mAT-180H

Automatic Tuner For ICOM&KENWOOD Transceivers

Instruction Manual Version V3.0

INTRODUCTION

The mAT-180H is an automatic antenna tuner specially designed for modern ICOM and KENWOOD HF transceivers. It has two control cables to choose from: mAT-CI and mAT-CK. They are suitable for ICOM and KENWOOD transceivers respectively. With matching control cables, tuners can be used for corresponding transceivers. mAT-180H standard accessories only contain ICOM control cable mAT-CI, if you need mAT-CK, please buy more.

When mAT-180H is used in ICOM transceiver through mAT-CI control cable, it is fully compatible with the original AH-3 and AH-4 automatic tuners of ICOM. Transceivers that can use both ICOM tuners can also use mAT-180H, which includes IC-706, 703, 718, 7000, 7100, 7200, 7300, 7410, 746, 756, 7600 series transceivers.

When the tuner is used in KENWOOD transceiver through mAT-CK control cable, it is fully compatible with KENWOOD original tuners, such AT-300. KENWOOD transceivers that can use mAT-180H are TRC-80, TK-80, TS-2000, 50, 450, 480SAT (excluding HX version), 570, 590, 850, 870, 990, etc. Other types of transceivers can use mAT-180H as long as they support KENWOOD AT-300 tuners. KENWOOD TS-430, TS-440 are too old to use this tuner.

In addition to controlling the mAT-180H tuning operation, the transceiver also supplies power to the tuner through the control cable. Tuners no longer need extra power. Like the original tuner, the operation of mAT-180H is very simple and convenient. After necessary setting the menu of the transceiver, the tuning operation can be completed by pressing the tuning button on the front panel of the transceiver. Even most transceivers can start tuner directly without setting any menu.

The mAT-180H can work within the range of 1.8MHz to 54MHz, at power levels up to 120 watts. 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-180H has 16,000 frequency memories. When tuning on or near a previously tuned frequency, the mAT-180H 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-180H “learns” as it is used, adapting to the bands and frequencies as it goes. You can also start a tuning cycle manually whenever necessary.

SPECIFICATIONS

- 0.1 to 120 watts SSB and CW peak power, 30 watts on PSK and digital modes, and 100 watts on 6 meters.
- 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.
- 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-180H 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-180H. 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.

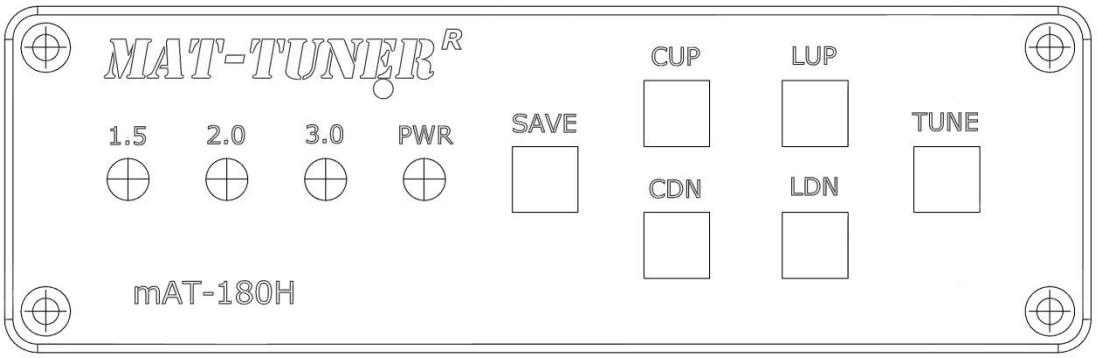
[SAVE]: Save current configuration to memory.

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

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

[TUNE]: Initiates a tuning cycle.

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



REAR PANEL

The rear panel of the mAT-180H features five connectors.

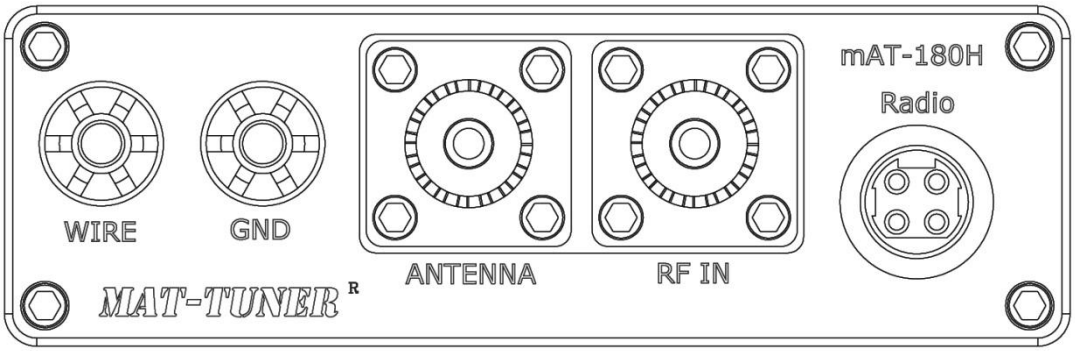
ANTENNA: SO-239 connector for coax cable from antenna. **When using the ANTENNA connector, there should be no wire attached to the WIRE binding post.**

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.

Radio: This 4-pin mini-DIN connector is connected to the tuner control socket of the transceiver through a matching control cable. DC power is also supplied over this jack.

WIRE: Binding post for connecting single wire antennas. **When using the WIRE binding post, there should be no coax cable connected to the Antenna connector.**

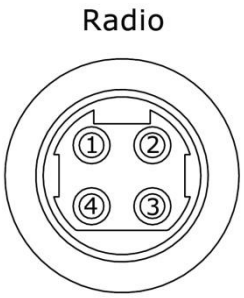
GND: Connect to antenna system ground.



CONTROL CABLE

Control cables are used to transmit control commands between transceivers and tuners. Their standard length is 50 centimeters. If it is desired that the mAT-180H is positioned farther from the transceiver than this cable length allows, a custom cable will need to be constructed. This can be accomplished in two ways: Cut the supplied cable and solder a jumper wire between all the connections, or purchase new connectors and cable to construct a custom-length interface cable from scratch.

The socket used to connect the control cable on the tuner is shown below, it is on the rear panel.



1 GND
2 KEY / TS
3 +13.8V
4 START / TT

When you make your own customized length control cable, make sure the connection is correct. The wrong connection will cause the tuner not to work properly, or even damage. Too long control cable may cause RF interference to tuner and affect its work. When the length requirement is satisfied, the length of control cable should be shortened as far as possible, and appropriate anti-interference measures should be taken.

INSTALLATION

The mAT-180H 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!

Compatible Transceivers

Any ICOM 100 watt transceiver that supports the AH-3 or AH-4 ICOM tuners. This includes: IC-706, 703, 718, 7000, 7100, 7200, 7300, 7410, 746, 756, 7600 series transceivers.

Any KENWOOD 100 watt transceiver that supports the AT-300 KENWOOD tuners. This includes:

TRC-80, TK-80, TS-2000, 50, 450, 480SAT (excluding HX version), 570, 590, 850, 870, 990, etc. KENWOOD TS-430, TS-440 are too old to use this tuner.

Other models of transceivers have not been tested yet. We will update this list after testing.

Installation

1. Connect the HF/50 MHz antenna jack on the transceiver to the “RF IN” jack on the back of the mAT-180H, using a 50 ohm coax cable rated 120 watts or greater.

Special Notice: For some transceivers with built-in tuners, such as KENWOOD TS-480, TS-2000 and TS-590(S/SG), the external tuner must be connected to the ANT1. These transceivers will not initiate an external tuning cycle if ANT 2 is selected. Because their built-in tuners have been fixed to ANT2 and cannot be changed. When you don't know how a transceiver connects to an external tuner, please read the transceiver's user manual carefully.

2. Connect the supplied transceiver control cable to the mini-DIN 4-pin jack on the rear of the mAT-180H, marked “RADIO”. Connect the other end of this cable to the “TUNER” jack on the rear of the transceiver. For ICOM transceivers, the control cable is mAT-CI, it has a four-pin plug for connecting the transceiver. For KENWOOD transceivers, the control cable is mAT-CK, it has a six-pin plug for connecting the transceiver.

Tips: For some ICOM transceivers, such as IC-M710, their TUNER sockets are not standard 4-pin sockets. After retrofitting their "TUNER" sockets, mAT-180H can still be used, just to ensure that each line in the socket is connected correctly. For the definition of each line in their sockets, please read the user manual of the transceiver. The same is true for KENWOOD transceivers.

3. Connect the antenna feedline coax to the “ANTENNA” jack on the rear of the mAT-180H.

4. Grounding the mAT-180H 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.

TRANSCEIVERS SETTING

Most transceivers can directly use external tuners without any menu settings, but some need to be set. If you are not sure whether your transceiver needs to set up a menu, read the section on external tuners in its user manual. For ICOM transceiver, reference can be made to the setting of AH-4 tuner, and for KENWOOD transceiver, reference can be made to the setting of AT-300 tuner. Following is an example of ICOM IC-718 to illustrate the menu settings:

IC-718：

- Hold down [PWR] for 1 second to turn power OFF.
- While pushing and holding [SET], push [PWR] to turn ON the power.
- Push [UP] or [DN] one or more times to select [TUNER].
- Rotate the main dial to select “4.” AH-4TUNER is selected.
- Hold down [PWR] for 1 second to turn power OFF.
- Push [PWR] to turn ON the power.

OPERATION FROM THE TRANSCEIVER

The operation of the mAT-180H tuner is very simple. It only needs a button on the front panel of the transceiver. On an ICOM transceiver, this button may be [TUNER](most models), [TUNER/CALL] (IC-7100, 706) or [TUNE] (IC-M710). On KENWOOD transceivers, it is usually marked as [AT]. In the following description, we call it [TUNER].

Start a tuning process

The two brands of transceivers operate the same way, press and hold the [TUNER] button for more than 2 seconds, and the transceiver will automatically start a tuning process. The following operations are performed automatically by transceiver, without manual operation.

1. The radio will switch to CW mode, reduce power, and begin to transmit a carrier.
2. The tuner will begin a memory tuning cycle，If an acceptable SWR match is found in the memory tuning cycle, the tuning cycle ends. Otherwise, the mAT-180H automatically begins a full tuning cycle in an attempt to find a good match.
3. At the end of the tuning cycle, if the SWR is less than 2:1, the match data is stored in a memory associated with the selected frequency. If SWR is greater than 2:1, the current matching data will not be stored.
4. The transceiver restores the current mode and power level to the previous settings, and the tuning ends.
5. After tuning is completed, when the tuner is working normally, the four indicator lights on the front panel are used to display the current SWR.

Manual fine-tuning

At any time, users can fine-tune the current SWR through the four buttons ([CUP],[CDN], [LUP],[LDN]) on the front panel of the tuner to get a lower SWR. After the manual fine-tuning, press the SAVE button to manually save the current matching data in the memory corresponding to the current frequency.

Online/Bypass

For some transceivers, the ONLINE/BYPASS state of the tuner can be switched by pressing the [TUNER] button. If the tuner is online, the "TUNER" tag is displayed on the display screen of the transceiver.

OPERATION FROM TUNER

Users can also start tuning through the TUNE button on the front panel of the mAT-180H. The method is:

- 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 10 watts or less.
- Press and hold the transceiver’s [PTT] button, then press the [TUNE] button once on the front panel of mAT-180H to start the automatic tuning.
- Return to the previous mode and power level after tuning, the tuning process completion.

LEDS

There are four indicator LEDs on the front panel of mAT-180H. The PWR LED is the power light,

it is lit,indicating that the tuner has been turned on.

The 1.5, 2.0, 3.0 light, means the current SWR; The 1.5 light means that the current SWR is less than or equal to 1.5; The 2.0 light means that the current SWR is from 1.5 to 3.0;The 3.0 light means the SWR is higher than 3.0.

TECHNICAL SUPPORT

Visit the Support Center at: http://www.mat-tuner.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.

Welcome to http://www.mat-tuner.com/ for more information

MAT-TUNER

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