

mAT-1500R Antenna Tuner Operating Manual

Universal Remote High-Power Antenna Tuner

Thank you for choosing this **MAT-TUNER** product.

Please read this manual carefully before using the product.

■ Important Notices

- ◇ Do not touch the antenna, terminals, or ground radials while transmitting. Doing so may cause electric shock or RF burns.
- ◇ Turn off the transceiver and tuner before connecting or disconnecting any cables. Connecting or disconnecting cables while powered may cause permanent equipment damage.
- ◇ Never connect antennas to both the **WIRE** and **COAX** terminals at the same time. Use only one antenna terminal.
- ◇ If a high-power linear amplifier is used, set it to **STBY** (standby) before tuning. Make sure the amplifier does not transmit high-power RF during tuning.
- ◇ This product has limited weather resistance; it is not fully sealed and must not be immersed in water. Install it in the orientation specified in this manual and waterproof all outdoor connectors.

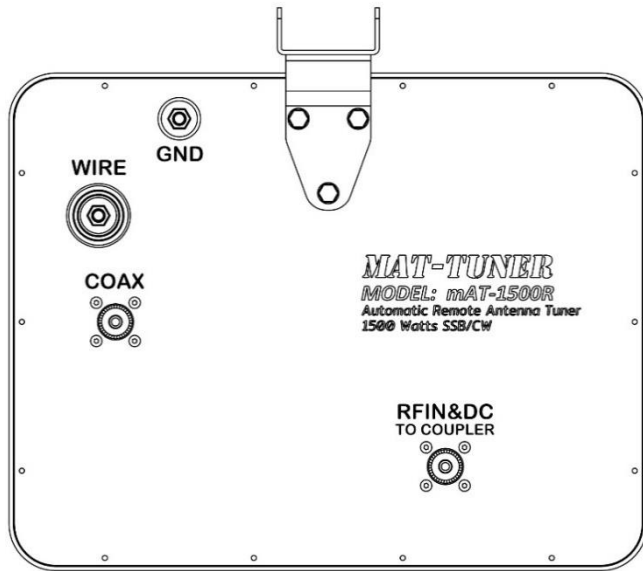
■ Introduction



- ◇ The mAT-1500R is a universal high-power remote automatic antenna tuner for the 1.8–30 MHz HF amateur radio bands. It is rated for up to 1500 W PEP (SSB). Install it near the antenna feed point to reduce additional losses caused by high SWR on the feed line.
- ◇ This universal tuner can be used with transceivers and linear amplifiers from any manufacturer. RF, DC power, and control signals are carried over the same coaxial cable, so no separate control cable or remote power cable is required.

- ◇ The mAT-1500R provides two antenna connections: an **SO-239 coaxial connector (COAX)** and a **WIRE** terminal for a single-wire antenna. These are alternatives; connect either a coax-fed antenna or a directly fed wire antenna.
- ◇ The package includes an **mAT-4117 Bias-T**, installed on the indoor transceiver side, to combine DC power and RF signals onto one coaxial cable.

■ Tuner Terminals



RFIN&DC: Connect to the Bias-T connector marked RF&DC using 50-ohm coaxial cable. RF and DC power enter the tuner through this connector.

COAX: SO-239 connector for a coax-fed antenna.

WIRE: Terminal for a wire antenna.

GND: Ground terminal.

■ System Components

The system consists of two components: the mAT-1500R tuner and the mAT-4117 Bias-T.

Power and control are supplied through the coaxial feed line, so only one coaxial cable is needed between the Bias-T and the tuner. At the transceiver end, the mAT-4117 combines RF and DC power and sends them to the tuner over the coaxial cable.

The mAT-4117 is included with the tuner; no separate purchase is required.

■ Mounting the Tuner

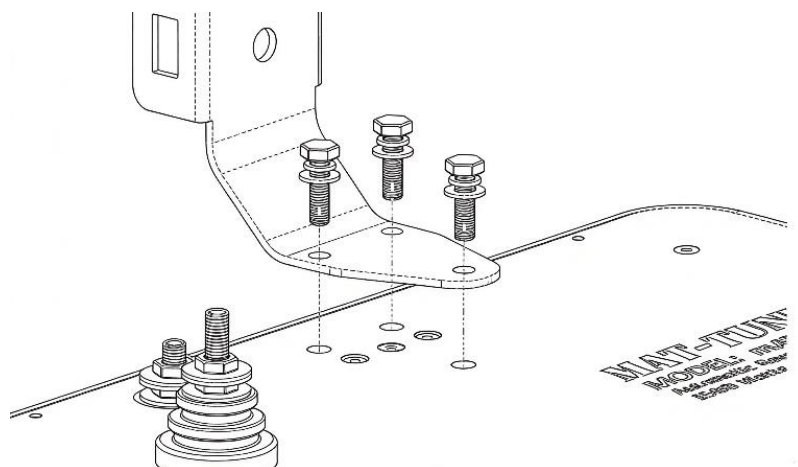
Important: To prevent water ingress, install the tuner with its black terminal panel facing downward and parallel to the ground.

Attaching the Mounting Bracket

Use the three sets of M5 combination bolts supplied with the tuner to attach the L-shaped stainless-steel bracket to the tuner's terminal panel, as shown in the illustrations.

Wall Mounting

Use two M8 expansion bolts (not supplied) to mount the L-shaped stainless-steel bracket vertically on the wall. The tuner's black terminal panel must face downward and remain parallel to the ground.



Mast Mounting

Pass the two supplied stainless-steel clamps through the square holes in the L-shaped bracket and secure the tuner to the mast. The black terminal panel must face downward and remain parallel to the ground. The mast diameter must not exceed 40 mm.

■ Installing a Wire Antenna

Connect the wire antenna to the terminal marked WIRE on the tuner's terminal panel.

- ◇ First, secure the antenna using ceramic or resin insulators. Then connect it to the WIRE terminal and tighten the screw.
- ◇ Do not connect an unsecured wire antenna directly to the tuner terminal. Tension from the antenna wire may damage the tuner.

Antenna Length

- ◇ An antenna length close to one-quarter of the operating wavelength will usually provide good matching results.
- ◇ A longer antenna is recommended. For similar HF wire antennas under otherwise comparable conditions, an antenna that is too short generally reduces radiation efficiency and may make tuning more difficult.
- ◇ Avoid antenna lengths close to integer multiples of one-half wavelength. In some cases, these lengths can produce high feed-point impedance and make tuning difficult.
- ◇ For a single-wire antenna, a length of approximately 12–14 m may be a useful starting point. With a suitable ground radial system or RF return path, it can cover multiple frequencies from the 80 m through 10 m bands.
- ◇ If a satisfactory SWR cannot be obtained after repeated tuning attempts, adjust the antenna length and tune again.

Grounding When Using a Wire Antenna

An unbalanced antenna, such as a single-wire antenna, needs a suitable RF return path. Reducing RF ground resistance can significantly improve radiation efficiency, especially when the antenna impedance is low. For better system performance and tuning stability, connect the tuner's GND terminal to a suitable earth ground, ground radial system, radials, or other appropriate RF return conductor.

■ Installing a Coax-Fed Antenna

Connect the coaxial feed line from the antenna to the SO-239 connector marked COAX on the tuner's terminal panel. Weatherproof the connection.

Grounding When Using a Coax-Fed Antenna

A coax-fed antenna usually does not require a dedicated RF ground radial system. If practical, connect the tuner's GND terminal to a suitable equipment grounding system.

Important: Connect either a wire antenna or a coax-fed antenna. Do not connect both at the same time.

■ mAT-4117 Bias-T

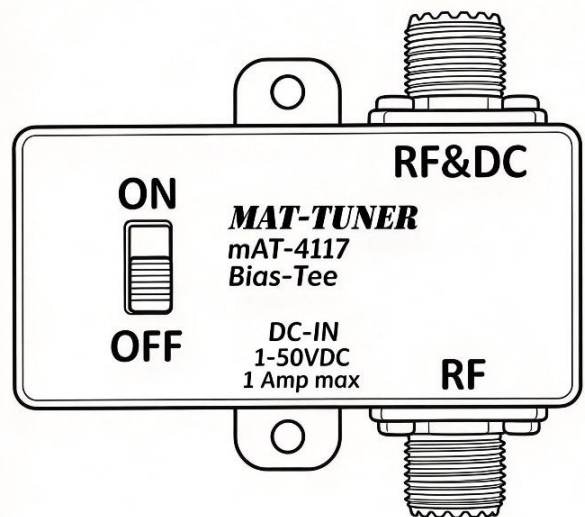
The mAT-4117 is designed for remote tuners that receive power and control over coax. It combines the input RF signal and DC power and sends both to the remote tuner over one coaxial cable.

The maximum RF power rating is 1500 W. The permitted DC input range is 1–50 V, with a maximum current of 1 A. For the mAT-1500R, the supply voltage must be 11–15 V DC; 12–14 V DC is recommended. Never exceed 15 V.

The Bias-T supports RF frequencies from 1.8 to 30 MHz. Therefore, the mAT-1500R operates from 1.8 to 30 MHz and cannot be used on the 6 m band.

If a power/SWR meter is required, connect it between the transceiver and the Bias-T's **RF IN** port, and make sure its power rating is adequate.

Important: Because the coaxial cable between the Bias-T and tuner carries both RF and DC, do not insert equipment that does not support DC pass-through into this cable path. Doing so may cause a DC short circuit or equipment damage.



■ RF and DC Power Connections

- ◇ Connect the transceiver or linear amplifier ANT port to the Bias-T port marked “**RF**” .
- ◇ Connect the Bias-T port marked “**RF&DC**” to the tuner port marked “**RFIN&DC**” .
- ◇ Connect the Bias-T “**DC-IN**” port to an 11–15 V DC power supply. A 12–14 V supply capable of at least 1 A is recommended.

■ Transceiver Requirements

The mAT-1500R is a universal tuner and does not use proprietary external-tuner control protocols from manufacturers such as ICOM or YAESU. It can be used with almost any HF transceiver that meets the following requirements:

- ◇ The transmit power can be set to **50 W** or less.
- ◇ The transceiver supports at least one mode that can produce a steady carrier, such as **CW, AM, FM, FSK, or RTTY**. In CW mode, key operation may be required.

■ Operating the Tuner

Starting a Tuning Cycle

1. Turn off the power switch on the Bias-T.
2. Set the transceiver transmit power to 5–10 W, and never exceed 50 W.
3. If a linear amplifier is used, set it to **STBY** (standby).
4. Select **CW, AM, FM, FSK, or RTTY** so the transceiver can produce a steady carrier.
5. Press the transceiver **PTT** to transmit a steady carrier.
6. Turn on the Bias-T. The tuner will begin tuning automatically.
7. Wait until the SWR reading on the transceiver or external SWR meter stabilizes.
8. If the resulting SWR is acceptable, restore the transceiver power and mode to the desired settings and set the amplifier to **OPER** (or **OPR**).
9. If the SWR is not acceptable, repeat the procedure from Step 1.

Important: Before starting tuning, make sure your linear amplifier is in STBY mode. Otherwise, excessive RF power may damage the tuner.

Bypass Mode

With the transceiver in receive mode, turn off the Bias-T and wait 3 seconds. Turn it on again and wait

another 3 seconds. The tuner will enter bypass mode, in which the tuner is inactive and the RF input is connected directly to the output.

Precautions

- ◇ If a linear amplifier is used, always make sure it is in **STBY** (standby) before starting a tuning cycle.
- ◇ During tuning, the transceiver RF output must not exceed **50 W**. Excessive RF power can greatly shorten the tuner's service life and may damage the transceiver. The tuner has protection that stops tuning if the input power is too high. Even with this protection, high-power tuning is strongly discouraged.
- ◇ During tuning, the transceiver may briefly stop RF output and then transmit again because it detects a high SWR. This does not affect tuning. However, some older transceivers may have malfunctioning power control and could output excessive RF power during tuning, causing tuning failure.
- ◇ Tuning with less than **5 W** will not damage the tuner or transceiver, but may not achieve a sufficiently low SWR and may fail.
- ◇ If you use a Bias-T other than the supplied mAT-4117, make sure its RF power rating, supply voltage, and current capacity meet the requirements.
- ◇ The Bias-T may share the transceiver's power supply or use a separate supply. The voltage must not be below 11 V or above 15 V; **12–14 V** is recommended. The supply must provide at least **1 A**.

■ Specifications

Frequency range: 1.8–30 MHz

Maximum RF power: 1500 W PEP (SSB); 800 W (data, under 3 min); 300 W (continuous).

Tuning power: 5–10 W recommended; 50 W maximum

Typical matching range: 5–1500 Ω

Antenna types: Wire antenna; coax-fed antenna

Tuning time: ≤ 3 seconds for a full tune (90%+); 0.1 second for memory tuning

Bias-T supply: 11–15 V DC; 12–14 V DC recommended; 1.0 A maximum operating current

Operating temperature: -10°C to $+60^{\circ}\text{C}$ (14°F to 140°F)

Dimensions / weight: 300 × 234 × 93 mm (11.81 × 9.21 × 3.66 in); 2.1 kg (74.1 oz)

■ Included Accessories

1. mAT-4117 Bias-T × 1
2. Stainless-steel mounting bracket and clamps × 1 set
3. Operating manual × 1

■ Technical Support

Visit our official website at <http://www.mat-tuner.com> to download the latest manuals, watch operating videos, and learn more about our products. If you encounter problems while using the tuner, please contact your dealer for assistance.

MAT-TUNER

www.mat-tuner.com