



Hybrid Portable HF Antenna (CHA HYBRID - MINI / MICRO) Operator's Manual

Nevada - USA

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VERSATILE – DEPENDABLE – STEALTH – BUILT TO LAST

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Table of Contents

Introduction	3
HF Propagation	4
Parts of the Antenna	5
Antenna Configurations	7
Horizontal NVIS	8
Sloping Wire	10
Inverted “L”	12
Manpack Vertical	13
Portable Vertical	15
Portable Dipole	17
Recovery Procedure	19
Troubleshooting	19
Specifications	20
References	25
Accessories	25
Chameleon Antenna™ Products	27



Be aware of overhead power lines when you are deploying the CHA HYBRID - MINI / MICRO antenna system. 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™ Hybrid - Mini / Micro Portable High Frequency (HF) Antenna (CHA HYBRID-MINI or CHA HYBRID-MICRO). The CHA HYBRID - MINI / MICRO antenna system is designed to be the most versatile, high performance, and rugged portable / manpackable HF antenna available - similar to those used by armies worldwide. The base system is comprised of either a CHA HYBRID - MINI or CHA HYBRID - MICRO portable base and your choice of 30, 60, or 130 feet of high-quality, subdued color, insulated wire, as shown in plate (1). The components of the CHA HYBRID - MINI / MICRO antenna system provide a continuum of portability and performance to meet your communications requirements. See “Accessories” section for available system options.



Plate 1. CHA Hybrid-Micro (left) and CHA Hybrid-Mini (right).

The integral broadband impedance matching network transformer allows broadband antenna tuning. The antenna will operate from 1.8 - 54 MHz (including 160m – 6m amateur bands) without any adjustment with a wide range antenna tuner (the shortest configurations have limited performance below 3.5 MHz). The CHA HYBRID - MINI / MICRO is perfect for a wide variety of military, government agencies, and non-governmental organizations (NGOs), such as: Military Affiliate Radio System (MARS), Civil Air Patrol (CAP), Amateur Radio Emergency Service (ARES) / Radio Amateur Civil Emergency Service (RACES), Salvation Army Team Emergency Radio Network (SATERN), and First Responders needing inter-regional communications capability. It is also a great antenna for hams that enjoy outdoor activities, like: Parks on the Air (POTA), Summits on the Air (SOTA), or just relaxing outdoors. Hams living in apartments and condominiums or developments with Home Owner’s Associations (HOAs), will appreciate the versatility, stealthiness, and performance of this antenna. The CHA HYBRID - MINI / MICRO is configurable to facilitate Near-Vertical Incident Sky wave (NVIS) communication and is totally

waterproof. The CHA HYBRID - MINI / MICRO antenna system may require an antenna tuner or coupler, depending on the frequency and antenna configuration.

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 HYBRID - MINI / MICRO antenna system.

HF Propagation

HF radio provides relatively inexpensive and reliable local, regional, national, and international voice and data communication capability. It is especially suitable for undeveloped areas where normal telecommunications are not available, too costly or scarce, or where the commercial telecommunications infrastructure has been damaged by a natural disaster or military conflict.

Although HF radio is a reasonably reliable method of communication, HF radio waves propagate through a complex and constantly changing environment and are affected by weather, terrain, latitude, time of day, season, and the 11-year solar cycle. A detailed explanation of the theory of HF radio wave propagation is beyond the scope of this operator's manual, but an understanding of the basic principles will help the operator decide what frequency and which of the CHA HYBRID - MINI / MICRO configurations will support their communication requirements.

HF radio waves propagate from the transmitting antenna to the receiving antenna using two methods: ground waves and sky waves.

Ground waves are composed of direct waves and surface waves. Direct waves travel directly from the transmitting antenna to the receiving antenna when they are within the radio line-of-sight. Typically, this distance is 8 to 14 miles for field stations. Surface waves follow the curvature of the Earth beyond the radio horizon.

They are usable, during the day and under optimal conditions, up to around 90 miles, see table (1). Low power, horizontal antenna polarization, rugged or urban terrain, dense foliage, or dry soil conditions can reduce the range very significantly. The U.S. Army found that in the dense jungles of Vietnam, the range for ground waves was sometimes less than one mile.

Frequency	Distance	Frequency	Distance
2 MHz	88 miles	14 MHz	33 miles
4 MHz	62 miles	18MHz	29 miles
7 MHz	47 miles	24 MHz	25 miles
10 MHz	39 miles	30 MHz	23 miles

Table 1. Maximum Surface Wave Range by Frequency.

Sky waves are the primary method of HF radio wave propagation. HF radio waves on a frequency below the critical frequency (found by an ionosonde) are reflected off one of the layers of the ionosphere and back to Earth between 300 and 2,500 miles, depending upon the frequency and ionospheric conditions. HF radio waves can then be reflected from the Earth to the ionosphere again during multihop propagation for longer range communication. The most important thing for the operator to understand about HF radio wave propagation is the concept of Maximum Usable Frequency (MUF), Lowest Usable

Frequency (LUF), and Optimal Working Frequency (OWF). The MUF is the frequency for which successful communications between two points is predicted on 50% of the days of in a month. The LUF is the frequency below which successful communications are lost due to ionospheric losses. The OWF, which is somewhere between the LUF and around 80% of the MUF, is the range of frequencies which can be used for reliable communication. If the LUF is above the MUF, HF sky wave propagation is unlikely to occur.

The HF part of the Radio Frequency (RF) spectrum is usually filled with communications activity and an experienced operator can often determine where the MUF is, and with less certainty, the LUF by listening to where activity ends. The operator can then pick a frequency in the OWF and attempt to establish contact. Another method is using HF propagation prediction software, such as the *Voice of America Coverage Analysis Program (VOACAP)*, which is available at no cost to download or use online at www.voacap.com. The operator enters the location of the two stations and the program shows a wheel with the predicted percentage of success based on frequency and time. ALE, which is the standard for interoperable HF communications, is an automated method of finding a frequency in the OWF and establishing and maintaining a communications link.

Even under optimal conditions, there is a gap between where ground waves end (around 40 to 90 miles) and the sky wave returns to Earth on the first hop (around 300 miles). NVIS propagation can be used to fill this gap. The frequency selected must be below the critical frequency, so NVIS can normally only be used on frequencies from around 2 to 10 MHz. Frequencies of 2 – 4 MHz are typical at night and 4 – 8 MHz during the day.

Parts of the Antenna

The CHA HYBRID - MINI / MICRO is comprised of the following components, see plates (2) and (3):

- a. **Hybrid Base (Mini or Micro).** The Hybrid Base provides a mounting base and impedance matching for the CHA HYBRID - MINI / MICRO antenna system.
- b. **Antenna Wire.** The Antenna Wire is a 30, 60, or 130 foot length of high quality, subdued color, insulated wire.
- c. **Isolation Ring.** An Isolation Ring is permanently attached to each end of the Antenna Wire and there is one floating ring along the length of the Antenna Wire.
- d. **Carabiner.** The Carabiner is a removable pear-shaped stainless-steel hook with a spring-loaded gate.
- e. **Not Used.**
- f. **Wire Terminal.** The Wire Terminals are located at one end of the Antenna Wires.

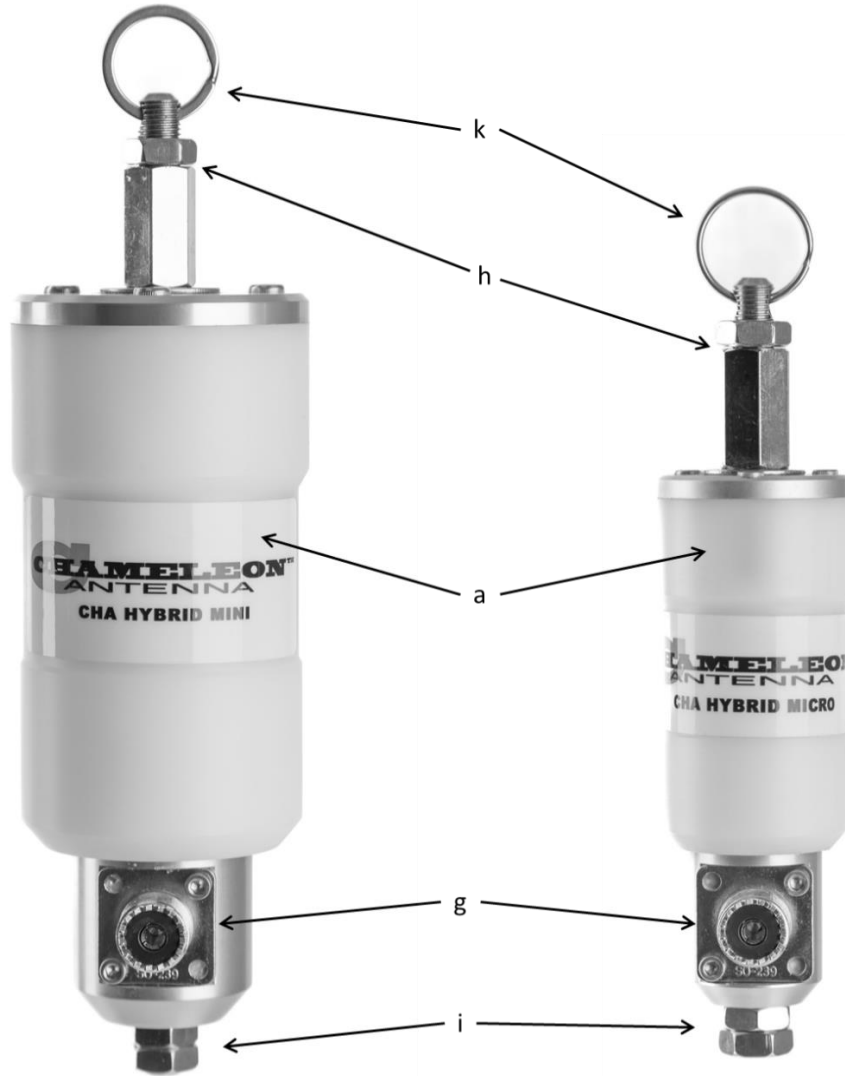


Plate 2. Hybrid Base, Mini (left) and Micro (right).

- g. **UHF Socket.** The UHF Socket, SO-239, is located on the side of the Hybrid Base.
- h. **Antenna Connection.** The Antenna Connection is located on the top of the Hybrid Base. It is a 3/8" x 24 (fine thread) female fitting.
- i. **Counterpoise Connection.** The Counterpoise Connection is located on the bottom of the Hybrid Base. It is a 3/8" x 24 (fine thread) male fitting.
- j. **Line Winder.** The Line Winder is used to store the Antenna Wire. It enables rapid deployment and recovery of the CHA HYBRID MINI / MICRO antenna.
- k. **Antenna Shackle.** The Antenna Shackle assembly consists of a split ring, bolt, and nut. It is attached to the top of the Hybrid Base.

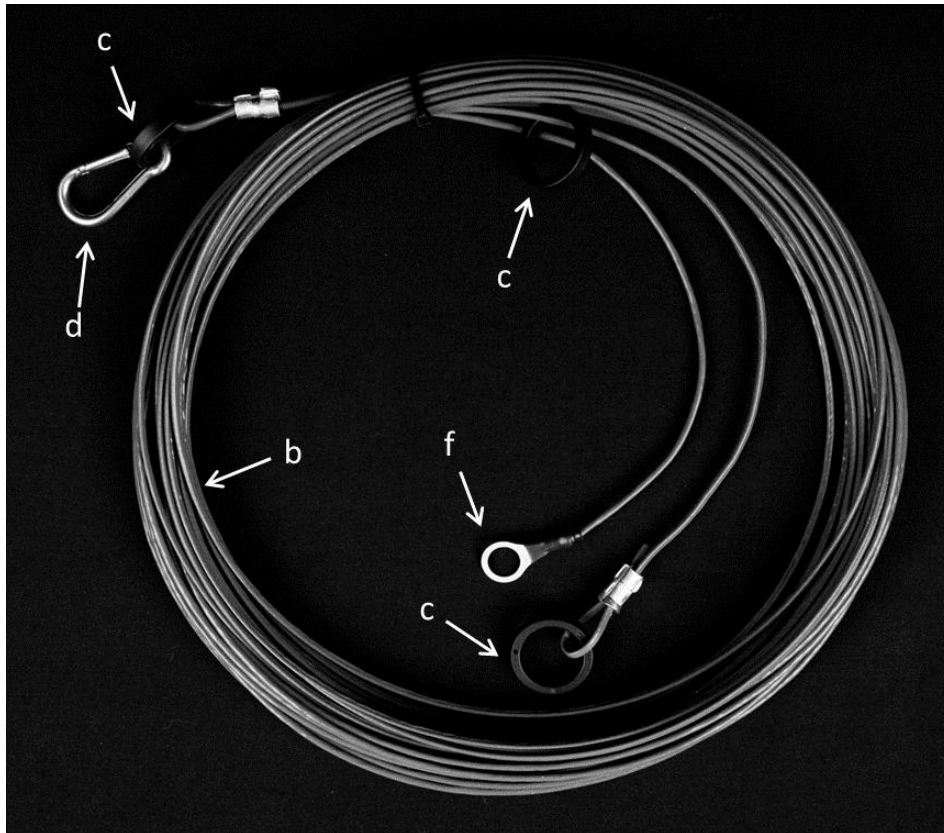


Plate 3. Antenna Wire.

Antenna Configurations

Using the supplied components, the CHA HYBRID - MINI / MICRO can be deployed into a number of operationally useful configurations. Six configurations (*some requiring optional system components that are sold separately*) are described in this manual, each with unique performance characteristics, as shown in table (2).

Configuration	Ground	Short	Medium	Long	Directionality
Horizontal NVIS		↓	↑		Omnidirectional
Sloping Wire	↓		↕		Unidirectional
Inverted "L"	↓		↕		Unidirectional
Manpack Vertical	↕				Omnidirectional
Portable Vertical	↕		↑		Omnidirectional
High Efficiency Portable Vertical	↕		↕		Omnidirectional
Portable Dipole		↓	↑		Bidirectional

Table 2. Antenna Configuration Selection.

The table can assist the operator to quickly select the most appropriate antenna configuration to meet their operational requirements. To use the table, decide which distance column (Ground = 0 to 90 miles, Short = 0 - 300 miles, Medium = 300 – 1500 miles, Long > 1500 miles) best matches the distance

to the station with whom you need to communicate. Then, determine if the OWF is in the lower ($\downarrow = 1.8 - 10$ MHz) or upper ($\uparrow = 10 - 30$ MHz) frequency range. Finally, select the antenna configuration with the corresponding symbol in the appropriate distance column. All CHA HYBRID - MINI / MICRO configurations provide some capability in each distance category, so depending upon the complexity of your communications network, you may need to select the best overall configuration. The directionality column indicates the directionality characteristic of the antenna configuration. When using NVIS, all the configurations are omnidirectional. Some configuration and frequency combinations may require an antenna tuner or coupler.

Horizontal NVIS

The CHA HYBRID - MINI / MICRO Horizontal NVIS configuration, see figure (1), is a special configuration designed to provide good NVIS propagation on lower frequencies. It is predominately omnidirectional and also provides medium range sky wave propagation on frequencies above 10 MHz. It requires two supports that will enable the ends of the antenna to be raised to a height of 10 – 12 feet and 60 feet apart. A counterpoise wire, with a length of 25 to 50 feet, is recommended. If a counterpoise wire is not used, the coaxial cable must be 25 to 100 feet in length, as the shield of the coaxial cable provides the counterpoise. Use the following procedure to install the Horizontal NVIS configuration.

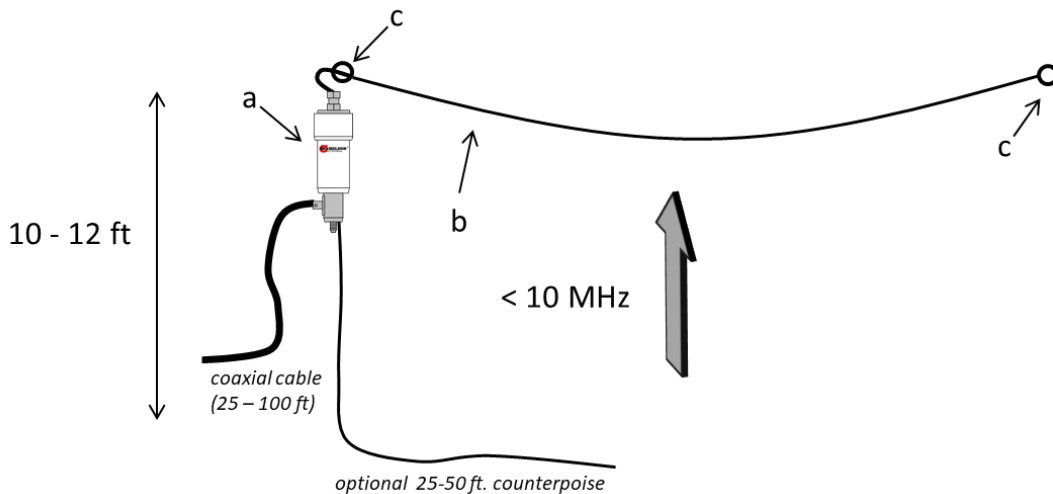


Figure 1. Horizontal NVIS Configuration.

Site Selection and Preparation.

1. Select a site to deploy the CHA HYBRID - MINI / MICRO Horizontal NVIS configuration. The site must have two supports that will position the Hybrid Base and the end of the Antenna Wire to be at a height of between 10 and 12 feet and 60 feet apart. Higher or lower heights may be used, but may reduce NVIS performance. Refer to plates (2) through (4) for the following steps.
2. If not already attached, connect a Carabiner (d) to the Isolation Ring (c) at the Wire Terminal (f) end of the Antenna Wire.

Connect the Hybrid Base.

3. Temporarily remove the Antenna Shackle (k) from the Antenna Connection (h).
4. Place the Wire Terminal from the Antenna Wire over the Antenna Connection and replace the Antenna Shackle. Tighten the nut snugly.
5. Connect the Carabiner from the Antenna Wire to the Antenna Shackle.
6. If using a counterpoise wire, connect it to the Counterpoise Connection (i). Tighten the nut snugly.

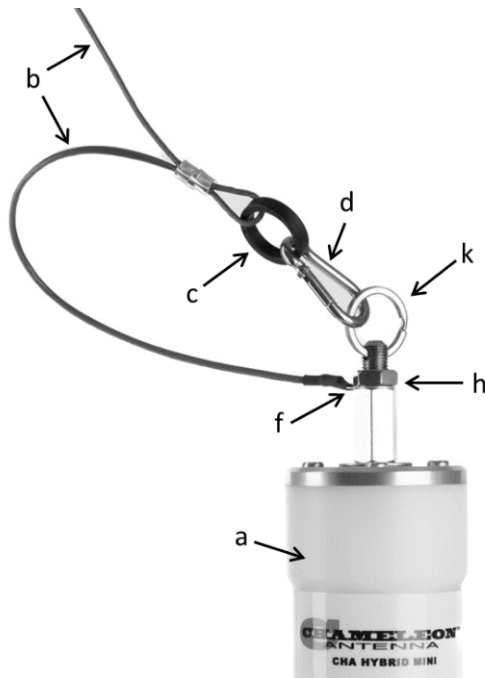


Plate 4. Hybrid Base Electrical and Mechanical Connections.

7. Connect a CHA RFI CHOKE and coaxial cable or the Integrated RF Choke end of the CHA

Coaxial Cable assembly to the UHF Socket (g) on the Hybrid Base.

Raise the Antenna.

8. Using a Bowline or similar knot, tie the end of a long length (25 feet or more) of Paracord to the Carabiner from step (5).
9. Using a throw weight or other method, loop the Paracord over the support that is closest to where the radio set will be located.
10. Raise the Hybrid Base end of the antenna to a height of 10 to 12 feet and secure it to the support using a Round Turn and two Half Hitches, or similar knot.
11. Using a Bowline, or similar knot, tie another long length of Paracord to the Insulator (e) or Isolation Ring (c) at the end of the Antenna Wire.
12. Using a throw weight, or some other method, loop the Paracord over the other support.
13. Raise the end of the Antenna Wire to a height of 10 to 12 feet, such that the Antenna Wire is not quite taut, and secure it to the support using a Round Turn and two Half Hitches.

Extend the Counterpoise.

14. If using a counterpoise, extend it along the ground under the raised portion of antenna.
15. Perform operational test.

Sloping Wire

The CHA HYBRID - MINI / MICRO Sloping Wire configuration, see figure (2), is a broadband short to medium range HF antenna. It is a good general-purpose antenna, which provides acceptable ground wave and sky wave propagation and can be hastily deployed. This configuration is predominately omnidirectional, becoming slightly unidirectional towards the end of the antenna wire as the frequency increases. The Sloping Wire requires one support and should be mounted at a height of 25 to 40 feet for best performance. A counterpoise wire, with a length of 25 feet, is recommended. If a counterpoise is not used, the coaxial cable must be 25 to 100 feet in length, as the shield of the coaxial cable provides the counterpoise. The "Half Sloper" is an alternate version of this configuration, where the antenna is attached to a metal tower and the antenna is fed from the top.

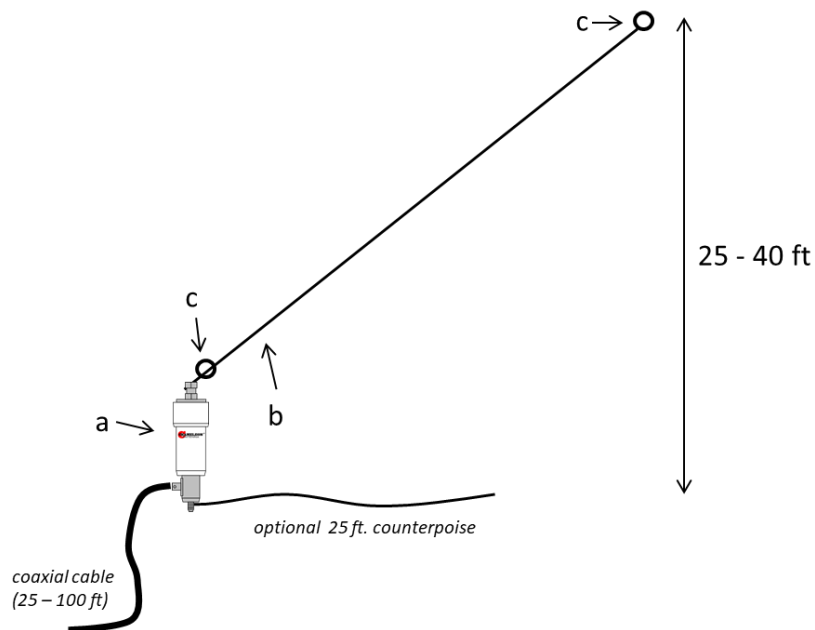


Figure 2. Sloping Wire Configuration.

Perform the following procedure to install the Sloping Wire configuration:

Site Selection and Preparation.

1. Select a site to deploy the CHA HYBRID - MINI / MICRO Sloping Wire configuration. The site must have a support that will position the end of the Antenna Wire at a height of 25 to 40 feet. If the right support is unavailable, any convenient object, such as a fence post or the top of a vehicle, may be used as a field expedient support with reduced performance.

Refer to plates (2) through (4) for the following steps.

2. If not already attached, connect a Carabiner (d) to the Isolation Ring (c) at the Wire Terminal (f) end of the Antenna Wire.

Connect the Hybrid Base.

3. Temporarily remove the Antenna Shackle (k) from the Antenna Connection (h).
4. Place the Wire Terminal from the Antenna Wire over the Antenna Connection and

replace the Antenna Shackle. Tighten the nut snugly.

5. Connect the Carabiner from the Antenna Wire to the Antenna Shackle.
6. If using a counterpoise wire, connect it to the Counterpoise Connection (i). Tighten the nut snugly.
7. Connect a CHA RFI CHOKE and coaxial cable or the Integrated RF Choke end of the CHA Coaxial Cable assembly to the UHF Socket (g) on the Hybrid Base.

Raise the Antenna.

8. Using a Bowline, or similar knot, tie a long length (50 feet or more) of Paracord to the Insulator (e) or Isolation Ring at the end of the Antenna Wire.
9. Using a throw weight or some other method, loop the Paracord over the support.

10. Raise the end of the Antenna Wire to the desired height, and secure it to the support using a Round Turn and two Half Hitches, or similar knot.

11. Using a Bowline or similar knot, tie the end of a short length (around 4 feet) of Paracord to the Carabiner.

12. Fully extend the Antenna Wire so that it is not quite taut,

13. Drive a Stake into the ground around two feet beyond the end of the Antenna Wire and tie the Paracord from the Hybrid Base to the Stake using two Half Hitches, or similar knot. *The optional Spike Mount is an excellent alternative for this task.*

Extend the Counterpoise.

14. If using a counterpoise wire, extend it along the ground in any convenient direction.

15. Perform operational test.

Inverted “L”

The CHA HYBRID - MINI / MICRO Inverted “L” configuration, see figure (3), is a broadband short to medium range HF antenna. This configuration tends to be unidirectional, favoring the end of the horizontal part of the antenna. It also provides effective ground waves communication during the day time on frequencies between 1.8 – 4.0 MHz without using sky wave propagation. The Inverted “L” requires two supports and should be mounted at a height of 25 feet for best performance. Though, it will provide good performance at a height of 10 to 20 feet, and is usable when mounted as low as three feet. One counterpoise wire, with a length of 25 feet, is recommended. If a counterpoise is not used, the coaxial cable must be 25 to 100 feet in length, as the shield of the coaxial cable provides the counterpoise. Use the following procedure to install the Inverted “L” configuration.

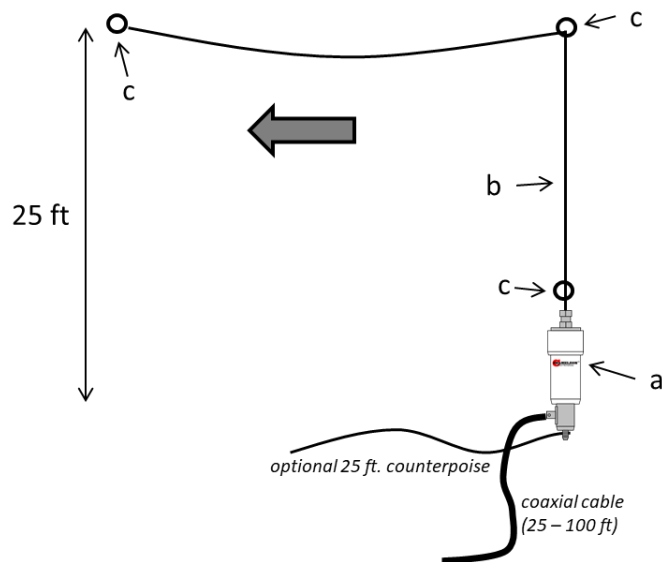


Figure 3. Inverted “L” Configuration.

Site Selection and Preparation.

1. Select a site to deploy the CHA HYBRID - MINI / MICRO Inverted “L” configuration. The site must have two supports that will position the corner of the “L” and the end of the Antenna Wire at a height of about 25 feet. If the right supports are unavailable, any convenient objects, such as fence posts or the tops of vehicles, may be used as a field expedient supports with reduced performance.

Refer to plates (2) through (4) for the following steps.

2. If not already attached, connect a Carabiner (d) to the Isolation Ring (c) at the Wire Terminal (f) end of the Antenna Wire (b).

Connect the Hybrid Base.

3. Temporarily remove the Antenna Shackle (k) from the Antenna Connection (h).
4. Place the Wire Terminal from the Antenna Wire over the Antenna Connection and replace the Antenna Shackle. Tighten the nut snugly.
5. Connect the Carabiner from the Antenna Wire to the Antenna Shackle.
6. If using a counterpoise wire, connect it to the Counterpoise Connection (i). Tighten the nut snugly.
7. Connect a CHA RFI CHOKE and coaxial cable or the Integrated RF Choke end of the CHA

Coaxial Cable assembly to the UHF Socket (g) on the Hybrid Base.

Raise the Antenna.

8. Using a Bowline or similar knot, tie the end of a short length (around 4 feet) of Paracord to the Carabiner.
9. Drive a Stake into the ground near the location closest to the radio set and tie the Paracord from the Hybrid Base to the Stake using two Half Hitches, or similar knot. *The optional Spike Mount is an excellent alternative for this task.*
10. Using a Fisherman's Hitch or similar knot, attach a long length (50 feet or more) to the Antenna Wire around 25 feet from the Hybrid Base (a). *This will form the corner of the "L"*
11. Using a throw weight or some other method, loop the Paracord over the support closest to the radio set.

12. Using a Bowline or similar knot, tie a long length of Paracord to the Isolation Ring at the end of the Antenna Wire.

13. Using a throw weight or some other method, loop the Paracord over the other support.
14. Pull the Paracord at the radio set end until the Antenna Wire is at the desired height and secure it to the support using a Round Turn and two Half Hitches, or similar knot.
15. Pull the Paracord at the end of the Antenna Wire, such that the Antenna Wire is not quite taut, and secure it to the support using a Round Turn and two Half Hitches, or similar knot.

Extend the Counterpoise.

16. If using a counterpoise wire, extend it along the ground under the antenna.
17. Perform operational test.

Manpack Vertical

The CHA HYBRID - MINI / MICRO and CHA MIL WHIP Manpack Vertical configuration, see figure (4), is a broadband short range HF/VHF-LO antenna. This configuration, which is especially designed to be man-packable, is omnidirectional and provides ground wave communication on frequencies between 1.8 – 54.0 MHz without using sky wave propagation. Performance is limited below 3.5 MHz, but very good above 24 MHz. A single 25 foot counterpoise "tail wire" will provide a good compromise between portability and performance or you can use the supplied antenna wire as the counterpoise. An antenna tuner or coupler is required on most frequencies.

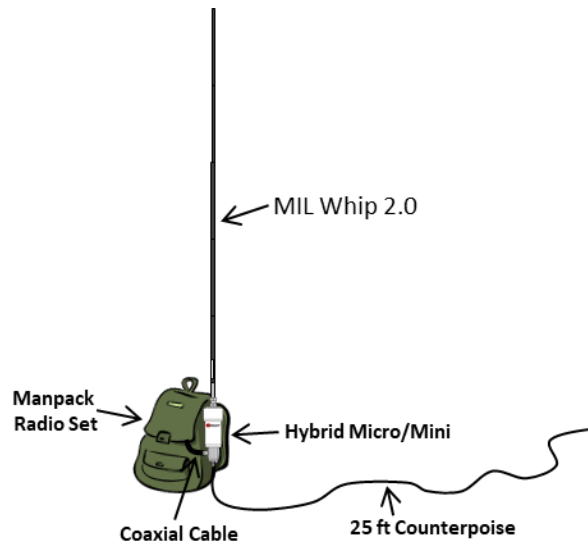


Figure 4. Manpack Vertical.

Site Selection and Preparation

1. Select a site to deploy the CHA HYBRID - MINI / MICRO Manpack Vertical configuration. Best ground wave communication occurs when the radio set is located in a clear area and the whip antenna is vertical.

Refer to plates (2) and (4) for the following steps.

2. If attached, remove the Antenna Shackle (k) from the Hybrid Base (a) by loosening the nut on the Antenna Shackle and then unscrewing the Antenna Shackle from the Antenna Connector (h). Store in secure place.

Connect the Hybrid Base.

3. Attach a counterpoise wire to the Hybrid Base by placing the counterpoise wire terminal lug over the Counterpoise Connection (i) and tightening the nut until snug.

4. Connect a CHA RFI CHOKE and coaxial cable or the Integrated RF Choke end of the CHA Coaxial Cable assembly to the UHF Socket (g) on the Hybrid Base.

Raise the Antenna.

5. Extend the CHA MIL WHIP 2.0 by unfolding the sections of the whip, starting with the section above the bottom section, and ensure each section is fully seated onto section below until the whip is fully extended.
6. Connect the CHA MIL WHIP 2.0 to the Hybrid Base by carefully screwing the 3/8" base stud into the Antenna Connection (h) until finger tight.

Extend the Counterpoise

7. Extend the counterpoise wire along the ground in any convenient direction.
8. Perform operational test.

Portable Vertical

The CHA HYBRID - MINI / MICRO and CHA MIL WHIP 2.0 with CHA MIL EXT 2.0 Portable Vertical configuration, see figure (4), is a broadband short to medium range HF/VHF-LO antenna. This configuration, which is especially designed to be portable, is omnidirectional and provides ground wave communication on frequencies between 1.8 – 54.0 MHz without using sky wave propagation. It also provide sky wave propagation, especially above 12 MHz. Using the optional CHA JAW MOUNT or Universal Clamp Mount (CHA UCM), the Portable Vertical can be mounted on almost any support, such as a camouflage netting support pole, fence post, picnic table, or ground mounted using the optional CHA SPIKE MOUNT. At least one counterpoise wire should be used. A single counterpoise wire, 25 feet in length, provides a good compromise between performance and portability. You may also use the supplied antenna wire as the counterpoise. The antenna can be attached to a standard 3/8" mobile mount on a stationary vehicle. No radials are required when mounted on a vehicle. Using four optional counterpoise wires (CHA COUNTERPOISES KIT) and an optional capacity hat (CHA CAP HAT) turns the Portable Vertical into a High-Efficiency Portable Vertical. An antenna tuner or coupler may be required for some frequencies and configurations. Use the following procedure to install the Portable Vertical configuration.

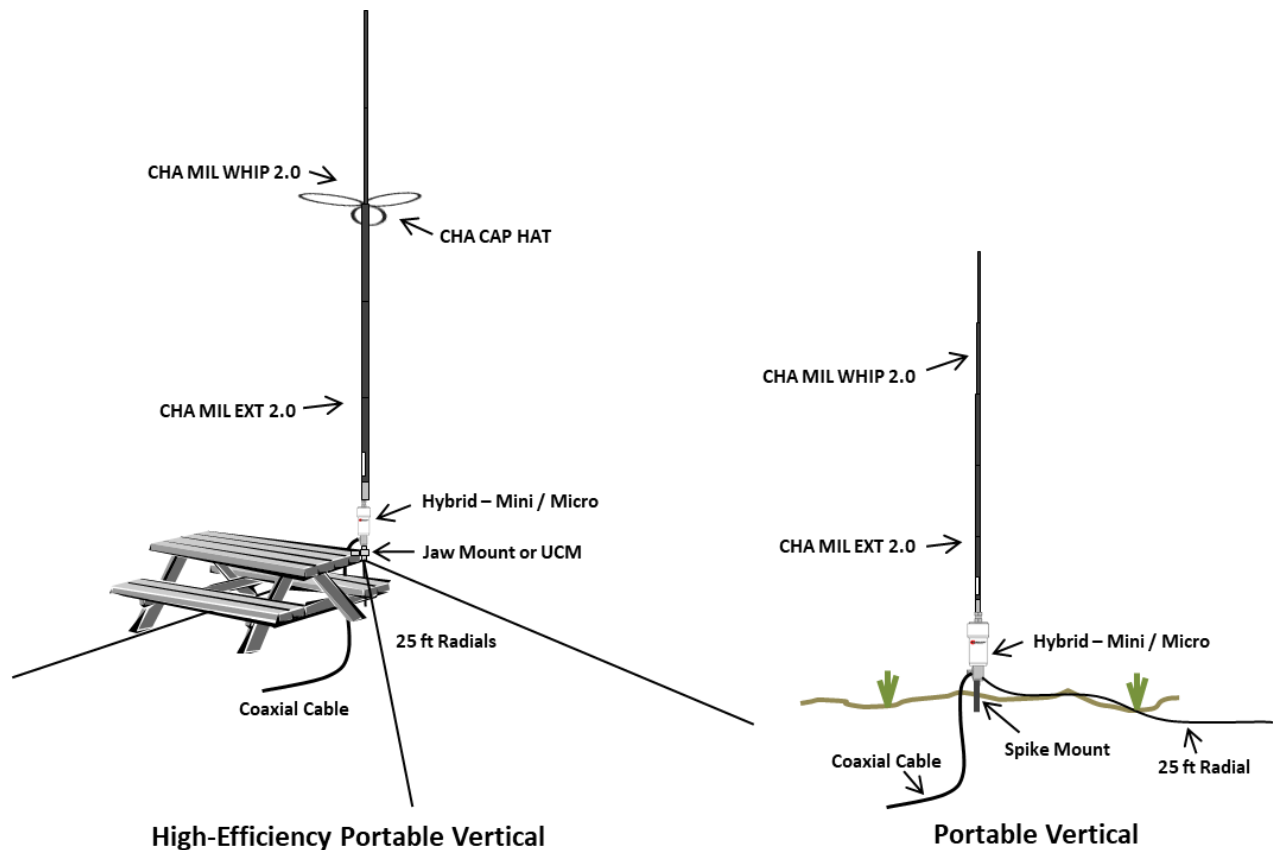


Figure 5. Example Portable Vertical Installations.

Site Selection and Preparation

1. Select a site to deploy the CHA HYBRID - MINI / MICRO Portable Vertical configuration. Best ground wave communication occurs when the radio set is located in a clear area and the whip antenna is vertical.
2. Clamp the CHA JAW MOUNT or Universal Clamp Mount (CHA UCM) to the support or drive the CHA SPIKE MOUNT into the ground. A vehicle mounted 3/8" x 24 mount may also be used when the vehicle is stationary.

Refer to plate (2) for the following steps.

3. If attached, remove the Antenna Shackle (k) from the Hybrid Base (a) by loosening the nut on the Antenna Shackle and then unscrewing the Antenna Shackle from the Antenna Connector (h). Store in secure place.

Connect the Hybrid Base.

4. If used, place the Terminal Lugs of the Counterpoise Wires over the Counterpoise Connection (i) on the Hybrid Base. You can use either the Antenna Wire (b) or the optional counterpoise kit (CHA COUNTERPOISES).
5. Screw the Hybrid Base Counterpoise Connection into the antenna mount 3/8" socket until finger tight.
6. Connect the Coaxial Cable assembly to the UHF Socket (g) on the Hybrid Base.

Raise the Antenna

7. Extend the CHA MIL EXT 2.0 by unfolding the middle section of the extension, fully seating it onto the bottom section, then

unfolding the top section and fully seating onto the middle section.

8. Extend the CHA MIL WHIP 2.0 by unfolding the sections of the whip, starting with the section above the bottom section, and ensure each section is fully seated onto section below until the whip is fully extended.
9. Connect the CHA MIL WHIP 2.0 to the CHA MIL EXT 2.0 by carefully screwing the 3/8" base stud into the top section until finger tight.
10. Connect the CHA MIL EXT 2.0 to the Hybrid Base by carefully screwing it into the Antenna Connection until finger tight.

Extend the Counterpoise

11. Extend the counterpoise wire along the ground in any convenient direction. The end of the counterpoise wire can be secured to the ground with a tent stake.

High-Efficiency Portable Vertical

To reconfigure the Portable Vertical to a High-Efficiency Portable Vertical configuration, perform steps (12) and (13).

12. Connect additional Counterpoise Wires to base of Hybrid or to the mount ground connection.
13. Install Capacity Hat between the CHA MIL EXT 2.0 and the CHA MIL WHIP 2.0. The easiest way to do that is to remove the CHA MIL EXT 2.0 from the Hybrid and then unscrew the CHA MIL WHIP 2.0 from the CHA MIL EXT 2.0.
14. Perform operational test.

Portable Dipole

The CHA HYBRID - MINI / MICRO base with two optional 17 ft stainless steel telescoping whips (CHA SS17) and a CHA TDL Hub can make a Portable Dipole configuration, see figure (8). This antenna configuration is a broadband short to medium range HF/VHF-LO antenna. When used with the optional Chameleon Antenna™ MIL EXT 2.0 mast and Spike Mount, this configuration provides the ultimate in versatility and portability. This configuration will provide good NVIS propagation on lower frequencies. It is predominately omnidirectional and also provides medium range sky wave propagation on frequencies above 10 MHz. An antenna tuner or coupler may be required for some frequencies.

Higher performance can be obtained by using a taller mast, such as the CHA FG Mast 12, shown in figure (9).

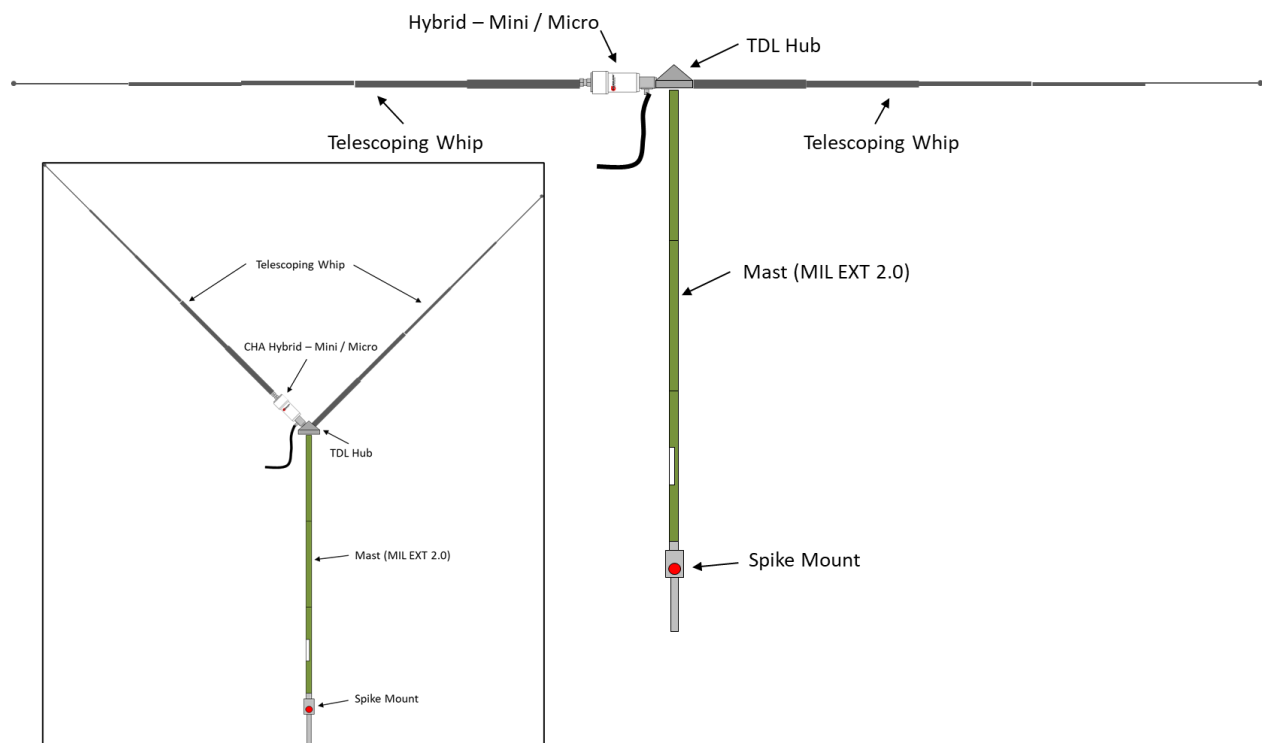


Figure 8. Portable Horizontal Dipole (Portable "V" Dipole, inset).

Use the following procedure to install the Portable Dipole configuration:

Site Selection and Preparation

1. Select a site to deploy the CHA HYBRID - MINI / MICRO Portable Dipole configuration. The best location would be a clear and reasonably level area.
2. Drive the Spike Mount into the ground at the desired location.

Refer to plate (2) for the following steps.

3. If attached, remove the Antenna Shackle (k) from the Hybrid Base (a) by loosening the nut on the Antenna Shackle and then unscrewing the Antenna Shackle from the Antenna Connector (h). Store in secure place.

Assemble Components

4. Extend the CHA MIL EXT 2.0 mast by unfolding the middle section of the extension, fully seating it onto the bottom section, then unfolding the top section and fully seating onto the middle section.
 5. Thread the base 3/8" stud of the TDL Hub into the socket on top of the MIL EXT 2.0 mast until finger tight.
 6. Thread the Hybrid Base Counterpoise Connection (i) into the appropriate socket in the TDL Hub until finger tight.
 7. Thread the base 3/8" stud of one CHA SS17 telescoping whip (the antenna) into the Antenna Connection (h) on top of the Hybrid Base, until finger tight.
 8. Thread the base stud of the other CHA SS17 telescoping whip (the counterpoise) into the appropriate socket in the TDL Hub, until finger tight.
 9. Connect the Coaxial Cable assembly to the UHF Socket (g) on the Hybrid Base.
- Raise the Antenna.*
10. Carefully thread the base stud of the CHA MIL EXT into the socket on top of the Spike Mount until finger tight.
 11. Extend both of the CHA SS17 telescoping whips by pulling out each section of the whip fully, starting from the top of the whip.
 12. Perform operational test.

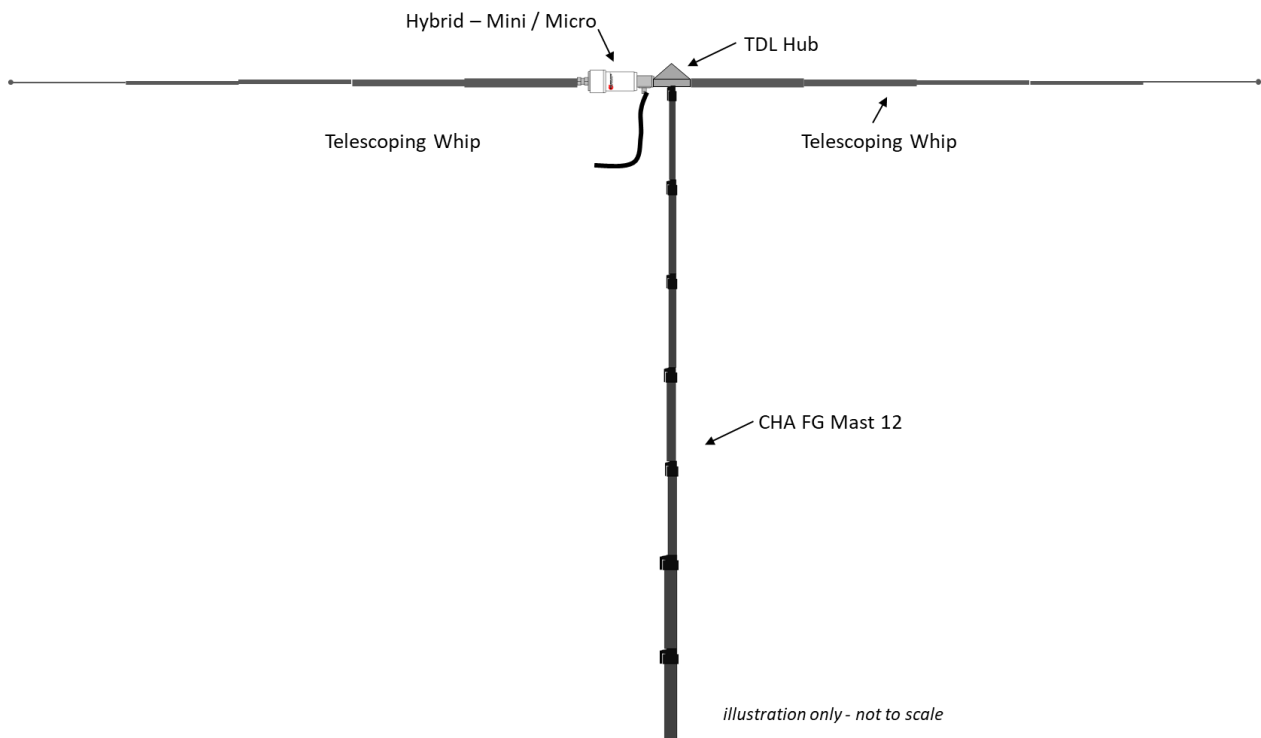


Figure 9. Portable Horizontal Dipole Using Fiberglass Portable Mast.

Recovery Procedure

To recover the CHA HYBRID - MINI / MICRO, perform the following steps:

1. Disconnect the Coaxial Cable from the radio set.
2. Lower the antenna to the ground.
3. Disconnect the Coaxial Cable from the Hybrid Base (a).
4. Carefully roll (do not twist) the Coaxial Cable.
5. Untie the Paracord from the Hybrid Base and Antenna Wire (b), as applicable and wind on line winder.
6. If used, pull the Stakes from the ground.
7. Disconnect the antenna from the Hybrid Base.
8. If used, wind the Antenna Wire onto the Line Winder (e) and secure with attached shock cord.
9. If used, starting at the bottom of the CHA MIL WHIP 2.0, pull the section apart from the section above and fold the section above over the section below. Repeat until all sections are apart. Secure the sections together with the sticky strap.
10. If used, starting at the bottom of the CHA MIL EXT 2.0, pull the section apart from the section above and fold the section above over the section below. Repeat until all sections are apart. Secure the sections together with the sticky strap.
11. If used, store the assembled capacity hat where it will not get bent when not in use. We recommend that you do not disassemble the CHA CAP HAT.
12. If used, collapse the CHA SS17 telescoping whips by collapsing each section fully, starting at the bottom.
13. Remove dirt from antenna components and inspect them for signs of wear.
14. Store components together, ready for next deployment.

Troubleshooting

1. If using the Antenna Wire, ensure Wire Terminal is securely connected.
2. Inspect Antenna Wire or Whips for corrosion, breakage, or signs of strain.
3. Ensure UHF Plugs are securely tightened.
4. Inspect Coaxial Cable assembly for cuts in insulation or exposed shielding. Replace if damaged.
5. If still not operational, connect a Standing Wave Ratio (SWR) Power Meter and check SWR.
6. If SWR is greater than 10:1, check antenna tuner or coupler using the technical manual or manufacturer's procedure. Be sure to check the Coaxial Patch Cable that connects the radio set to the antenna tuner or coupler.
7. If still not operational, replace Coaxial Cable assembly. *Most problems with antenna systems are caused by the coaxial cables, connectors, and adapters.*
8. Connect a Multi-Meter to the Antenna Wire to check continuity. Replace assemblies that do not pass a continuity check.
9. If still not operational, replace Hybrid Base.

Specifications

- Frequency: (all configurations require an antenna tuner or coupler)
 - CHA HYBRID MINI / MICRO with supplied Antenna Wire: 1.8 MHz through 54 MHz continuous (*including all Amateur Radio Service bands 160m to 6m*).
 - CHA MIL WHIP 2.0: 24 – 54 MHz (*whip only*), 1.8 – 54 MHz (*with CHA HYBRID MINI / MICRO. Limited performance below 3.5 MHz.*)
 - CHA MIL WHIP 2.0 with CHA MIL EXT 2.0: 12 – 54 MHz (*whip and extension only*) or CHA SS17, 1.8 – 54 MHz (*with CHA HYBRID MINI / MICRO.*)
- Power:
 - HYBRID MICRO: 100W SSB Phone, 25W All Other Modes Intermittent Commercial and Amateur Service (ICAS)
 - HYBRID MINI: 500W SSB Phone, 100W All Other Modes (ICAS)

Note: Prolonged transmissions or exceeding power specifications may cause damage to antenna components.
- RF Connection: UHF Plug (PL-259)
- SWR: Subject to frequency and configuration, but within limits of most antenna tuners or couplers. Figure (9) shows a graph of SWR by frequency for a typical deployment.
- Hybrid Configuration Far Field Plots are shown in figures (10) through (16).
- Length:
 - Antenna Wire: 30, 60, or 130 ft
- Weight:
 - CHA HYBRID MINI: 1.5 lbs.
 - CHA HYBRID MICRO: 1 lbs.
- Personnel Requirements and Setup Time: one operator, less than 15 minutes (antenna wire), less than 5 minutes (whip).

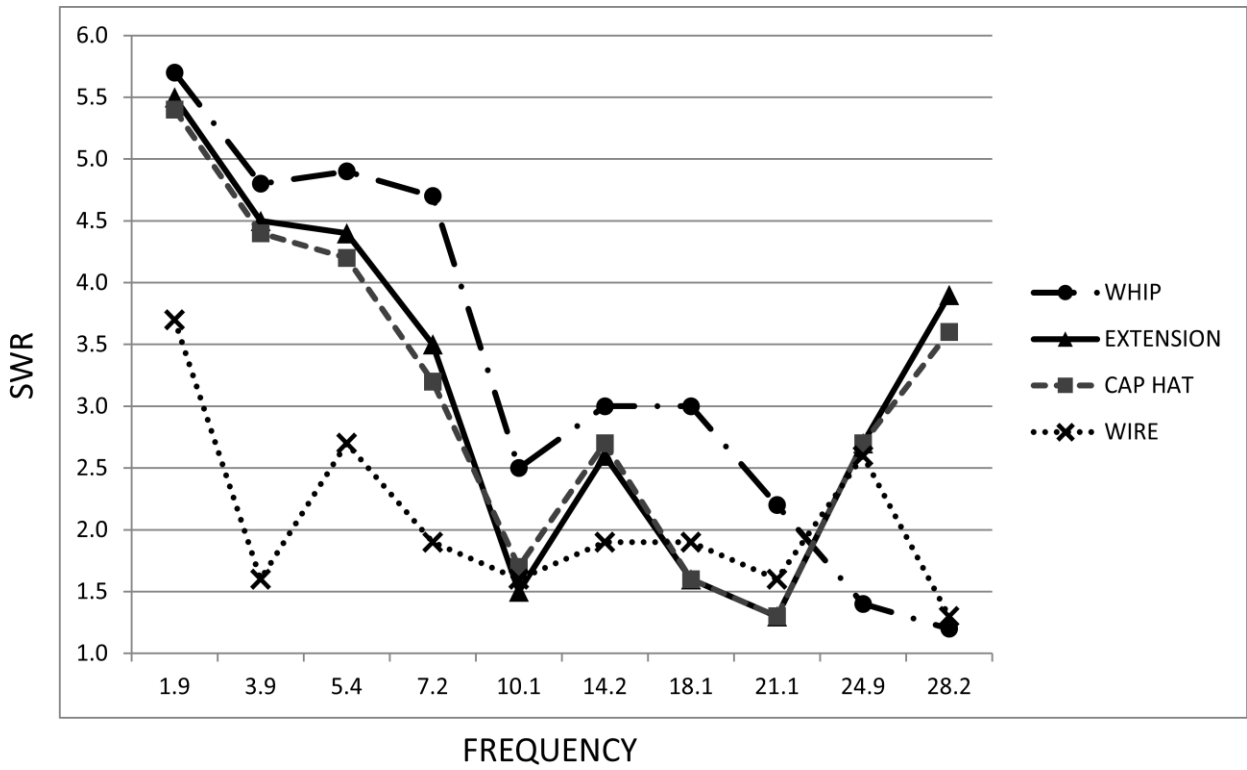
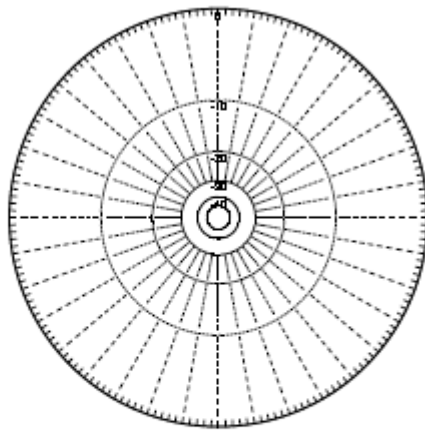


Figure 9. SWR by Frequency Graph.

MMANA-GAL basic v. 3.0.0.31



MMANA-GAL basic v. 3.0.0.31

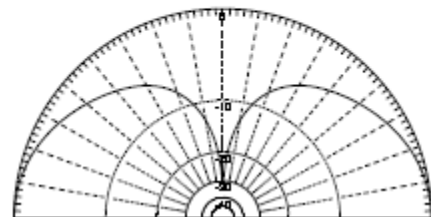
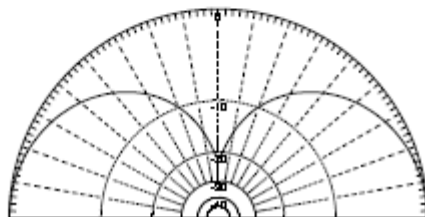
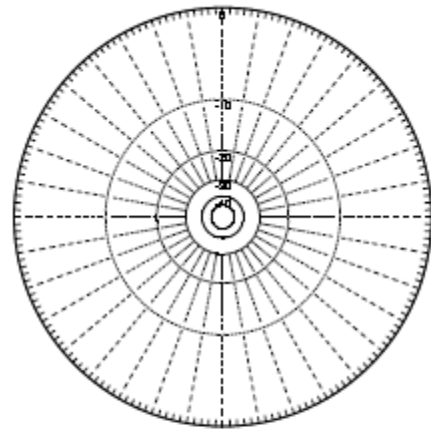
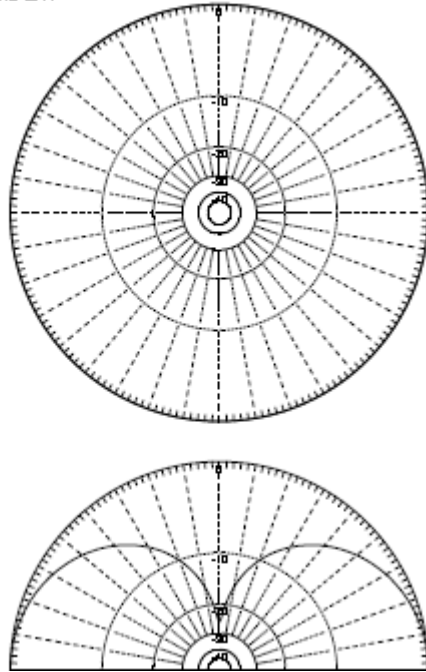


Figure 10. Manpack Vertical Far Field Plots 7 MHz (left), 14 MHz (right).

MMANA-GAL basic v. 3.0.0.31
CHAMIL WHIP MIL EXT



MMANA-GAL basic v. 3.0.0.31
CHAMIL WHIP MIL EXT

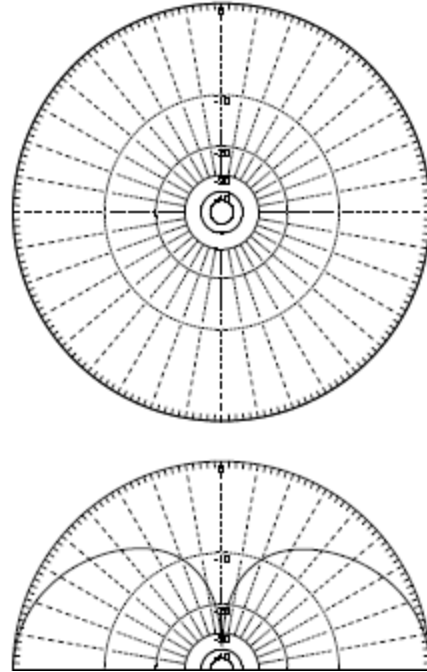
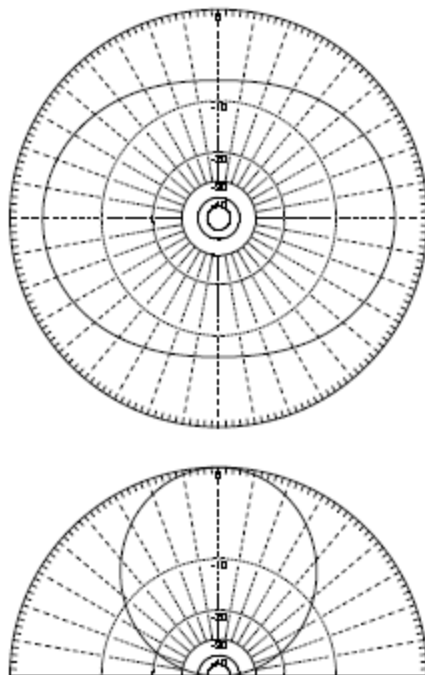


Figure 11. Portable Vertical Far Field Plots 7 MHz (left), 14 MHz (right).

MMANA-GAL basic v. 3.0.0.31
Tilted NMS



MMANA-GAL basic v. 3.0.0.31
Tilted NMS

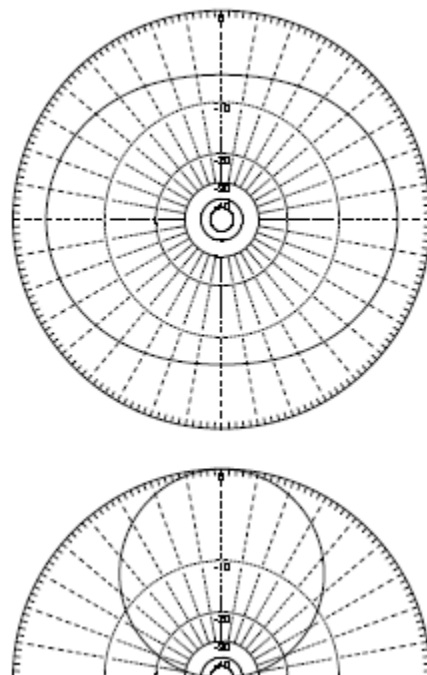
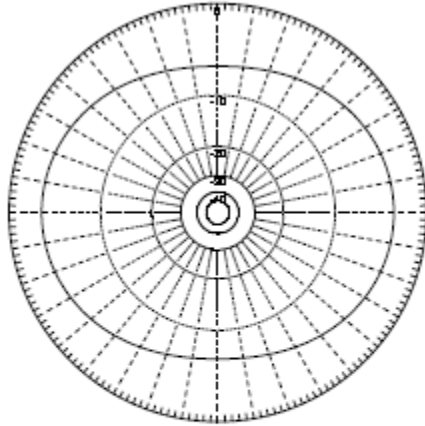


Figure 12. Tilted NVIS Far Field Plots 3.7 MHz (left), 7 MHz (right).

MMANA-GAL basic v. 3.0.0.31
MIL WHIP EXT DIPOLE



MMANA-GAL basic v. 3.0.0.31
MIL WHIP EXT DIPOLE

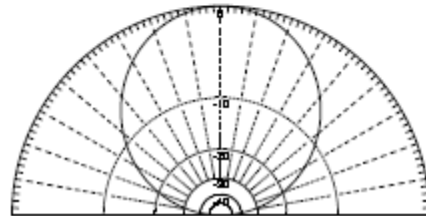
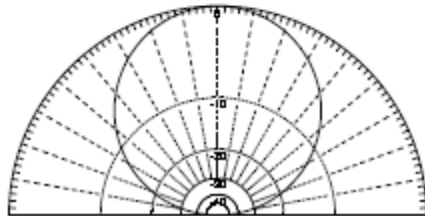
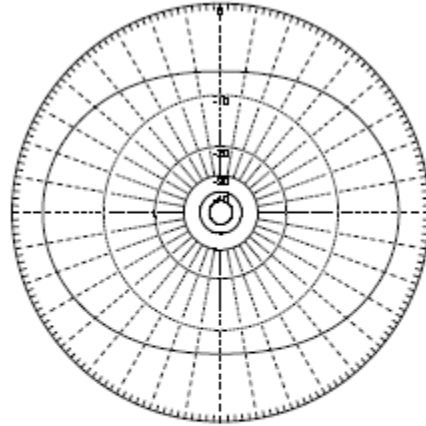
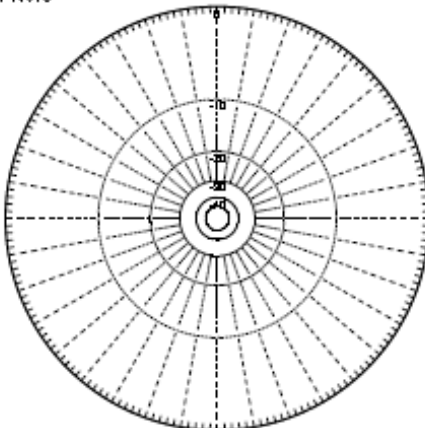


Figure 13. MIL WHIP EXT Dipole Far Field Plots 7 MHz (left) 14 MHz (right).

MMANA-GAL basic v. 3.0.0.31
CHA TD Horizontal NVIS



MMANA-GAL basic v. 3.0.0.31
Horizontal NVIS

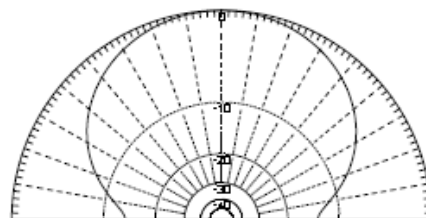
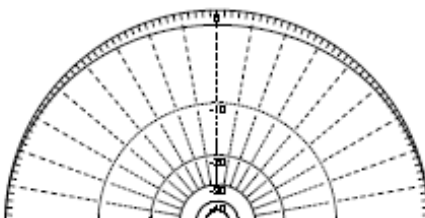
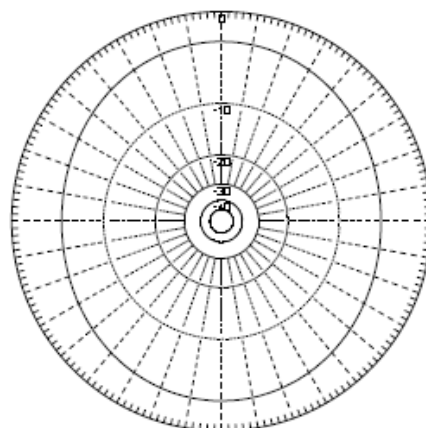
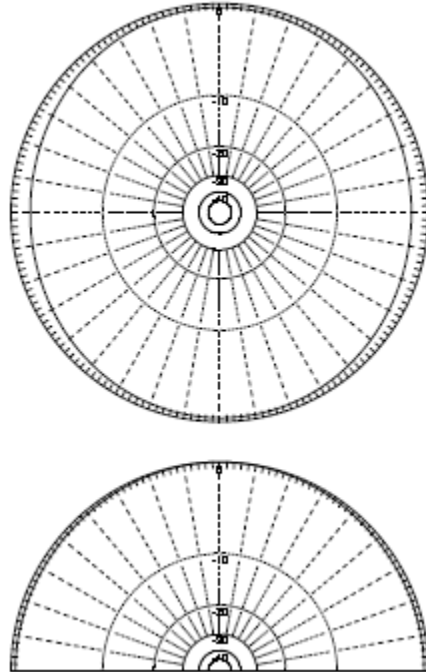


Figure 14. Horizontal NVIS Far Field Plots 3.7 MHz (left) 7 MHz (right).

MMANA-GAL basic v. 3.0.0.31
Sloping Wire Unterminated



MMANA-GAL basic v. 3.0.0.31
Sloping Wire Unterminated

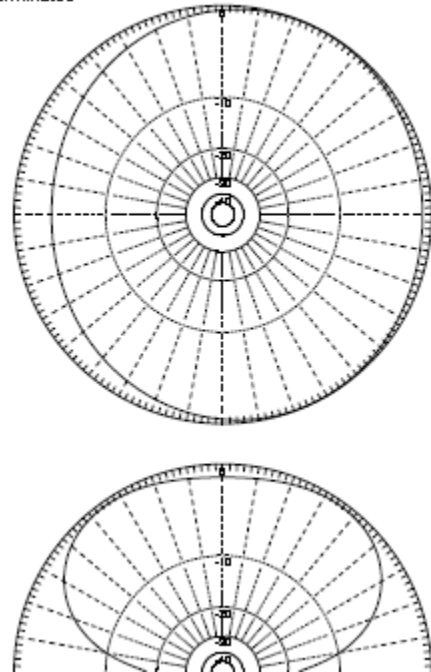
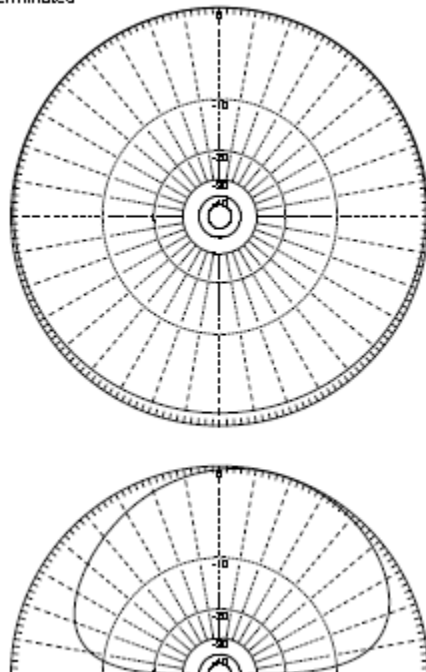


Figure 15. Sloping Wire Far Field Plots 7 MHz (left) 14 MHz (right).

MMANA-GAL basic v. 3.0.0.31
INVERTED L Unterminated



MMANA-GAL basic v. 3.0.0.31
INVERTED L Unterminated

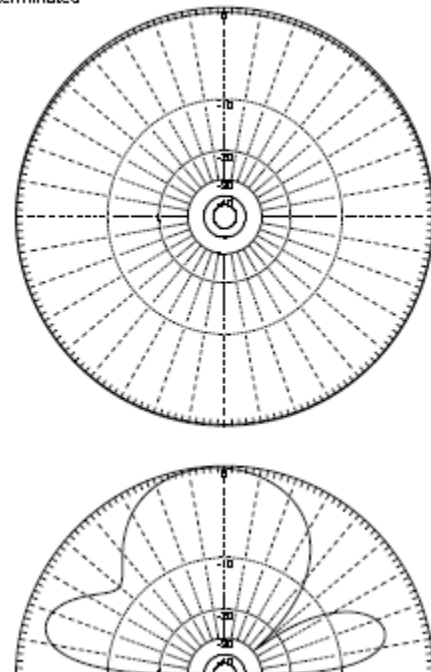


Figure 16. Inverted "L" Far Field Plots 7 MHz (left) 14 MHz (right).

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.

Accessories

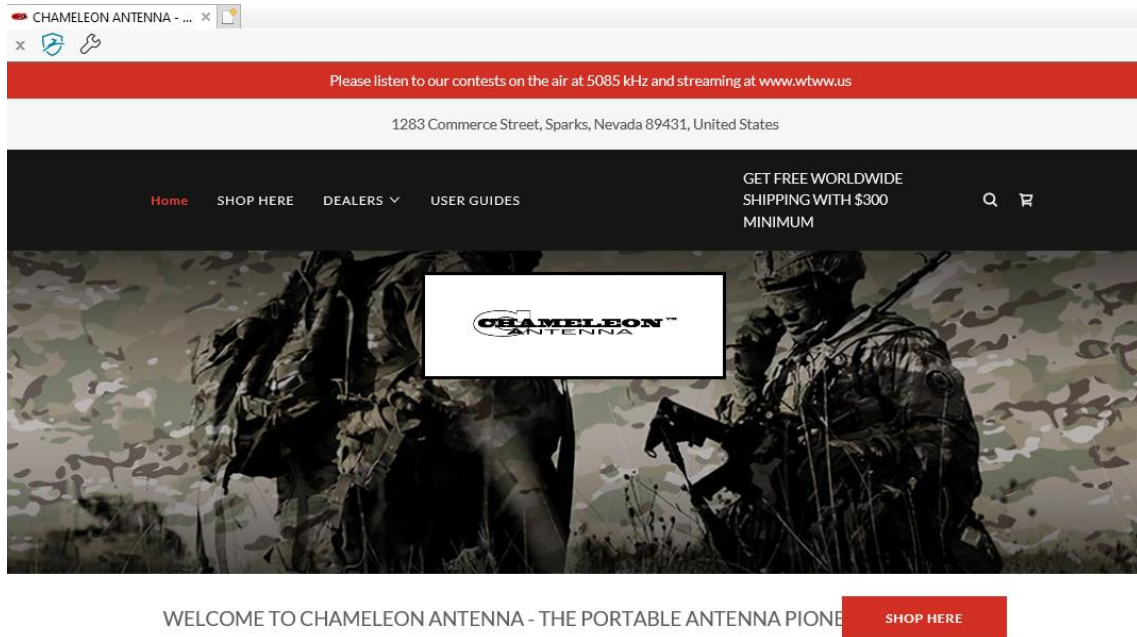
The following accessories are available for purchase from Chameleon Antenna™. Please contact us at support@chameleonantenna.com for current prices and availability.

- **CHA MIL WHIP 2.0.** The CHA MIL 2.0 whip is a broadband monopole antenna designed for portable or manpack radios requiring compact but rugged antenna systems.
- **CHA MIL EXT 2.0.** The CHA MIL EXT 2.0 antenna extension has been designed to offer maximum portability and performance for those already using the portable CHA MIL 2.0 whip for man-pack antenna system. This collapsible antenna extension needs to be used with the CHA MIL 2.0 to create an 18' 2" long portable vertical antenna.
- **CHA SS 17.** The CHA SS17 is a rust resistant 10 section stainless steel telescoping whip which extends to 17' and collapses to 27". The CHA SS17 is equipped with a 3/8x24 mounting stud for easy mounting to other Chameleon products such as the Hybrid Mini or Hybrid Micro.
- **CHA SPIKE MOUNT.** The CHA SPIKE is a must have accessory for use with the HYBRID series antenna bases. It is highly portable and enables easy ground mounting of the HYBRID series antennas.
- **CHA Jaw Mount.** The Chameleon Jaw Mount has been assembled to offer portable antenna versatility for Chameleon Antenna owners. The mount orientation can easily be changed with a simple 3/16 Allen Key. The mount can also be used for NVIS antenna configuration.
- **Capacity Hat.** The CHA CAP-HAT has been designed to enhance the radiation of any screw together HF antennas.
- **Counterpoise Kit.** The Counterpoise Kit is ideal for portable antenna deployment. The system will create the ground-plane needed to any vertical antennas and will also play the role of guy wires. It contains four 25 foot wire radials secured around plastic wire winders and four steel tent stakes.
- **50' Paracord and Line Winder Assembly.** One assembly is recommended to enable installation of the CHA HYBRID - MINI / MICRO wire configurations.
- **Coaxial Cable Assembly.** The CHA 50' COAX with integrated RFI Choke consists of 50 feet of high-quality RG-58 cable with PL-259 connectors on each end and an integrated RFI Choke.

- **Universal Clamp Mount.** The Super heavy-duty CHA UCM Universal Clamp Mount, is the first ham radio antenna mounting system, purposely designed for extreme portable operations. This is a rugged, robust product, intended to support considerable antenna loads.
- **CHA Hub Kit.** The CHA Hub Kit consists of 25' Tinned Copper KEVLAR PTFE and a TDL HUB. The TDL HUB is used to create portable dipoles or the Tactical Delta Loop.
- **CHA FG Mast 12.** The CHA FG Mast 12 is a portable fiberglass telescoping mast that is 12 foot tall when extended and 3 ft. 7 in. when collapsed. It comes with a 3/8" x 24 adapter top to enable use with many antennas produced by Chameleon Antenna™.
- **Universal Guying Kit.** The Universal Guying Kit (CHA UGS) contains the guy lines and tent stakes needed to support the CHA FG Mast 12 in the field.

Chameleon Antenna™ Products

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



Chameleon Antenna™ products are available from these great dealers:

- HRO
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- WIMO
- MOONRAKER
- RADIOWORLD UK
- R&L ELECTRONICS
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