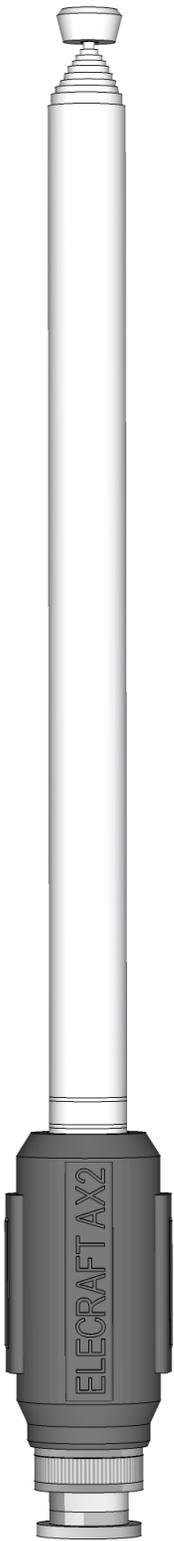


ELECRAFT AX2 OWNER'S MANUAL



AX2 MINI-20 METER WHIP ANTENNA

Page 2

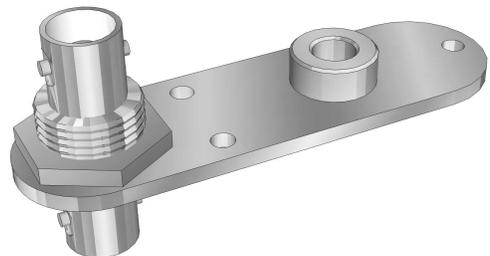
MODIFYING THE AX2 FOR 17 - 6 METERS

Page 6

AXE1 40 METER EXTENDER

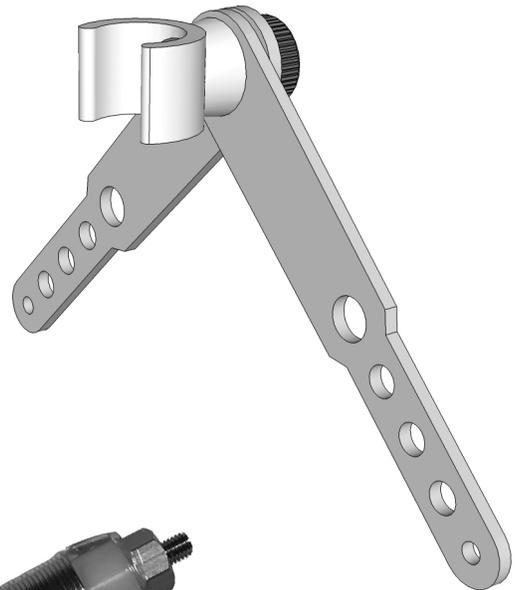


AXB1 TRIPOD ADAPTER



AXB1 WHIP BIPOD

Page 5



Introduction



The Elecraft AX2 is a miniature 20 meter telescoping whip that disassembles into a 6" (15 cm) whip and 2.5" (6 cm) base unit. **It is intended to be used with an ATU (antenna tuner).**

While the AX2 is supplied configured for 20 m, it can be modified to cover any single band from 17 through 6 m by removing turns from the inductor and optionally shortening the counterpoise wire (see pg. 6). The AXE1 40 m extender can also be used with the AX2. Refer to the AXE1 instruction sheet for details.

The AX2 is ideal for pedestrian mobile, "stealth" operation, or whenever dipoles, verticals, long wires, and other full-size antennas cannot be erected. It can be used in three ways:

- HT-style (shown here with an Elecraft KX2 transceiver)
- On a table-top with a right-angle BNC adapter and an **AXB1 whip bipod** (see page 5)
- Mounted on a tripod or other support using an **AXT1 tripod adapter** (refer to AXT1 instruction sheet).

FOR BEST RESULTS, USE THE AX2 WITH AN ATU (automatic antenna tuner). As with all short whips, resonance will be in or near the target band, but can vary with terrain, radial height, body capacitance, etc. High SWR without an ATU may result reduced power output and/or RFI.

All Elecraft transceivers have optional wide-range internal ATUs that are fully compatible with the AX2. An external ATU such as an Elecraft T1 may also be used.

Caution

- **DO NOT TOUCH THE WHIP WHILE TRANSMITTING.** You may receive an RF burn even at a few watts.
- **Do not overtighten the whip on the base unit, as hardware may become loose when the whip is removed.**
- The AX2 is not intended for vehicle-mounted use or for permanent outdoor installations.
- Keep the whip collapsed when not in use.
- Always use at least one radial (included). This improves transmit signal strength by ~20 dB and reduces RF burn risk.

NOTE: The AX2 has a new design that reduces BNC connector wobble. However, the whip may still tilt slightly.

AX2 Setup

- If you're using the AXE1 40 meter extender, follow the setup instructions in the AXE1 instruction sheet.
- Thread the whip into the base and extend it. **Do not overtighten the whip, as this may cause base unit hardware to come loose.**
- Plug the AX2 into your transceiver's BNC jack for HT-style operation. For right-angle use with an **AXB1**, see page 5. For use with a tripod and an **AXT1**, see the AXT1 instruction sheet.
- **ATTACH AT LEAST ONE COUNTERPOISE WIRE** (or radial) to your transceiver's ground screw. Otherwise, your transmit signal will be as much as 20 dB weaker (4 to 5 S-units). **An insulated counterpoise wire with a spade lug at one end is supplied with the AX2.** When using a KX2 or KX3, secure the spade lug to the rig at the thumb screw closest to the antenna jack. (An option for the KX2 is to use a mini-banana plug, e.g. Elecraft **KX2GNDPLUG**, with the quick-release ground jack on the left side panel.)
- Match the antenna to the transceiver using an ATU or with manual length adjustments as described below.

Using an ATU

The resonant frequency of any short whip can be affected by many factors, radial length, changes in terrain, and in the location of the radio relative to the operator. An ATU can compensate, eliminating tedious whip or radial length adjustments. (An ATU is also required when using the AXE1 extender.)

To match using an ATU: Tap the ATU tuning switch on the radio or tuner. If you're using a K4 / K3S / K3 / KX3 / KX2, tapping the TUNE switch a second time may result in a better match.

Manual Adjustment

Manual adjustment of resonance to a target frequency may be possible.

To adjust antenna resonance manually: Check the SWR at both the low and high end of the desired band. If SWR is higher at the *low* end of the band, lengthen the radial. If SWR is higher at the *high* end of the band, shorten the radial or reduce the length of the telescoping whip.

NOTE: In cases where it is difficult to achieve a low SWR (< 3:1), transmitting may still be possible at reduced power. Elecraft transceivers can be safely used at high SWR.

Operating Tips

- At QRP power levels, CW and certain data modes (including FT8) will have an advantage over SSB.
- If you need to improve your transmit signal, elevate the AX2 above ground by standing or using a tripod. When operating outdoors, seek high ground, or an area with a downslope in a preferred direction. Such a slope may act as a reflector. Indoors, extend the telescoping whip outside a window if at all possible, and allow the counterpoise wire to hang outside the window as well. Use a balcony if available.
- When operating pedestrian mobile (/PM), let the counterpoise wire trail out behind you. As terrain changes, SWR may fluctuate during transmit. An ATU, if available, can compensate; tap the ATU tune button if SWR is high.
- Try operating during contests when there's lots of activity (most weekends). Contest stations often have high-gain antennas, benefitting both ends of a QSO.
- Rather than call CQ, try answering strong stations who are calling CQ or just completing a contact. A strong signal is often an indication that propagation is excellent in that direction.
- Tune slowly, especially when listening for weak signals. As an example, SOTA (Summits On The Air) CW stations can often be found between 14058 and 14063 kHz, and SSB on 14340 kHz, but they may be very weak.

QRP operation with a short whip can be both rewarding and challenging.

For times when conditions are poor, we recommend also carrying a lightweight wire antenna. A simple random-length antenna can be made from two 25' (7.5 m) lengths of #26 "Silky" (thewireman.com). Counterpoise wires supplied with the AX2 and AXE1 can also be used. Throw one wire into a tree and lay the other on the ground, or into a second tree. Attach the wires to the transceiver via a BNC-to-binding post adapter, such as our model **BNC-BP**. Elecraft ATUs will usually match this efficient antenna on 40 through 10 m.

AXB1 Whip Bipod

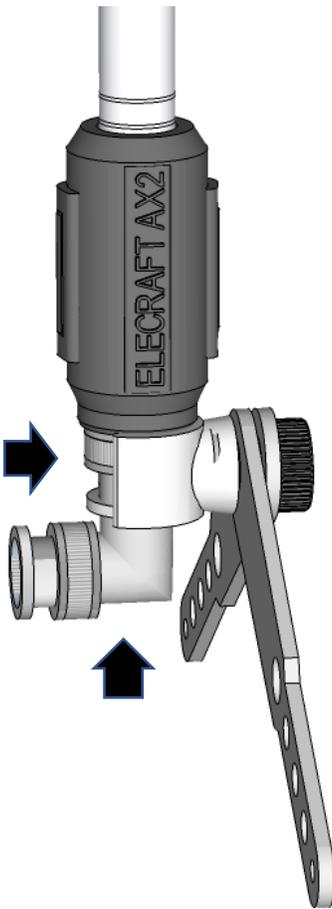
A whip antenna used with a right-angle BNC may tip over due to wind load. To stabilize a whip in light to moderate winds, an AXB1 bipod can be used as described below.

To use the AXB1:

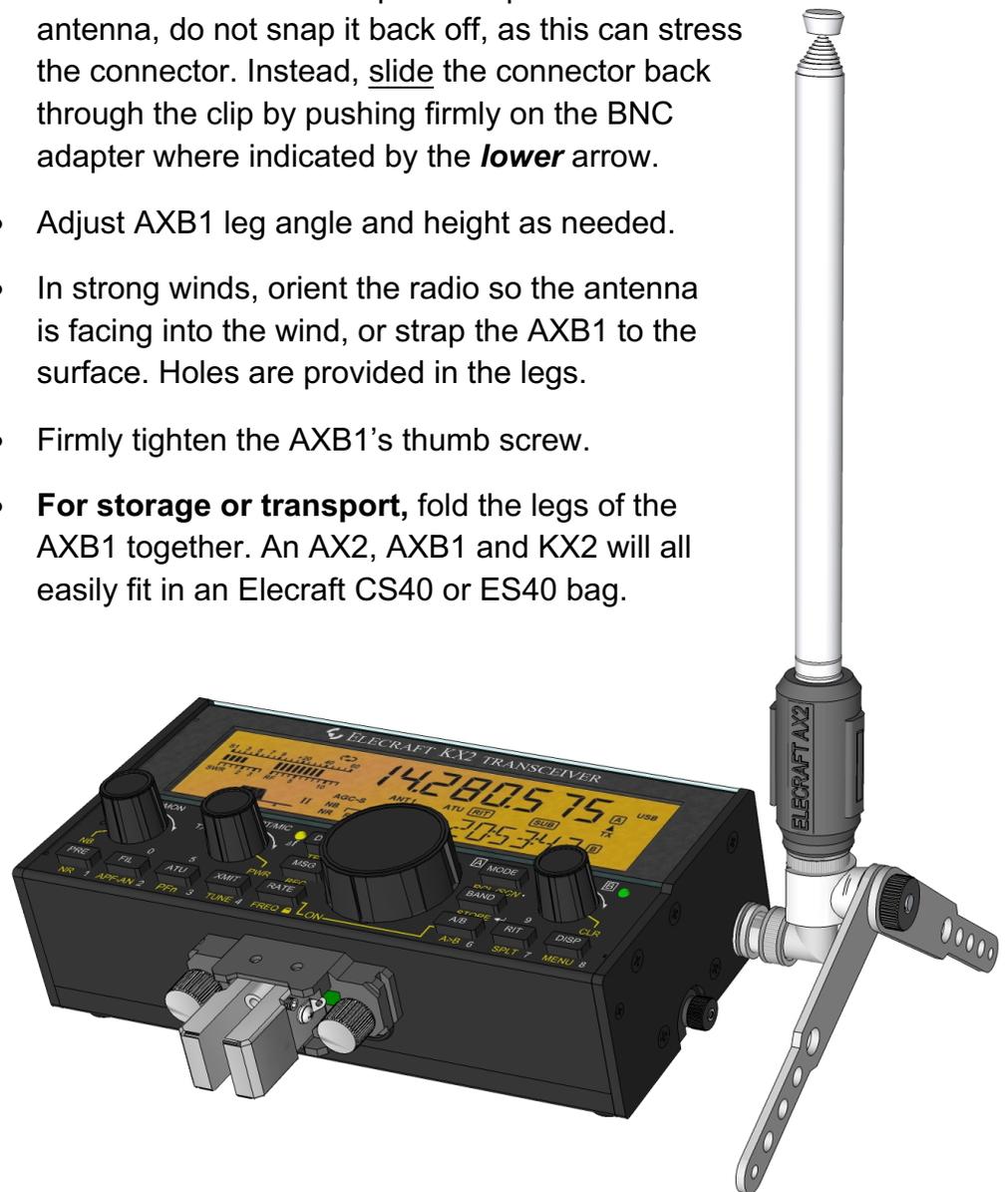
- Attach a right-angle BNC adapter (Elecraft **BNC-RA** or equivalent) to the antenna.
- Snap the AXB1's plastic clip firmly onto the knurled part of the AX2's BNC connector as shown by the **upper** arrow at left.

Caution: To detach the plastic clip from the antenna, do not snap it back off, as this can stress the connector. Instead, slide the connector back through the clip by pushing firmly on the BNC adapter where indicated by the **lower** arrow.

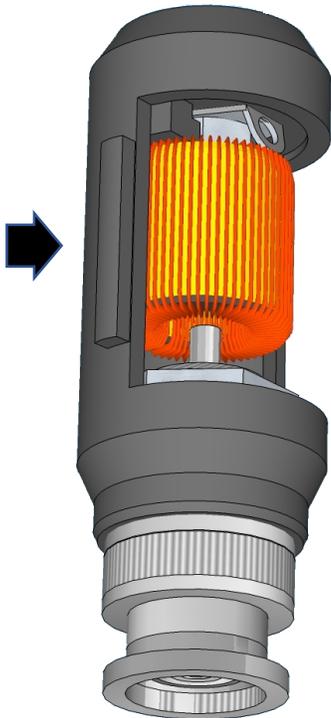
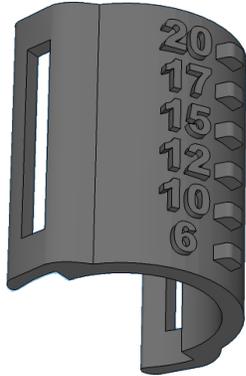
- Adjust AXB1 leg angle and height as needed.
- In strong winds, orient the radio so the antenna is facing into the wind, or strap the AXB1 to the surface. Holes are provided in the legs.
- Firmly tighten the AXB1's thumb screw.
- **For storage or transport**, fold the legs of the AXB1 together. An AX2, AXB1 and KX2 will all easily fit in an Elecraft CS40 or ES40 bag.



NOTE: The legs of the AXB1 may not be in electrical contact with the whip's BNC connector, so they should not be used as a radial wire attachment point.



Modifying the AX2 for Other Bands



The AX2 as supplied is resonant in or near the 20 meter band. By removing turns from the toroidal inductor, it can be re-resonated for any single band from 17 through 6 meters.

Note to antenna experimenters: While resonance of the AX2 and its counterpoise can be adjusted using a vector network analyzer (VNA), the frequency will shift during field use due to changes in terrain, etc. This is not a concern if an ATU is used.

Substituting other core types: Max core size is 0.5" (12.7 mm) in diameter. Use a high-Q iron-powder, phenolic, or air core, not ferrite. Micrometals/Amidon -6 or -7 is recommended. -2 is also suitable for low bands and -10 or -17 for the highest bands.

Wire requirements: The supplied core uses enamel wire having a very high temperature rating. If standard wire is used, inspect the insulation for discoloration or other artifacts at max power.

Follow these steps to modify the AX2:

- Gently pry off the cover at one edge (see arrow at left).
- Unsolder the toroid leads from the solder lug and BNC jack.
- The standard winding has 22 turns (about 8 μ H, resonant near 14 MHz). Remove turns on the toroid as described below, re-strip the lead, then re-solder both leads. (Do not use sharp tools when removing turns, as you may nick the enamel wire.)

These turns counts are starting points. It is possible to further fine-tune the turns count or squeeze/spread the turns. If an ATU is used, this should not be necessary; it will typically provide coverage of one to three bands.

18 MHz: 17 T (remove 5) 21 MHz: 15 T (remove 7)

25 MHz: 12 T (remove 10) 28 MHz: 11 T (remove 11)

50 MHz: 8 T (remove 14)

- **OPTIONAL:** Adjust the length of the counterpoise wire (per page 7) to match the target band. Start on the long side and trim if desired. ***This step is optional because an ATU compensates for non-ideal counterpoise length. But note that if the counterpoise is long relative to the base/whip resonant frequency, the antenna may exhibit two resonant frequencies when swept with a VNA.***
- **BAND IDENTIFICATION:** Clip off the nub(s) on the cover corresponding to the band(s) covered by the modified whip.

Counterpoise Wires

The counterpoise (or radial) wire supplied with the AX2 is cut for 20 m. The inductor in the base unit has also been adjusted to provide resonance close to the 20 m band with this radial length. The AXE1's longer counterpoise wire is usable on 40 m. Adding more radials may yield improved results on one or more bands.

During pedestrian-mobile operation, a single "dragged counterpoise" wire is typically used to minimize the risk of snagging or other hazards. Optimal length for a dragged counterpoise varies with many factors, but the length most often used is: $L \text{ (ft)} = 185 / F$, or $L \text{ (m)} = 56 / F$ (F in MHz).

A good starting point for elevated radials (e.g., using the AX2 with a tall tripod or mast) is a full quarter wavelength: $L \text{ (ft)} = 234 / F$, or $L \text{ (m)} = 71.3 / F$. This length also works best on 40 m (AXE1).

Radial length adjustments to achieve resonance can be tedious. An antenna analyzer is recommended. NOTE: A VNA can also yield inaccurate results, varying between workbench and field.

AX2 Specifications

Resonant Frequencies
(approx.)

AX2: ~14 MHz (20 m)
AXE1: ~7.2 MHz (40 m)
Resonant frequencies may vary +/- 400 kHz or more due to variations in terrain, antenna height, body capacitance, and length of radial(s).

Supplied Radial Wire

AX2: 13 ft. (4 m). AXE1: 33 ft. (10 m).
Includes spade lug.

Max. Power

15 Watts. *If RFI symptoms are observed, reduce power or move antenna farther from the transceiver.*

Construction

Corrosion-resistant whip and hardware; Lexan outer tube; high-Q inductors using #20 AWG high-temp enamel wire.

Dimensions
(approx.)

Whip: 6" (15 cm) collapsed, 45" (115 cm) extended. Base unit: 2.5" (6 cm). AXE1 extender: 6" (15 cm).

Weight

AX2: 3.2 oz. (90 g). AXE1: 2.0 oz. (55 g).

Customer Service and Support

Technical Assistance

You can send e-mail to support@elecraft.com and we will respond quickly – typically the same day Monday through Friday. If you need replacement parts, send an e-mail to parts@elecraft.com. Telephone assistance is available from 9 A.M. to 5 P.M. Pacific time (weekdays only) at 831-763-4211. Please use e-mail rather than calling when possible since this gives us a written record of the details of your problem and allows us to handle a larger number of requests each day.

Repair / Alignment Service

If necessary, you may return your Elecraft product to us for repair or alignment. (Note: We offer email and phone support, so please try that route first as we can usually help you find the problem quickly.) **IMPORTANT: You must contact Elecraft before mailing your product** to obtain authorization for the return, what address to ship it to and current information on repair fees and turnaround times. (Frequently we can determine the cause of your problem and save you the trouble of shipping it back to us.) Our repair location is different from our factory location. We will give you the address to ship your kit to at the time of repair authorization. *Packages shipped without authorization will incur an additional shipping charge for reshipment to our repair depot.*

Elecraft 1-Year Limited Warranty

This warranty is effective as of the date of first consumer purchase (or if shipped from the factory, the date the product is shipped to the customer). It covers both our kits and fully assembled products. For kits, before requesting warranty service, you should fully complete the assembly, carefully following all instructions in the manual.

Who is covered: This warranty covers the original owner of the Elecraft product as disclosed to Elecraft at the time of order. Elecraft products transferred by the purchaser to a third party, either by sale, gift, or other method, who is not disclosed to Elecraft at the time of original order, are not covered by this warranty. If the Elecraft product is being bought indirectly for a third party, the third party's name and address must be provided at time of order to ensure warranty coverage.

What is covered: During the first year after date of purchase, Elecraft will replace defective or missing parts free of charge (post-paid). We will also correct any malfunction to kits or assembled units caused by defective parts and materials. Purchaser pays inbound shipping to us for warranty repair; we pay shipping to return the repaired equipment to you by UPS ground service or equivalent to the continental USA and Canada. For Alaska, Hawaii, and other destinations outside the U.S. and Canada, actual return shipping cost is paid by the owner.

What is not covered: This warranty does not cover correction of kit assembly errors. It also does not cover misalignment; repair of damage caused by misuse, negligence, or builder modifications; or any performance malfunctions involving non-Elecraft accessory equipment. The use of acid-core solder, water-soluble flux solder, or any corrosive or conductive flux or solvent will void this warranty in its entirety. Also not covered is reimbursement for loss of use, inconvenience, customer assembly or alignment time, or cost of unauthorized service.

Limitation of incidental or consequential damages: This warranty does not extend to non-Elecraft equipment or components used in conjunction with our products. Any such repair or replacement is the customer. Elecraft will not be liable for any special indirect, incidental or consequential damages, including but not limited to any loss of business or profits.