



Ultra High Frequency (UHF) Tactical Yagi Antenna (CHA TACYAGI-70) Operator's Manual

Nevada - USA

WWW.CHAMELEONANTENNA.COM



VERSATILE – DEPENDABLE – STEALTH – BUILT TO LAST

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Be aware of overhead power lines when you are deploying this antenna. You could be electrocuted if the antenna gets near or contacts overhead power lines.

Photographs and diagrams in this manual may vary slightly from current production units due to manufacturing changes that do not affect the form, fit, or function of the product.

All information on this product and the product itself is the property of and is proprietary to Chameleon Antenna™. Specifications are subject to change without prior notice.

Introduction

Thank you for purchasing and using the Chameleon Antenna™ Ultra High Frequency (UHF) Tactical Yagi antenna (CHA TACYAGI-70). The CHA TACYAGI-70 is designed for portable UHF operation, such as Summits on the Air (SOTA), Parks on the Air (POTA), camping or RVing, hill-topping, or on an apartment or condominium balcony. It will greatly extend the range of handheld UHF FM transceivers and can be used horizontally polarized with radios like the Yaesu FT-817/818, Icom IC-705, or the new Yaesu FTX-1F for CW, SSB, or digital modes.

It is also the perfect antenna for Preppers, who need a rugged and transportable antenna for the General Mobile Radio Service (GMRS).

The CHA TACYAGI-70, shown in plate (1), is a small, lightweight, three element Yagi. It has 7 dBi of gain with a front-to-back ratio of >15.0 DB and will operate between 400-470 MHz, including the 70cm Amateur Service Band, GMRS, and Government Public Service frequencies. The CHA TACYAGI-70 folds up into a package that is less than 18 inches in length, 3 inches in height, 2 inches in width, and weighs only 13.7 oz. – so it will fit in a daypack or backpack. It has a pistol grip mount for the ultimate in man packable portability and can also be mounted on a camera tripod or a Trekking pole with a camera mount. It will also mount on the Chameleon Antenna™ Universal Clamp Mount (CHA UCM) or Jawmount with an optional adapter.



Plate 1. CHA TACYAGI-70.

Antennas built by Chameleon Antenna™ are versatile, dependable, stealthy, and built to last. Please read this operator's manual so that you may maximize the utility you obtain from your CHA TACYAGI-70.

UHF Propagation

UHF radio wave propagation is predominantly line of sight between the two stations. The radio horizon communication range can be calculated using the formula:

$$Range = \sqrt{2 \times Height_{Station 1}} + \sqrt{2 \times Height_{Station 2}}$$

Where *Range* is in miles and *Height* is in feet above the ground. Fortunately (or unfortunately) for our ham radio hobby, there are many factors that affect this simplistic range model. Intervening terrain, buildings, and other objects cause reflection, scattering, and diffraction of radio waves. These radio waves arrive at the same time at the receiving station by slightly different paths causing the signals to be out of phase resulting in Rayleigh fading. Rayleigh fading is particularly noticeable as slow fading and picket fencing with mobile stations. Figure (1) shows a simplified example of Multipath propagation.

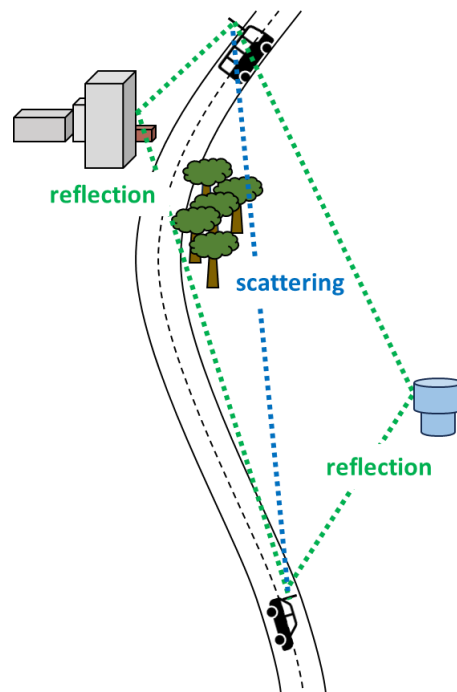


Figure (1). Multipath Propagation.

A useful online tool for determining line-of-sight is found at: [RF Line of Sight - SCADACore](#), courtesy of SCADACore. Figure (2) shows a Radio Path Study between two mobile stations; one located at the Monte Sano State Park Camp Ground and the other in Toney, Alabama. There are no terrain obstructions between the two mobile stations, so communication should be possible between the two stations. Another example is shown in figure (3). The mobile station in Toney moved to an intersection around 3 ½ miles southeast of the first location. Wade Mountain is now between the two stations and line of sight communications may not be possible without multipath propagation.

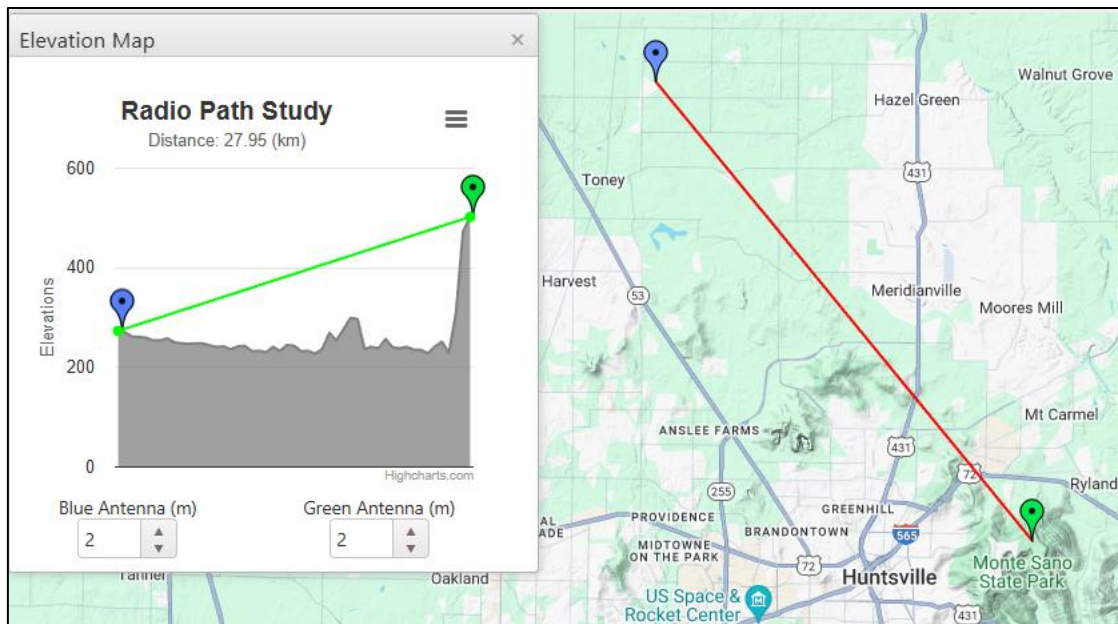


Figure 2. Line of Sight Example 1.

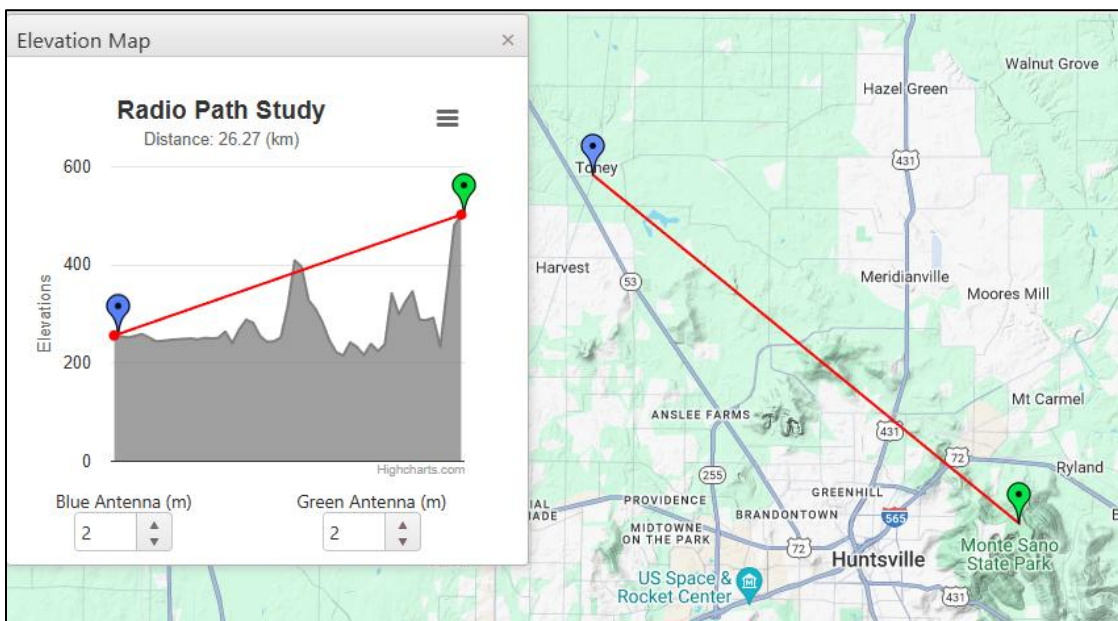


Figure 3. Line of Sight Example 2.

Tropospheric propagation is also a factor in UHF communication with weather being the primary cause. The most interesting weather events for ham radio operations are temperature inversions. Normally, temperature decreases with increasing altitude. However, certain weather conditions will cause part of the Troposphere to have an increase in temperature with increasing altitude before returning to normal. This is called a temperature inversion and sometimes it causes ducting. Ducting acts like a pipeline for radio waves and can enable communications over long distances.

CHA TACYAGI-70 Components

The CHA TACYAGI-70 is comprised of the following components, see plate (2).

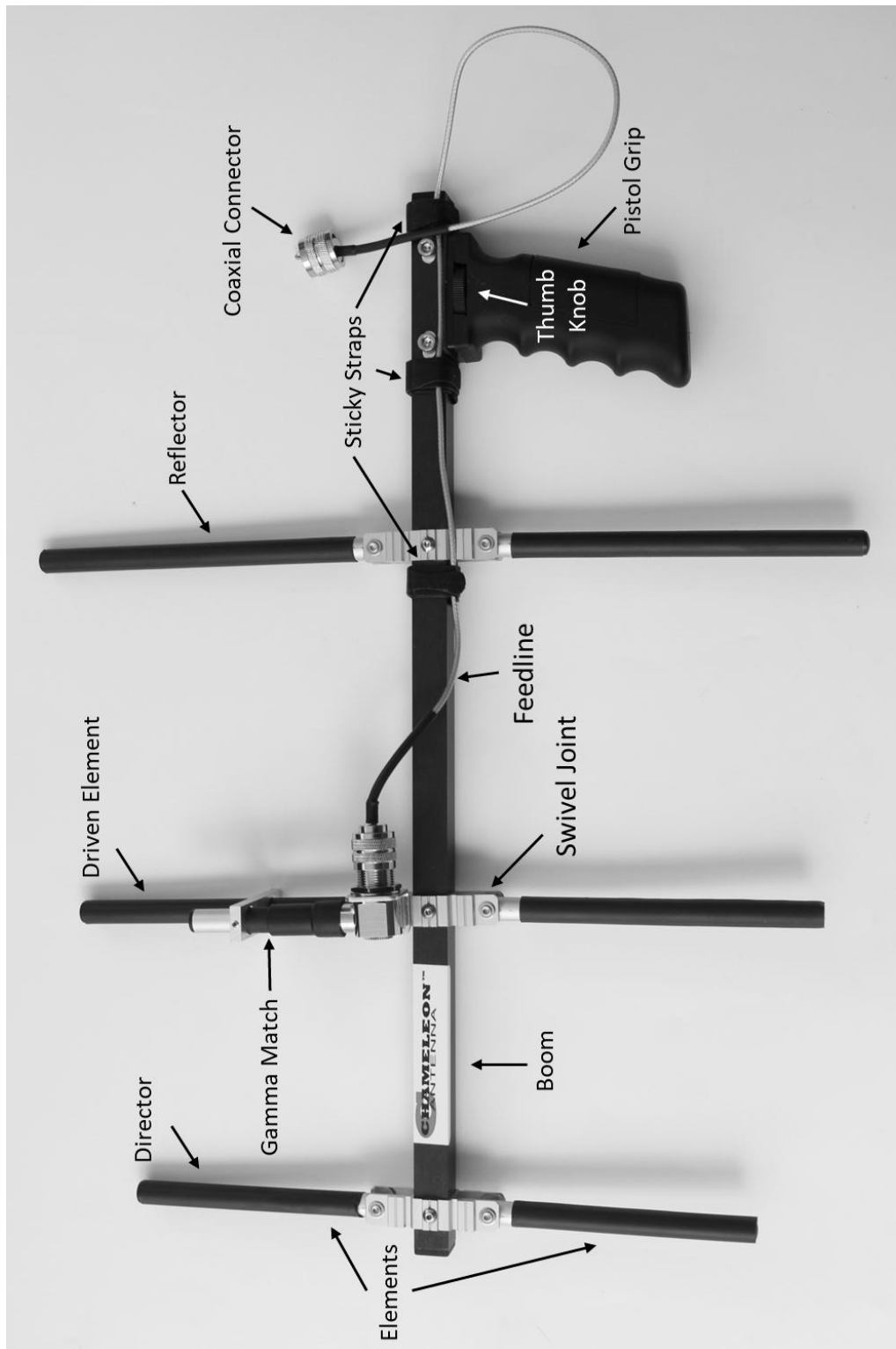


Plate 2. Antenna Components.

Handheld / Manpack Use

Setup of the CHA TACYAGI-70 for handheld / manpack use is quick and easy in the field (see figure [4]). Due to its light weight and small size when collapsed, it will easily fit in a daypack or backpack making it perfect companion for your handheld UHF transceiver when hiking or doing Summits on the Air (SOTA) activations. The CHA TACYAGI-70 will greatly extend the range of your handheld UHF transceiver.

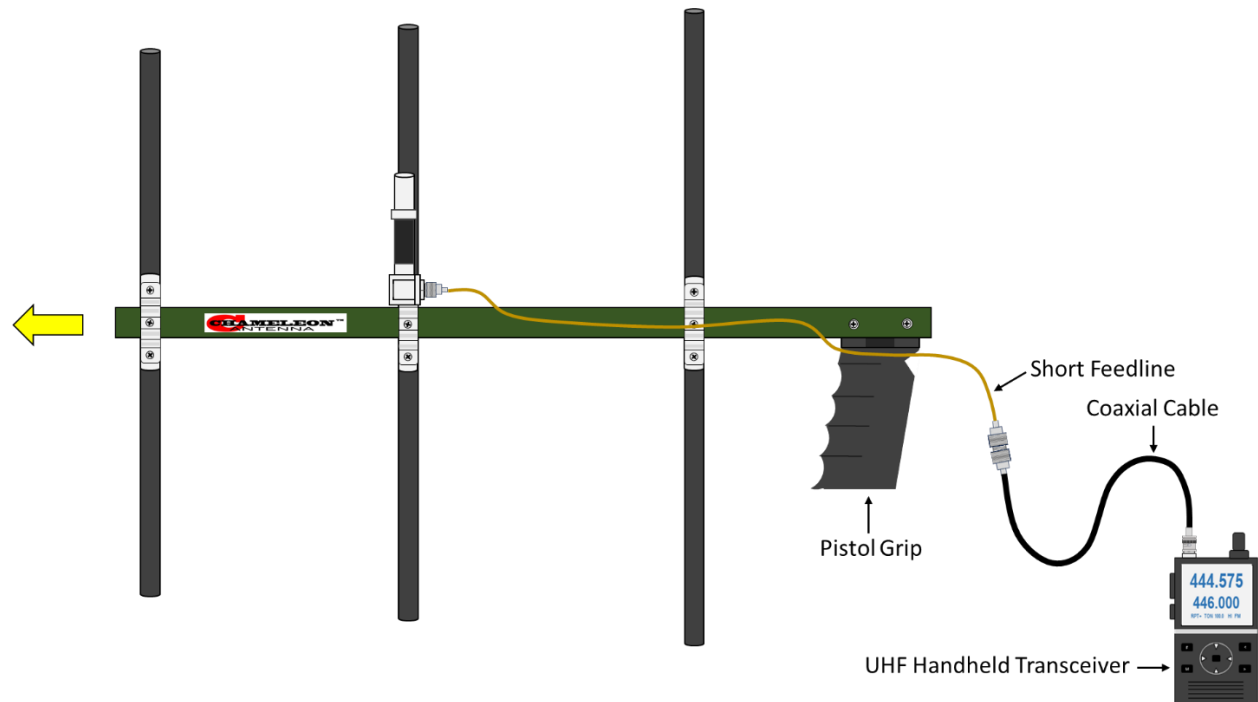


Figure 4. TACYAGI-70 Handheld / Manpack.

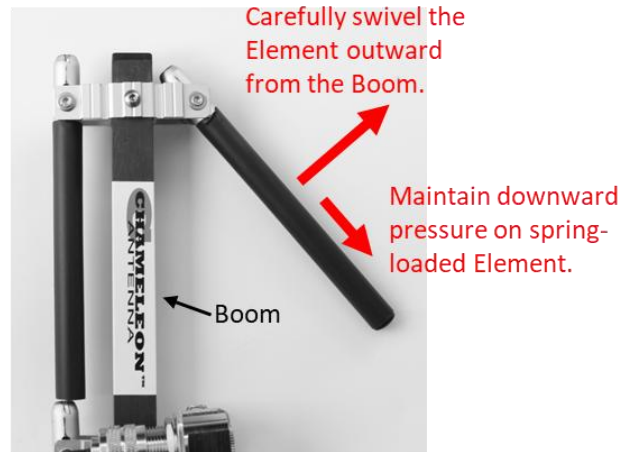
Extending the Collapsed Antenna

Use the procedure shown in plates (3) and (4) to setup the CHA TACYAGI-70 for handheld / manpack use.

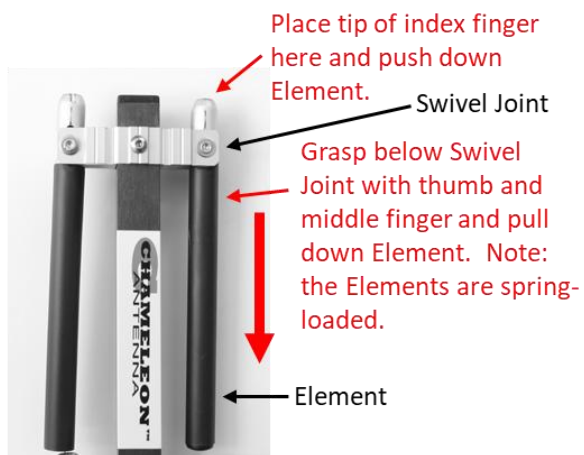
Step 1. Position collapsed antenna.



Step 3. Extend Element.



Step 2. Pull down the Element.



Step 4. Fully Extend Element.

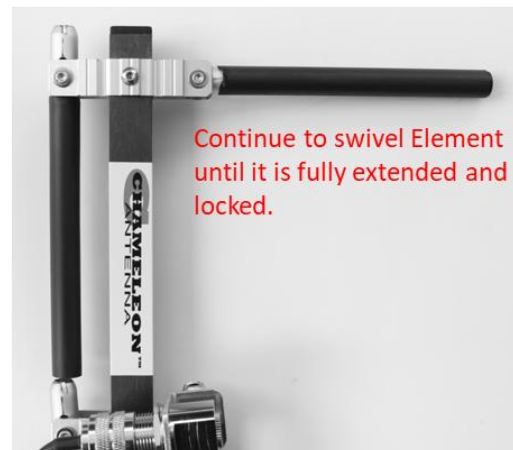


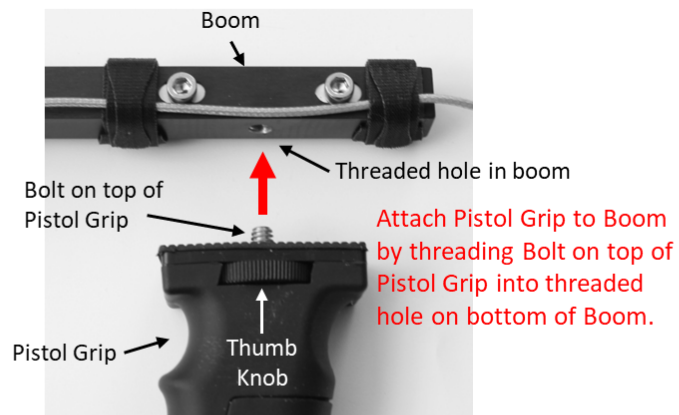
Plate 3. TACYAGI-70 Handheld Setup Procedure.

Step 5. Extend remaining elements.

Repeat Steps 2 – 4 for the remaining five elements.
The antenna should look like that pictured below.



Step 6. Attach Pistol Grip.



Step 7. Tighten Thumb Knob.



Plate 4. TACYAGI-70 Handheld Setup Procedure (*continued*).

Tripod / Trekking Pole Use

The CHA TACYAGI-70 is easy to mount on a Tripod, Monopod, or a Trekking Pole with a camera mount, see figure 5. The advantages of this are: you don't have to hold the antenna while operating; it provides a more stable platform for the antenna; and it permits the antenna to be separated from the operator.

To attach the CHA TACYAGI-70 to a tripod, position the bottom of the Pistol Grip onto the top of the camera mount and tighten the camera mount screw. You must use the Pistol Grip as the base because threads on the Boom socket are incompatible with a camera mount.

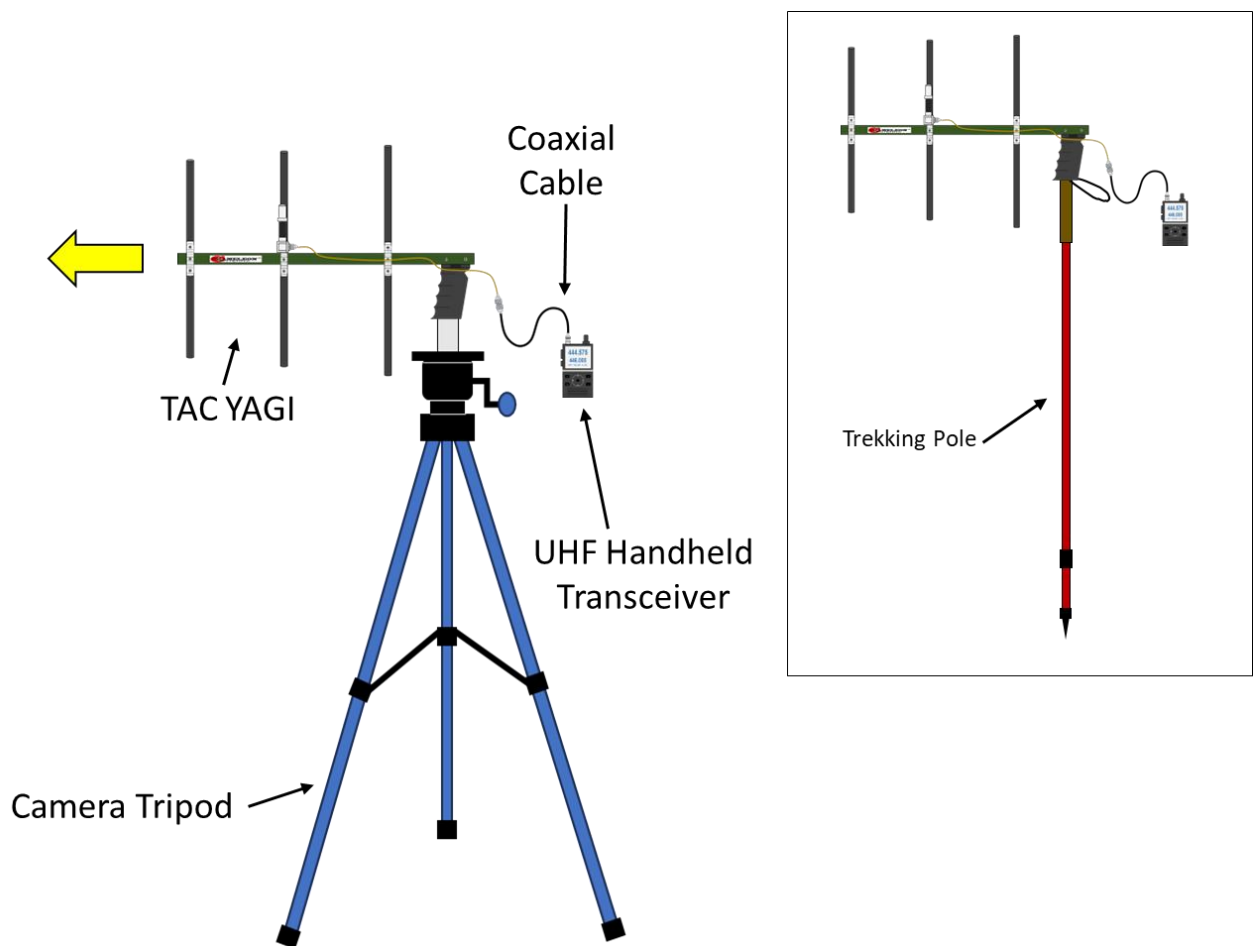



Figure 5. TACYAGI-70 on a Tripod and Trekking Pole (inset).

Use with MPAS Ready Components

The CHA TACYAGI-70 can use the MPAS Ready  family of components to create a highly portable modular antenna system. Figure (6) shows some of the ways the TACYAGI-70 can be deployed using MPAS Ready components. The Spike Mount enables deployment of antennas anywhere you can drive it into the ground. The Universal Clamp Mount (UCM) is very strong and enables mounting antennas on flat horizontal surfaces, such as picnic tables or balcony rails. The Jawmount can be clamped to almost any type of object, such as a picnic table, fence post, balcony rail, or pipe. Go to www.chameleonantenna.com for more information on MPAS Ready components or visit your local dealer.

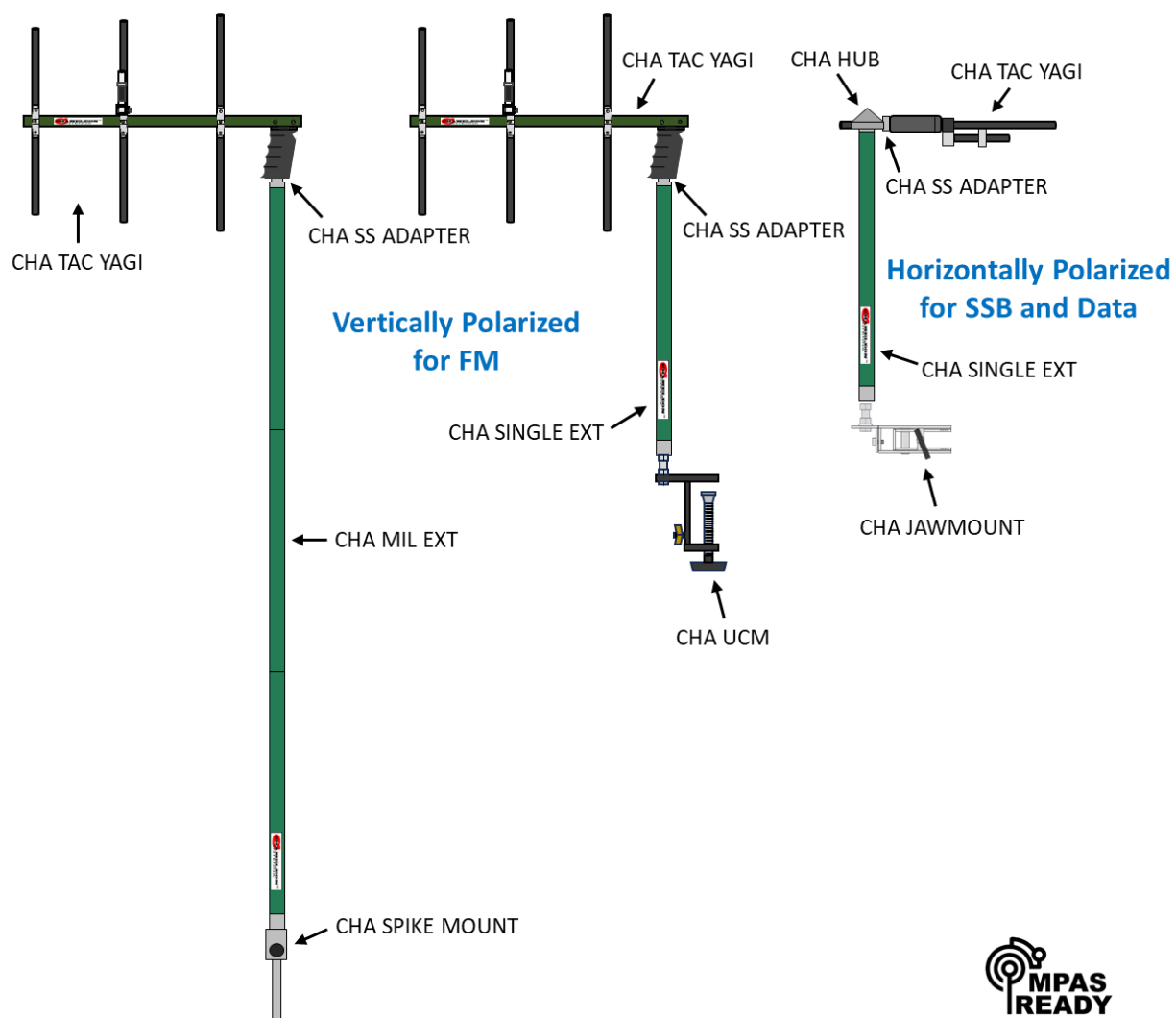


Figure 6. MPAS Ready Deployment Options.

Operation of the UHF Tactical Yagi

The TACYAGI-70 is a unidirectional antenna. The directivity is toward the front of the antenna, as shown in figures (4) and (5). There will be very little signal strength on the sides or back of this antenna – the antenna needs to be pointed at the station with which you are communicating. Height is essential for UHF communications. Position the antenna as high as possible - such as on the top of a hill or on the balcony of a tall building. Antenna polarization is also important on UHF. Normally, communication on FM is vertically polarized (the antenna is vertical or perpendicular to the ground), while SSB and digital communications are horizontally polarized. You can horizontally polarize the CHA TACYAGI-70 by holding it horizontal (parallel to the ground) or using the tilt-head of your tripod, as shown in plate (5).



Plate 5. Horizontal Operation.

Finally, care must be taken in selecting the type and length of coaxial cable to avoid excessive loss on UHF. Table (1) shows the loss per 100 feet for four popular types of coaxial cable.

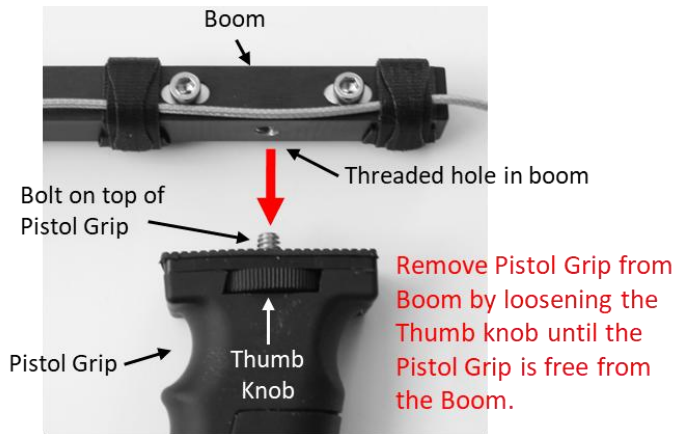
Cable Type	Diameter (In.)	Loss/100Ft. (dB)
RG-316 (ABR316)	0.102	17.2
RG-58 (ABR58C)	0.195	10.0
RG-8X (ABR240)	0.242	6.3
RG-213 (ABR213)	0.405	4.5

Table 1. Coaxial Cable Losses.

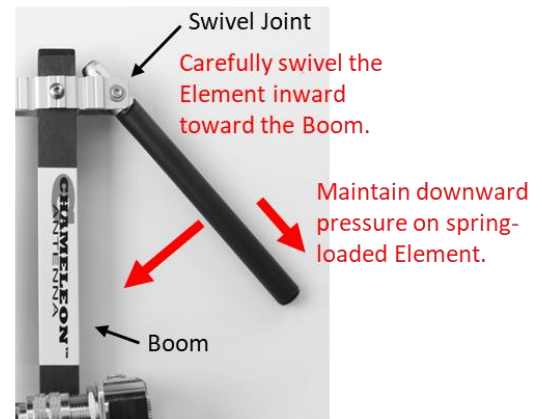
Recovery Procedure

Use the procedure shown in plate (6) to recover the CHA TACYAGI-70 for storage in your pack.

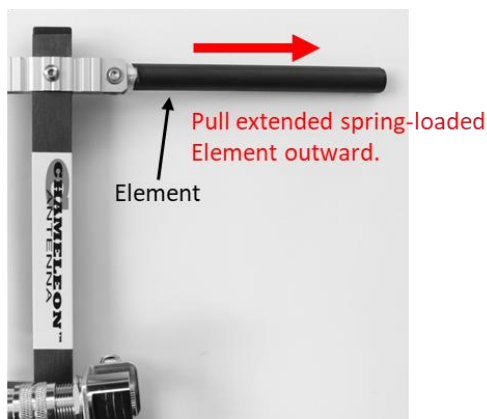
Step 1. Remove Pistol Grip.



Step 3. Collapse Element.



Step 2. Pull Out Extended Element.



Step 4. Fully Collapse Element.



Step 5. Fully Collapse remaining Elements.



Plate 6. Procedure for packing the TACYAGI-70.

Preventive maintenance tip: it is recommended that the Swivel Joints and bare Element ends be occasionally lubricated with Gardner Bender Ox-Gard Anti-Oxidant Compound.

Troubleshooting

1. Ensure all elements are fully extended and locked.
2. Inspect the antenna for damage.
3. Ensure all elements are aligned.
4. Ensure the feedline is connected securely to the Gamma Match.
5. Ensure the coaxial cable is connected to the feedline.
6. Check the feedline and coaxial cable for continuity or shorts.
7. Check that the components of the Gamma Match are tight, if they have become loose, position the Gamma Match Adjustment Bar as shown in plate (7) and tighten the set screws using a 1.5mm Hex Wrench. Note: the Gamma Match has been factory tuned. It is not recommended that it be tuned in the field.

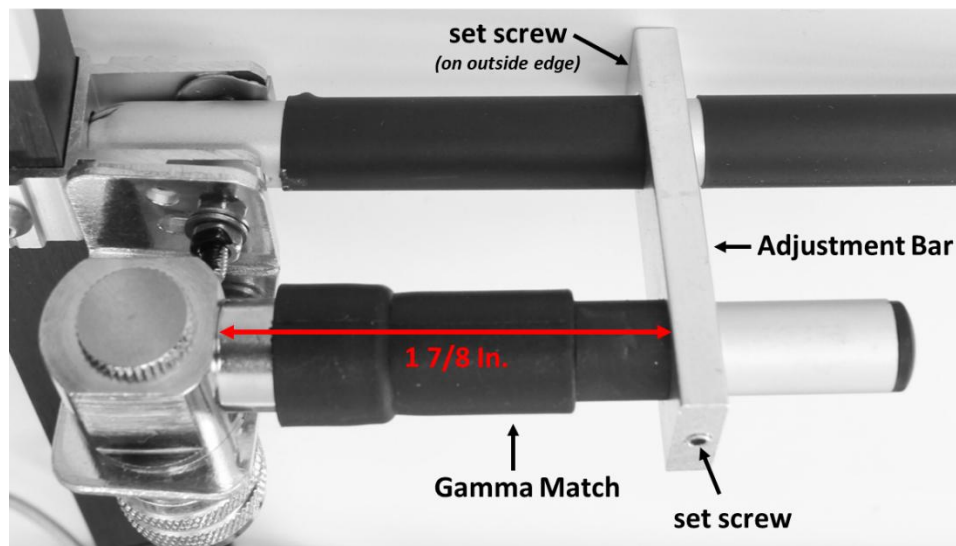


Plate (7). Gamma Match Adjustment.

8. Be sure to check any patch cables or adapters used.
9. If still not operational, connect a Standing Wave Ratio (SWR) Power Meter and check SWR.
10. If the SWR is still greater than 2:1, contact Chameleon Antenna™ for technical support.

Accessories

The following accessories are available for purchase from Chameleon Antenna™. Go to www.chameleonantenna.com for current prices and availability.

- **CHA SS ADAPTER** – The Stainless Steel Adapter has a 1/4-20 stud on one end and a 3/8-24 stud on the other. Used to mount the CHA TACYAGI-70 to a Universal Clamp Mount UCM), Jawmount, MIL Extension, or Porta Mast with a 3/8-24 socket.
- **CHA COAX** – A 12 foot length of RG-58C/U with a PL-259 connector on one end and a BNC connector on the other is a great option for use with the CHA TACYAGI-70.
- **SO-239 Barrel Connector** – An SO-239 Barrel Connector is required to connect the CHA TACYAGI-70 to a longer coaxial cable and is available from your local dealer.

Specifications

- **Usable Frequency Range:** 400 – 470 MHz, which includes the Amateur Radio Service 70cm Band, General Mobile Radio Service (GMRS), or other Military, Government, and Public Service frequencies in that range.
- **Power:** 100W.
- **Gain:** 7 dBi
- **F/B Ratio:** >15 dB
- **Polarization:** Vertical (can also be Horizontal when handheld)
- **Weight:** 13.7 Oz.
- **Dimensions:** Boom Length: 17 ¾ In., Reflector Height: 14 ¼ In., Width at Gamma Match: 2 In.
- **SWR:** Less than 2.5:1 from 400 – 470 MHz. See figures (7) - (9).
- **Color:** Black and Green.
- **Setup Time:** One operator, less than 3 minutes.

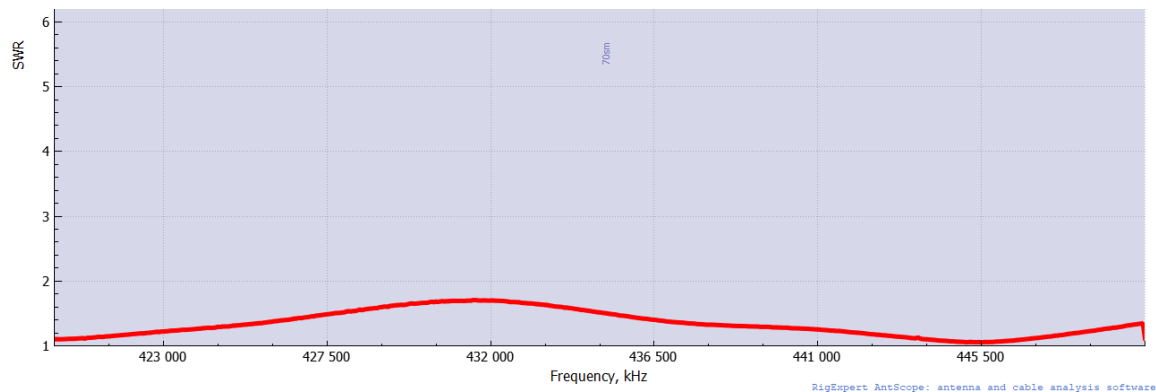


Figure 7. U.S. 70cm Band SWR Graph.

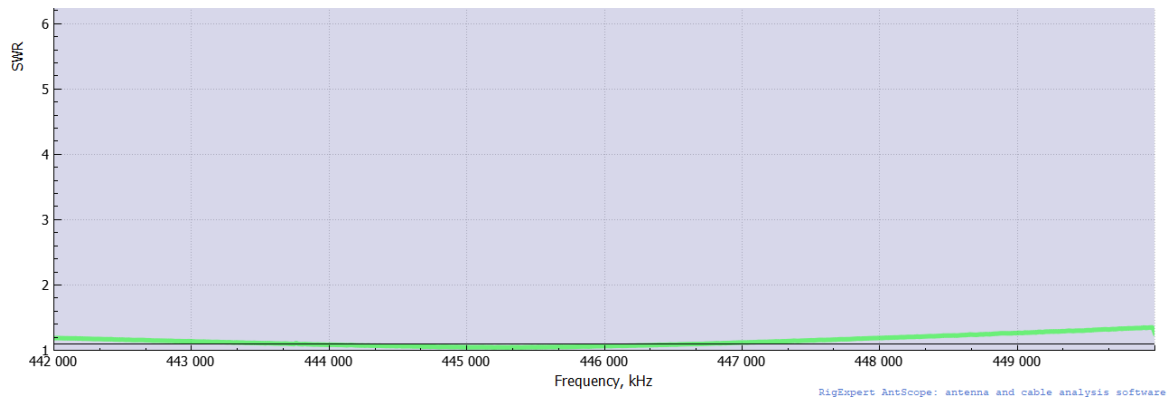


Figure 8. U.S. 70cm FM Band Segment SWR Graph.

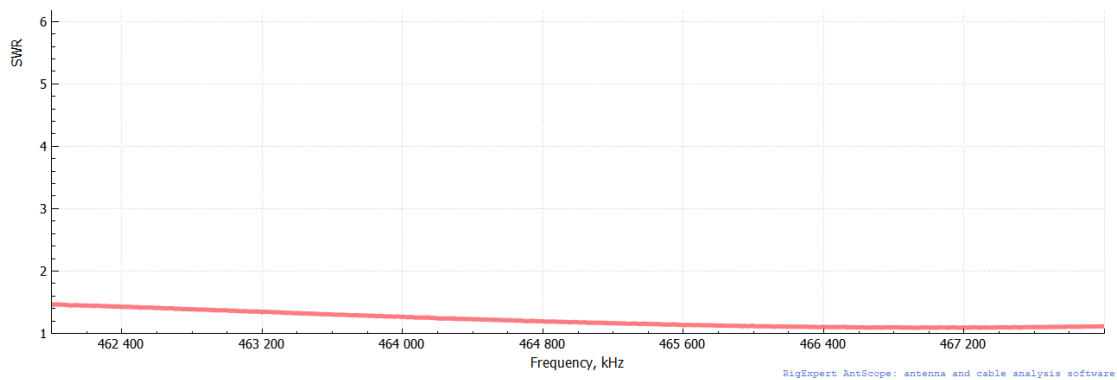


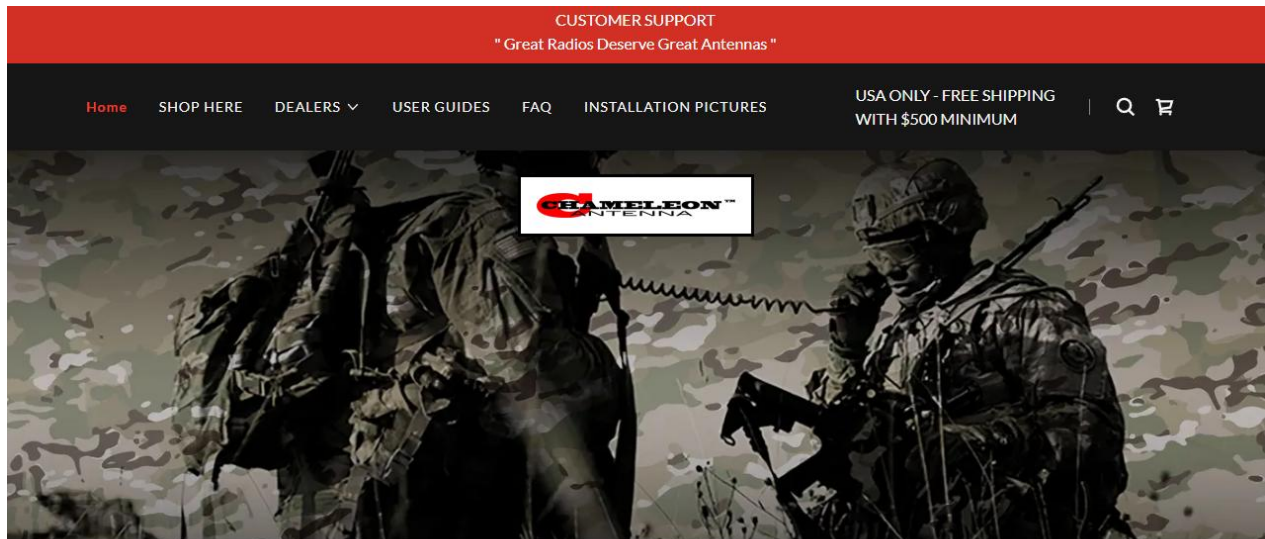
Figure 9. U.S. GMRS SWR Graph.

References

1. Silver, H. Ward (editor), 2013, *2014 ARRL Handbook for Radio Communications*, 91st Edition, American Radio Relay League, Newington, CT.
2. 1987, *Tactical Single-Channel Radio Communications Techniques (FM 24-18)*, Department of the Army, Washington, DC.
3. Turkes, Gurkan, 1990, *Tactical HF Field Expedient Antenna Performance Volume I Thesis*, U.S. Naval Post Graduate School, Monterey, CA.

Chameleon Antenna™ Products

Go to <http://chameleonantenna.com> for information about quality antenna products available for purchase from Chameleon Antenna™ – The Portable Antenna Pioneer.



THE PORTABLE ANTENNA PIONEER BECAUSE GREAT RADIOS DESERVE GREAT ANTENNAS

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