mAT-125E

HF-SSB General Automatic Antenna Tuner

Instruction Manual Version V3.0

INTRODUCTION

mAT-125E is a universal automatic antenna tuner that can be used in most HF transceivers. It has a working frequency range of 1.6-54MHz and a maximum allowable RF power of 120 watts. It has built-in lithium batteries, does not need external power supply, and is very convenient to use, especially in outdoor portable applications. The mAT-125E does not need a control cable to connect the transceiver. It only needs an RF cable to connect the transceiver to work well.

It will tune dipoles, verticals, Yagis, or virtually any coax-fed antenna. It will match an amazing range of antennas and impedances, far greater than some other tuners you may have considered, including the built-in tuners on many radios.

The mAT-125E has 16,000 frequency memories. When tuning on or near a previously tuned frequency, the mAT-125E uses "Memory Tune" to recall the previous tuning parameters in a fraction of a second. If no memorized settings are available, the tuner runs a full tuning cycle, storing the parameters for memory recall on subsequent tuning cycles on that frequency. In this manner, the mAT-125E "learns" as it is used, adapting to the bands and frequencies as it goes. You can also start a tuning cycle manually whenever necessary. The tuner has four fine-tuning buttons. After automatic tuning, you can make more fine adjustments manually to get a lower SWR.

Two 18650 lithium batteries are installed in the interior of the mAT-125E, which provides power for the tuner. Because of the use of advanced magnetic retaining relays, the power consumption of mAT-125E is very small, the lithium battery can work for a long time after it is fully charged. It is very suitable for outdoor use. Special chargers are provided with tuners. You must use its own charger to charge the tuner. It is dangerous to charge with an incorrect charger.

NOTE: Before the first use or after the battery is replaced, the tuner must be charged by the charger to activate the internal protection circuit before it can be used normally.

SPECIFICATIONS

- 0.1 to 120 watts SSB and CW peak power, 30 watts on PSK and digital modes, and 100 watts on 6 meters.
- Latching relays for ultra-low power operation.
- 16,000 memories for instantaneous frequency and band changing.
- Tuning time: 0.1 to 5 seconds full tune, 0.1 seconds memory tune.
- 1.6 to 54.0 MHz coverage. Built-in frequency sensor.
- Tunes 5 to 1500 ohm loads.
- Includes a lithium battery charger.
- For dipoles, verticals, Vees, beams, whip, wire or any coax-fed antenna.
- Dimensions: 20cm x 13cm x 4cm (L x W x H).
- Weight: 0.8Kg.

AN IMPORTANT WORD ABOUT POWER LEVELS

The mAT-125E is rated at 120 watts maximum power input at most. Many ham transmitters and transceivers, and virtually all amplifiers, output well over 120 watts. Power levels that significantly exceed specifications will definitely damage or destroy your mAT-125E. If your tuner fails during overload, it could also damage your transmitter or transceiver. Be sure to observe the specified power limitations.

FRONT PANEL

On the front panel there are six pushbuttons and four LED indicator lights.

[TUNE]: Initiates a tuning cycle, Online/Bypass state switching, Multifunctional keys.

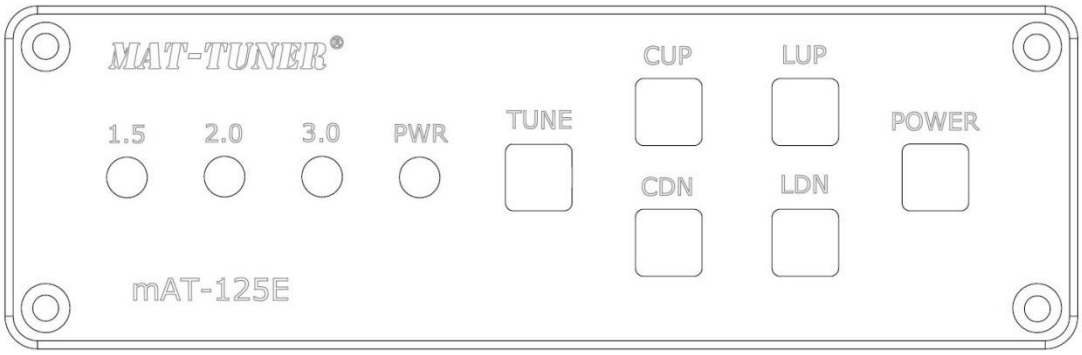
[CUP] / [CDN]: Manually increase/decrease capacitance.

[LUP] / [LDN]: Manually increase/decrease inductance.

[POWER]: Power key.

1.5, 2.0, and >3.0 LEDs: Indicate SWR.

PWR: Power light.



This picture is for reference only and may change later.

REAR PANEL

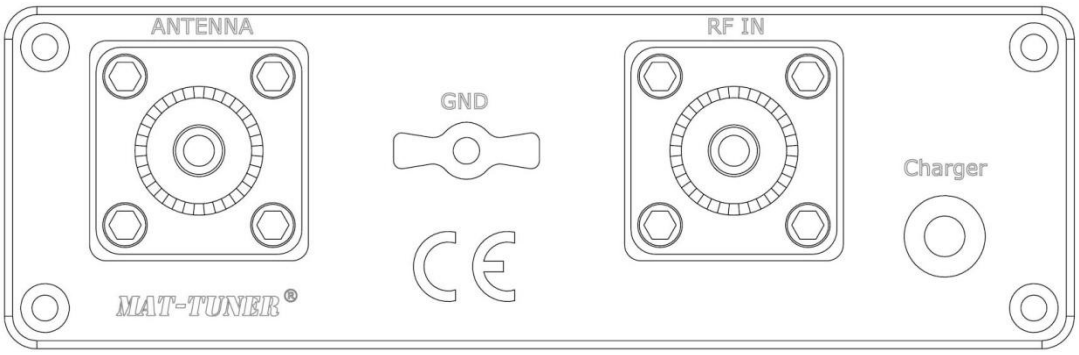
The rear panel of the mAT-125E features four connectors.

ANTENNA: SO-239 connector for coax cable from antenna.

RF IN: Connect a 50 ohm coax jumper cable from this standard SO-239 connector to the ANT jack on the back of the transceiver.

Charger: Charging socket.

GND: Connect to antenna system ground.



This picture is for reference only and may change later.

INSTALLATION

The mAT-125E tuner is designed for indoor operation only，it is not water resistant. If you use it outdoors (Field Day, for example), you must protect it from rain, dew and steam. Always turn your radio off before plugging or unplugging anything. The radio may be damaged if cables are connected or disconnected while the power is on.

IMPORTANT WARNING

When the tuner is working, there is a high voltage inside. In order to ensure personal safety, do not use it when the shell is opened!

Don't touch the antenna with your hand when the transceiver is transmitting, it will cause burns!

Transceivers can use mAT-125E

Most HF transceivers can use mAT-125E. They only need to satisfy two conditions: the RF power level can be adjusted below 20 W, and they have at least one of AM, FM, CW, FSK, RTTY modes to output constant carrier.

It should be noted that in the tuning process, a larger VSWR is detected in the transceiver, because the output power of the transceiver is very small, this high VSWR will not damage the transceiver. But some transceivers in Yaesu are very sensitive to this high VSWR, and they may turn off the transmitting carrier, which will cause the tuning to stop, you can't get a good SWR. If you happen to use such a transceiver, we recommend that you choose another tuner, mAT-30, which has a specially designed circuit and will not stop the tuning.

Installation

1. Connect the HF/50 MHz antenna jack on the transceiver to the “RF IN” jack on the back of the mAT-125E, using a 50 ohm coax cable rated 120 watts or greater.

2. Connect the antenna feedline coax to the “ANTENNA” jack on the rear of the mAT-125E.

4. Grounding the mAT-125E tuner will enhance its performance and safety. We recommends that you connect your tuner to a suitable ground; a common ground rod connected to buried radials is preferred, but a single ground rod, a cold water pipe, or the screw that holds the cover on an AC outlet can provide a serviceable ground. We strongly recommendsthe use of a properly installed, high quality lightning arrestor on all antenna cables.

OPERATION

As with other general tuners, a constant RF signal of 1-20 watts power level is needed to be input to the tuner during the tuning cycle, this signal should be CW, FM, FSK, or RTTY, it can’t be SSB. The power level of the input RF signal must not be greater than 20 watts, otherwise it will shorten the life of the tune, and even the tuner will be damaged. The mAT-125E have two modes of operation: automatic and semi-automatic, for better operation, you need to know more about the differences between the two models.

The mAT-125E have two modes of operation: automatic and semi-automatic, Users can easily switch between the two modes of work by using multi-functional combination keys. For better operation, you need to know more about the differences between the two models.

Automatic Mode: When the RF signal is input into the mAT-125E, the tuner verifies that the power at its input (FORWARD) is within the predefined range (1-20W). Power above this range can damage the relays during the Hot Switching, while power below the predefined range can cause inaccurate tuning. If the tune power is within the specified range, the tuner captures a 20ms sample of the signal. The sample signal frequency is divided by 128 and measured by a counter. The tuner reads the tuning data corresponding to the measured frequency from its internal memory (such data exists if tuning was previously performed for this frequency). The tuner sets the tuning network according to that data and measures the resulting VSWR, and display the current VSWR by the LED of the front panel. Even if SWR is higher than 2, the tuning cycle will not be activated unless the TUNE key is pressed and released.

Semi-automatic: When the RF signal is input into the mAT-125E, the tuner only measures the current VSWR and displays the results through the LED on the front panel, a tuning cycle is not initiated until the [TUNE] key is pressed. When the [TUNE] key is pressed and released, similar to the automatic mode, the tuner measures the frequency of the input signal, reads the configuration data from the corresponding memory, and configures the LC tuning network. After completing the above operation, the tuner will measure the current VSWR. If VSWR<1.5,the tuning is completed. If it is higher, a new tuning cycle is started. When the tuner completes the tuning process it stores the tuning network data in memory in a location corresponding to the current frequency.

Manual:

Regardless of whether the tuner is in automatic or semi-automatic mode, you can fine tune the current LC tuning network by pressing the [CUP], [CDN], [LUP], and [LDN] key. After the manual seat adjustment is completed, you can save the current configuration data in the corresponding memory by pressing the [TUNE]+[LUP] combination key.

Tuning

The steps to start tuning are as follows:

- Set the radio to the FM, FSK or RTTY mode, in order to make the transceiver output a stable carrier signal
- Make the power reduced to 20 watts or less.
- Press and hold the transceiver's [PTT] button, then press the [TUNE] button once on the front panel of mAT-125E to start the automatic tuning.
- Return to the previous mode and power level after tuning, the tuning process completion.
- After tuning, the front panel's three lights are used to display the current VSWR.

Online/Bypass state switching

There are two ways to switch the state of the tuner. Shortly press the [TUNE] key and the [TUNE] +[CDN] combination key. If the 1.5 indicator flashes once, it means that the current state is online, and if the 3.0 indicator flashes once, it means that the current state is offline.

Combination key

A combination key is formed by [TUNE] and other keys([CDN], [LUP], [LDN]) to perform part of the function operation. The combination key means that the [TUNE] key is first pressed and held, the other key is pressed, and then released together.

[TUNE]+[CDN]: Online/Bypass switching. When the 1.5 light flashes, it indicates that the

current status is online. When the 3.0 light is flashing, it indicates that it is bypass now.

[TUNE]+[LDN]: Automatic/semi-automatic mode switching. When the 1.5 light flashes, it indicates that the current mode is automatic. When the 3.0 light is flashing, it indicates that it is semi-automatic now.

[TUNE]+[LUP]: The matching data of the tuning network is saved to the corresponding memory.

AUTOMATIC SHUTDOWN

The tuner has automatic shutdown function for saving electric energy, when the function is activated, the tuner will turn off automatically if no key is pressed in about 3 minutes. Because the tuner uses magnetic latching relay, the current tuning state will not be affected after the tuner is turned off.

In shutdown state, press on the [TUNE] key, and then press [POWER] key to boot, you can open or close the function, When the 1.5 light blinks once, it indicates that this function is activated. When the 3.0 light blinks once, this function is turned off.

THE FLASHING OF THE INDICATOR LIGHT WHEN STARTING UP

When the mAT-125E is powered on, the LED on the front panel flashes to indicate the settings for the current tune.

1.5: If flashing once, indicating that the current is semi-automatic mode. If flashing two times, indicating that the current mode is automatic.

2.0: If flashing once, indicating automatic shutdown function closed. If not flashing, indicating automatic shutdown function open.

BATTERY REPLACEMENT

The tuner uses two 18650 lithium batteries with a recommended capacity of 2000-2500mAH. Batteries can be unprotected because the tuner already contains a battery protection circuit.

When the tuner is first used or the battery is replaced, it must be charged to activate the internal protection circuit before it can work properly.

SAFETY PRECAUTIONS

Never operate the tuner with its cover removed. Contact with the components inside the tuner while transmitting will result in painful RF burns.

Locate the tuner so that the rear terminals are not accessible during operation. The single wire connection may have high voltage while transmitting.

Disconnect all antennas from the tuner during lightning storms.

TRANSPORT

Because there are two lithium batteries installed inside the tuner, Please comply with local laws when transporting. It could be banned from air transportation.

TECHNICAL SUPPORT

Visit the Support Center at: http://www.mat-tuner.com/en/ or http://www.mat-electronics.com/en/

The website provides links to product manuals, just in case you lose this one! When you are thinking about the purchase of other **MAT-TUNER** products our website also has complete product specifications and photographs you can use to help make your purchase decision. Don't forget the links to all of the quality **MAT-TUNER** Dealers also ready to help you make that purchase decision.

PRODUCT FEEDBACK

We encourage product feedback! Tell us what you really think of your **MAT-TUNER** product. In an email tell us how you used the product and how well it worked in your application. We like to share your comments with our staff, our dealers, and even other customers at the **MAT-TUNER** website.

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