

mAT-180H

Automatic Tuner For Icom & Kenwood Transceivers

Instruction Manual Version V3.0

INTRODUCTION

The mAT-180H is an automatic antenna tuner designed for modern Icom and Kenwood HF transceivers. It has two control cables, mAT-CI (Icom) and mAT-CK (Kenwood).

The mAT-180H is supplied standard with the mAT-CI (Icom) cable. The mAT-CK (Kenwood) cable is sold as an accessory.

When mAT-180H is used with Icom transceivers via the supplied mAT-CI control cable, it is fully compatible with the original AH-3 and AH-4 automatic tuner protocol. Transceivers that can use either AH-3 or AH-4 tuners include IC-706, 703, 718, 7000, 7100, 7200, 7300, 7410, 746, 756, 7600, 7610 series transceivers.

When the tuner is used with Kenwood transceivers via the mAT-CK control cable, it is compatible with the Kenwood AT-300 tuner protocol. Kenwood transceivers that can use mAT-180H are TS-2000, 50, 450, 480SAT (excluding HX version), 570, 590, 850, 870, 990, etc.

In addition to controlling the mAT-180H tuning operation, the transceiver also supplies power to the tuner through the control cable. Tuners do not need external power. Like the original tuner the operation of mAT-180H is simple. After setting transceiver menu, tuning operation can be completed by pressing the tuning button on the front panel of the transceiver.

The mAT-180H has a matching range of 1.8-54 MHz, at power levels up to 120 watts. It will tune dipoles, verticals, Yagis, or virtually any coax-fed antenna. Impedance matching range 5-1500 ohms, in excess of the internal automatic antenna tuner or other external automatic antenna tuners available.

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.
- 1.8-54.0 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: 0.8 kg.

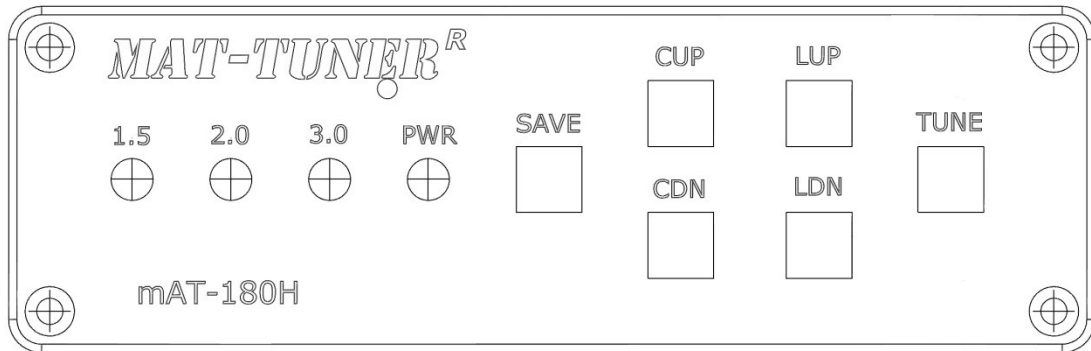
AN IMPORTANT WORD ABOUT POWER LEVELS

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.

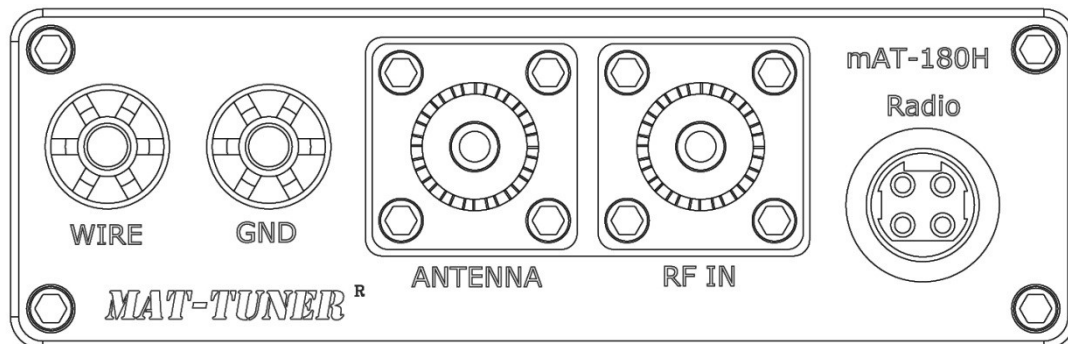
- [SAVE]: Save current configuration to memory.
- [CUP] / [CDN]: Manually increase/decrease capacitance.
- [LUP] / [LDN]: Manually increase/decrease inductance.
- [TUNE]: Initiates a tuning cycle.
- 1.5, 2.0, and >3.0 LEDs: Indicate SWR.



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.

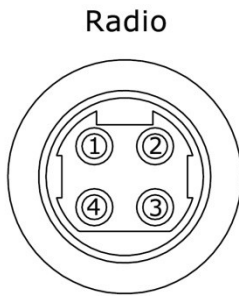


CONTROL CABLE

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

When you make your own customized length control cable, make sure connections are correct.



Radio

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

The wrong connection will cause the tuner not to work properly, or even be damaged. Long control cables may cause RF interference to tuner. 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. If you use it outdoors (Field Day, for example), you must protect it from rain or moisture. 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.

COMPATIBLE TRANSCEIVERS

Any Icom 100 watt transceiver that supports the AH-3 or AH-4 Icom tuner protocol can be connected. . This includes IC-706, 703, 718, 7000, 7100, 7200, 7300, 7410, 746, 756, 7600, 7610 series transceivers.

Any Kenwood 100 watt transceiver that supports the AT-300 Kenwood tuner protocol. This includes TS-2000, 50, 450, 480SAT (excluding HX version), 570, 590, 850, 870, 990, etc

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.
For some transceivers with built-in tuners, such as Kenwood TS-2000 the external tuner must be connected to the ANT1 jack. Different transceivers handle bypass of internal tuners differently and vary for which antenna output jack to use. Consult transceiver operation manual for information.
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 supplied control cable is mAT-CI, with a four-pin plug for connecting the transceiver. For Kenwood, the optional control cable mAT-CK, uses a six-pin plug for connecting the transceiver.
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, or a cold water pipe should suffice. We strongly recommend the use of a properly installed, high quality lightning arrestor on all antenna cables.

TRANSCEIVER SETTINGS

Some transceivers can directly use external tuners without any menu set up. If you are not sure whether your transceiver needs a menu setup to find an external antenna tuner, read the section on external tuners in the operation manual.

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 simple. One button on the front panel of the transceiver. For 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].

STARTING THE 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 tuning. The following operations are performed automatically by the 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

Users can fine-tune the current SWR through the four buttons ([CUP],[CDN], [LUP],[LDN]) on the front panel of the tuner to achieve lower SWR. After 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.

- 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.

INDICATOR LEDS

There are four indicator LEDs on the front panel of mAT-180H. The PWR LED is the power light. When lit, it indicates that the tuner has been turned on. The 1.5, 2.0, 3.0 lights are used for 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/>.

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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BG3MZU 2019.03.02