before being in Standby.

The Auto/Semi switch controls how the tuning process will be evoked. In Auto mode (Auto/Semi toggle switch in Auto), the tuner will seek a 1.5 match (or better) anytime the SWR rises above 3.0. In Semi mode (Auto/Semi toggle switch in Semi), the tuner will seek a match only when the Tune push button is pressed. Both modes require that more than 5 watts of RF power be present. If the Tune button is pressed and there is less than 5 watts of power, both meter needles will bounce once to indicate that there was not enough RF to tune properly.

The Capacitor and Inductor Up and Down switches are used for fine-tuning the inductors and capacitors and can be used in either, Auto or Semi mode. Pressing either of the Up switches will increment that tuning section until it reaches the maximum range. When the maximum value is reached, both meter needles will bounce. Conversely, pressing either of the Down switches will decrement that tuning section until it reaches the minimum range. When the minimum value is reached, both meter needles will bounce.

Pressing both Cap and Ind Down switches at the same time will reset the processor and place all relays in a bypass position.

Pressing the Tune push button and the Ind Up button will turn on the audio feedback feature (if installed). Pressing the Tune push button and the Ind Down button will turn off the audio. When an eight-ohm speaker is connected to J4, an LM386 amplifier is installed at U4 and audio is turned on, audio feedback will provide an indication of the SWR level. The feedback is a series of one to five beeps where one beep is an indication of SWR below 1.5, two indicates SWR between 1.5 and 2.0, three indicates SWR between 2.0 and 2.5, four indicates SWR between 2.5 and 3.0, and five indicates SWR above 3.



The back panel has SO-239s for connecting UHF type connectors to the antenna and transmitter. A coaxial power jack with center positive is used to provide DC power to the tuner. The jack mates with a 5.5 OD, 2.5 ID coaxial power plug. Between 11 and 15 volts DC can be used. The power supply must be able to provide up to 0.5 amps.

On the back panel is the Radio Interface. This works with radios that are compatible with the Icom AH-4, Alinco EDX-2 and Kenwood AT-50 tuners. When connected to a compatible radio, it enables the "Tune" button on the radio. Pressing the Tune button on the radio will cause the radio to temporarily switch modes to CW, transmit 10 watts and start the AT-11MP tuning cycle. Once the tuning cycle is complete the AT-11MP will signal the radio that the tuning is complete and the radio will return to the previous mode and power settings. Note that only control signals are used in the radio interface. Power and ground must still be provided through the AT-11 MP coaxial power jack. Also be sure to power the AT-11MP on first, then the radio to allow the radio to know that a remote tuner is present.

Optional cables and interfaces are available for the radios mentioned above. Interfaces for selected Yaesu radios area available through W4RT Electronics ([www.w4rt.com](http://www.w4rt.com)).

**Operational Notes:** Most tuning situations with the AT-11MP is very straightforward. With the tuner is the Semi mode, simply transmit a continuous carrier (AM mode is recommended) and momentarily press the tune button. The tuner will find the best match and stop tuning.

Note that even though the tuner can handle 150 watts, it must be tuned with reduced power. If your radio has an automatic "foldback" circuit, you will not have to lower the power manually. A foldback circuit will lower the power of the radio whenever the SWR is high. Typically, most solid states radios have foldback circuits. Tube radios and most Ten-Tec radios do not lower the power when the SWR is high. In these cases, the power should be lowered to approximately 25 watts before tuning is started.

In either mode (Auto or Semi), if power (either RF or +12) is removed after the tuning cycle starts, but before it finishes, the tuning will stop. The resultant tune will be undetermined; it may or may not be a match.

In some extreme tuning cases, the power needle may waver while transmitting a continuous carrier. This indicates that the tuner is near the tuning limits. You may be able to find a slightly better tune with the manual adjustment toggle switches. Sometimes reducing power will provide a better reading.

If reducing the RF power improves performance of the tuner, there may be RF getting into the tuner through the DC power or ground system. Placing RF chokes on the DC line or RF line may help reduce the RF interference.

In the presence of RF getting into the tuner, it is possible that the processor may lock up. In this case the red LED and meter light will be on, but there may be little or no control. By removing, then re-inserting the power plug on the rear panel, the processor will be reset and operation should be returned to normal. If the problem persists, takes corrective measures as mentioned above to remove the RF from getting into the tuner.

**Performance:** The actual performance from the small package will surprise you. It really tunes a lot of antennas to a lot of places! Here are some of the actual test results.

A 40-meter dipole (at 30 feet) would tune just about anywhere from 3.1 to 30 MHz! We had some problems at 19 and 28 MHz finding a 1.5 match. The AT-11MP usually found a 2.0, and then we had to use the manual switches to get below 1.5.

Next, an Antron-99 (at 40 feet) would again tune just about anywhere from 30 to 7 MHz. The auto mode worked great the whole time. We just dialed down the band and the AT-11MP would kick in whenever the SWR went over 3.0.

Then we tried out the unit on a 3-element tri-band (20,15,10) at 70 feet. It would tune any of the ham bands (including WARC) except 160 and 80. We had some problems finding a match around 28.200 MHz, but got around it by moving to 28.150, letting the AT-11MP find a match, then moving back to 28.200.

We've tried many other antennas with similar good results. There may be a place or two that your antenna (dipole, inverted-Vee, vertical, beam, etc.) won't tune. Also, the farther away from resonance you try to tune, the harder time the tuner will have. The AT-11MP will tune a 10 meter vertical to 80 meters, but your performance will not be that great (you can't get something for nothing).

For mobile operation, we find that a base or mid-loaded whip such as a Hamstick, Hamwhip, or Hustler Resonator the tuner will find a match for the band that the antenna is cut for, plus one band and minus one band. For example, a 20 meter antenna will usually tune 40, 20 and 15 meters (WARC bands included). A 102" CB whip will usually not tune anything except 10 and 15 meters.

For balanced lines and random wires, you may get better performance by using a 4 to 1 or 6 to 1 balun between the antenna and tuner. The optional RBA-1 4 to 1 balun is a good choice for an external balun to match balanced lines or random wires.

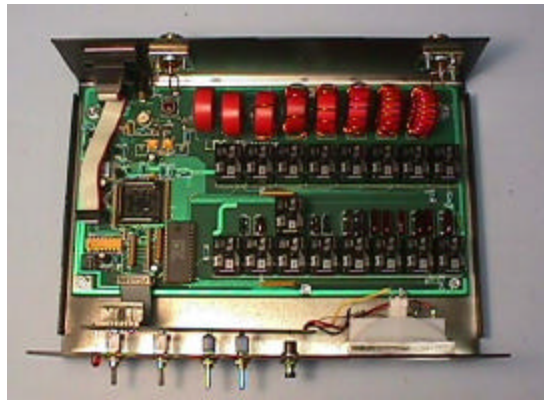
The SWR bandwidth (usable bandwidth of 1.5 SWR without retuning) averaged about 200 kHz. Not surprisingly, the bandwidth was smaller on the lower frequencies (about 75 kHz on 80 meters) and larger on higher frequencies (about 400 kHz on 10). Insertion loss was highest on 10 meters at about 0.1 db.

**Service:** If you have a problem with your LDG Product, please call or e-mail us and we will gladly try to resolve the problem remotely. If we can identify the suspect component, and you are able to install it, we will ship the component directly to you at no charge for warranty repairs, cost plus shipping for non-warranty repairs.

If return for repair is needed, wrap and package your unit to protect from damage. Include a note (or print our on-line return form) with your name, address, phone number, e-mail, and a brief description of the problem. Ship the unit to us prepaid and insured for the retail value. (LDG Electronics Inc. is not responsible for units lost or damaged in shipping).

For non-warranty repairs, the average repair cost is \$50.00. This covers most small parts. We will contact you with the cost for repairing your return. The customer is responsible for paying return shipping on non-warranty repairs. We will turn the unit around as quickly as we can. Repairs can take up to 6 weeks.

Future upgrades will be available for about \$10-20 with 68HC11 chip trade in. Upgrade information is usually available on our web site.



**Feedback:** We encourage everyone who uses the AT-11MP to drop us a note (card, letter or e-mail) to let us know how well it works for you. We're also always on the lookout for photographs of the AT-11MP in use. We frequently place pictures that we receive on our Web site ([www.ldgelectronics.com](http://www.ldgelectronics.com)).