HF Modular Portable Antenna System 2.0 (CHA MPAS 2.0) Operator's Manual

Nevada - USA
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VERSATILE – DEPENDABLE – STEALTH – BUILT TO LAST

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WARNING! Never mount this, or any other antenna near power lines or utility wires! Any materials: ladders, ropes, or feedlines that contact power lines can conduct voltages that kill. Never trust insulation to protect you. Stay away from all power lines.

WARNING! Never operate this antenna where people could be subjected to high levels of RF exposure, especially above 10 watts or above 14 MHz. Never use this antenna near RF sensitive medical devices, such as pacemakers.

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.

Introduction

Thank you for purchasing and using the Chameleon Antenna™ High Frequency (HF) Modular Portable Antenna System 2.0 (CHA MPAS 2.0). The CHA MPAS 2.0 is designed to be the most versatile, high performance, and rugged portable / man-packable HF antenna available using the "LEGO® BLOCK" approach. The CHA MPAS 2.0 has several product improvements over the original MPAS, which were designed to improve the overall performance, portability, and durability of the antenna system. We believe the CHA MPAS 2.0 is the best modular portable HF antenna system in the world.

The core components of the antenna system, see plate (1), are: a CHA HYBRID-MICRO or CHA HYBRID-MINI matching transformer unit and antenna base, 73 feet of antenna wire, 25 feet of counterpoise wire, a 9'4" military-style collapsible whip antenna (CHA MIL 2.0), a 8'9" military-style antenna extension (CHA MIL EXT 2.0), an in-ground antenna mount (CHA SPIKE), a coaxial cable with an integrated Radio Frequency Interference (RFI) choke and UHF connectors, and a military-style sling bag. Available high-performance options *(sold separately)* include a counterpoise (radial) kit (CHA COUNTERPOISE KIT), a high-efficiency capacity hat (CHA CAP HAT), a clamp-on antenna mount (CHA JAW MOUNT), a heavy-duty Universal Clamp Mount (CHA UCM), and a Universal Guying System (CHA UGS). The components of the CHA MPAS 2.0 provide a continuum of portability and performance to meet your communications requirements.

Plate 1. CHA MPAS 2.0 Core Components.

The integral broadband impedance matching network transformer of the CHA HYBRID Micro/Mini units allow broadband antenna tuning. The antenna will operate continuously from 1.8 – 54.0 MHz (including 160m – 6m amateur bands) without any adjustment with a wide range antenna tuner or coupler (the shortest configuration has limited performance below 3.5 MHz). The CHA MPAS 2.0 is perfect for Government/Military, Non-Governmental Organizations (NGO), and Emergency Preparedness and Survival Communication. It is also the antenna for hams that enjoy camping, hiking, biking or other types of outdoor recreation which require communication gear to be both effective and highly portable. The CHA MPAS 2.0 is configurable to facilitate Near-Vertical Incident Sky wave (NVIS) communication and is totally waterproof. The CHA MPAS 2.0 requires an antenna tuner or coupler on most frequencies. 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 MPAS 2.0.

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 MPAS 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 multi-hop 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 loses. 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 show 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 is 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 MPAS 2.0 is comprised of the following assemblies and components, see plates (2) through (4):

a. **Hybrid Micro/Mini Unit.** The Hybrid Micro/Mini Unit provides a mounting base and impedance matching for the CHA MPAS 2.0. The CHA Hybrid Mini performs the same function, and has the same electrical and mechanical connections as the Hybrid Micro, but has a higher power rating and is slightly larger and heavier.

b. **Antenna Wire.** The Antenna Wire is a 73-foot length of insulated wire.

c. **Isolation Ring.** An Isolation Ring is permanently attached to both ends of the Antenna Wire. There is also a floating Isolation Ring which is used to suspend the Antenna Wire anywhere in the middle for Inverted "V" and Inverted "L" antenna configurations.

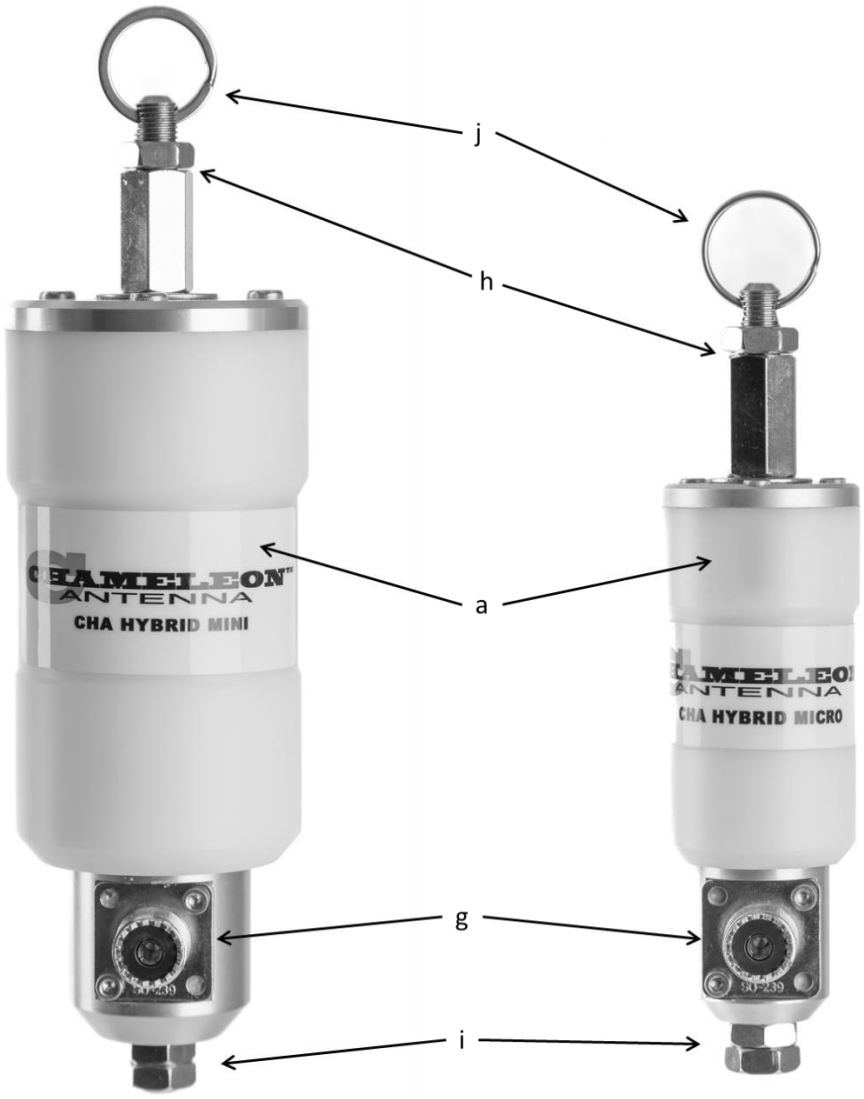


Plate 2. Hybrid Mini (left) / Micro (right).

d. **Carabiner.** The Carabiner is a removable pear-shaped stainless-steel hook with a spring-loaded gate used for mechanical connections.

e. **Line Winder.** The Line Winders are used to store the Antenna Wire and Counterpoise Wire enabling rapid deployment and recovery of the CHA MPAS 2.0.

f. **Wire Connector.** The Wire Connectors are terminal lugs located at one end of the Antenna Wire and Counterpoise Wire.

g. **UHF Connector Socket.** The UHF Connector Socket, SO-239, is located on the side of the Hybrid Micro/Mini Unit.

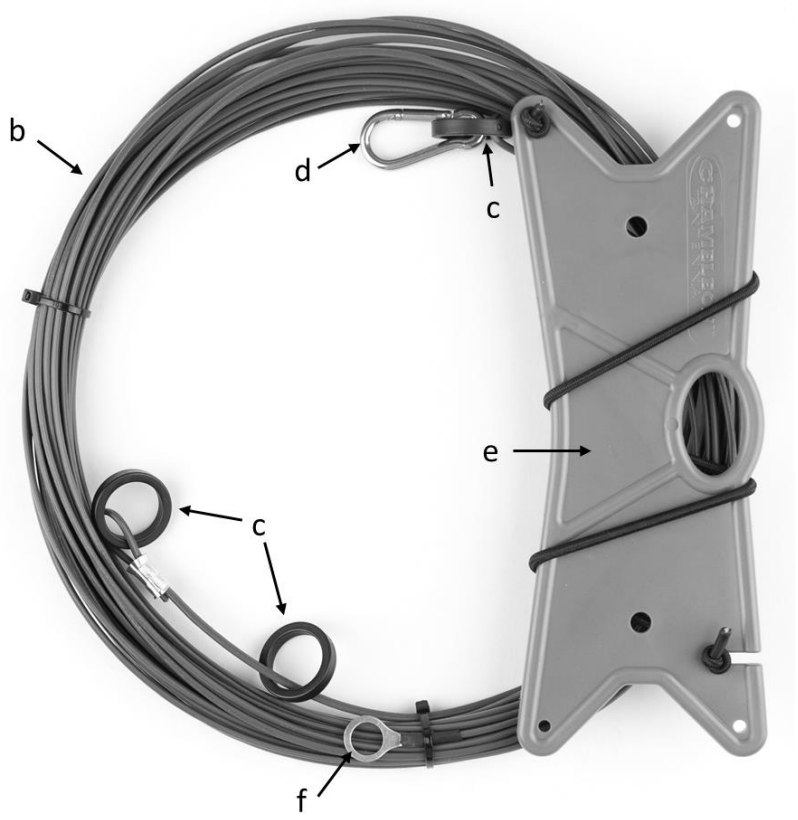


Plate 3. Antenna Wire Assembly.

h. **Antenna Connection.** The Antenna Connection is located on the top of the Hybrid Micro/Mini Unit (a). It is a 3/8" x 24 (fine thread) female fitting.

i. **Base Connection.** The Base Connection is located on the bottom of the Hybrid Micro/Mini Unit(a). It is a 3/8" x 24 (fine thread) male fitting. This fitting provides mechanical connection to the Spike Mount (or optional clamp mounts). It is also used for the ground connection when not using the Spike Mount.

j. **Antenna Shackle.** The Antenna Shackle consists of a shackle ring, bolt, and nut. It is attached to the top of the Hybrid Micro/Mini Unit.

k. **Counterpoise Wire** *(not shown).* The Counterpoise Wire consists of 25 feet of insulated wire with a Wire Connector (f) on one end.

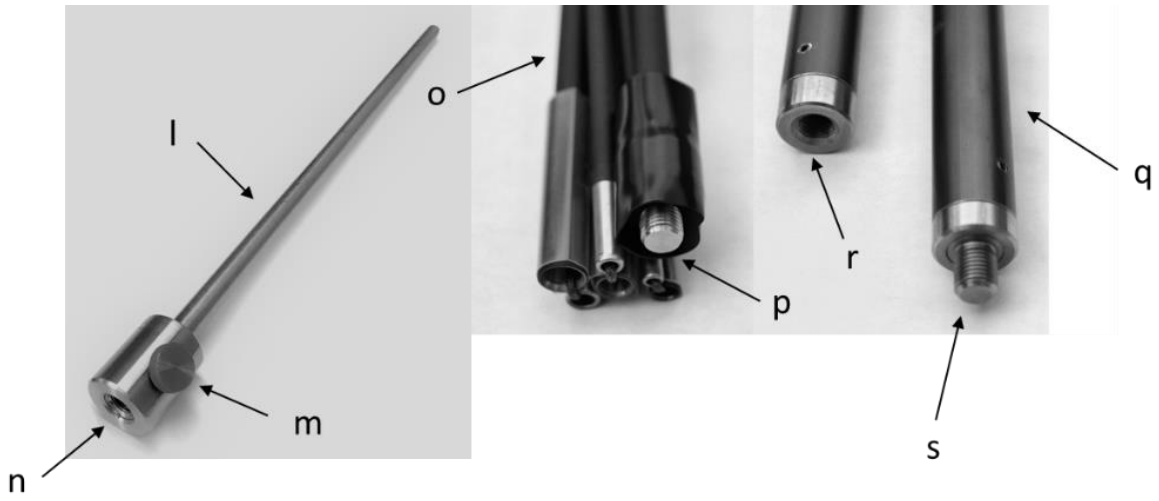


Plate 4. Whip Antenna and Spike Mount Connections.

l. **Spike Mount.** The Spike Mount (CHA SPIKE) is stainless-steel spike with a 3/8" x 24 (fine thread) female fitting and knurled knob, used as the in-ground mount for the vertical antenna configuration.

m. **Ground Connection.** The Ground Connection is used as the electrical connection point for the Counterpose Wire.

n. **Mount Connection.** The Mount Connection is used as the mechanical connection point for the Hybrid Micro/Mini Unit.

o. **Whip Antenna.** The Whip Antenna (CHA MIL WHIP 2.0) is a military-style collapsible whip antenna. It can be used with the Hybrid Micro/Mini Unit only or with the Hybrid Micro/Mini Unit and the Antenna Extension.

p. **Whip Base.** The Whip Base is used to connect the Whip Antenna (o) to the Hybrid Micro/Mini Unit.

q. **Antenna Extension.** The Antenna Extension (CHA MIL EXT 2.0) is used to increase the length of the Whip Antenna, which significantly increases the performance of the MPAS 2.0, especially on lower frequencies.

r. **Extension Connection.** The Extension Connection is used to connect the Whip Antenna to the Antenna Extension.

s. **Extension Base.** The Extension Base is used to connect the Antenna Extension to the Hybrid Micro/Mini Unit.

t. **Coaxial Cable** *(not shown).* The Coaxial Cable (CHA 50' COAX) consist of 50 feet of 50 Ohm coaxial cable with an integrated Radio Frequency Interference (RFI) choke. Both ends of the coaxial cable are terminated with a UHF Connector.

u. **Sling Bag** *(not shown).* The Sling Bag is a military-style sling bag used to store the components of the MPAS 2.0.

Antenna Configurations

Using the supplied components*, the CHA MPAS 2.0 can be deployed into a number of operationally useful configurations. Six configurations, see table (2), are described in this manual, each with unique performance characteristics.

**Note: you may also need approximately 50 feet of Paracord or other low-stretch synthetic line, a tent stake, and a plastic mallet.*

Configuration	Ground	Short	Medium	Long	Directionality
Manpack Vertical	↕				Omnidirectional
Portable Vertical	↕		↑		Omnidirectional
Horizontal NVIS		↓	↑		Omnidirectional
Sloping Wire	↓		↕		Unidirectional
End-Fed Inverted "L"		↓	↕		Bidirectional
End-Fed Inverted "V"	↕		↓	↑	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 (↓ = 1.8 – 10 MHz) or upper (↑ = 10 – 30 MHz) frequency range. Finally, select the antenna configuration with the corresponding symbol in the appropriate distance column. All CHA MPAS 2.0 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 predominate directionality characteristic

of the antenna configuration. When using NVIS, all the configurations are omnidirectional. Most configuration and frequency combinations will require a wide range antenna tuner or coupler.

Manpack Vertical

The CHA MPAS 2.0 Manpack Vertical configuration is a broadband short-range HF/VHF-LO antenna. This configuration, see figure (1), uses four components from the CHA MPAS 2.0: MIL WHIP 2.0, Hybrid Micro/Mini Unit, Counterpoise Wire, and Coaxial Cable *(a shorter 50 Ohm coaxial cable may be substituted to increase portability in this configuration)*. This configuration 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 7 MHz, but very good above 24 MHz. The included 25-foot counterpoise "tail wire" provides a good compromise between portability and performance. An antenna tuner or coupler is required on frequencies below 10 MHz. Use the following procedure to install the Manpack Vertical configuration.

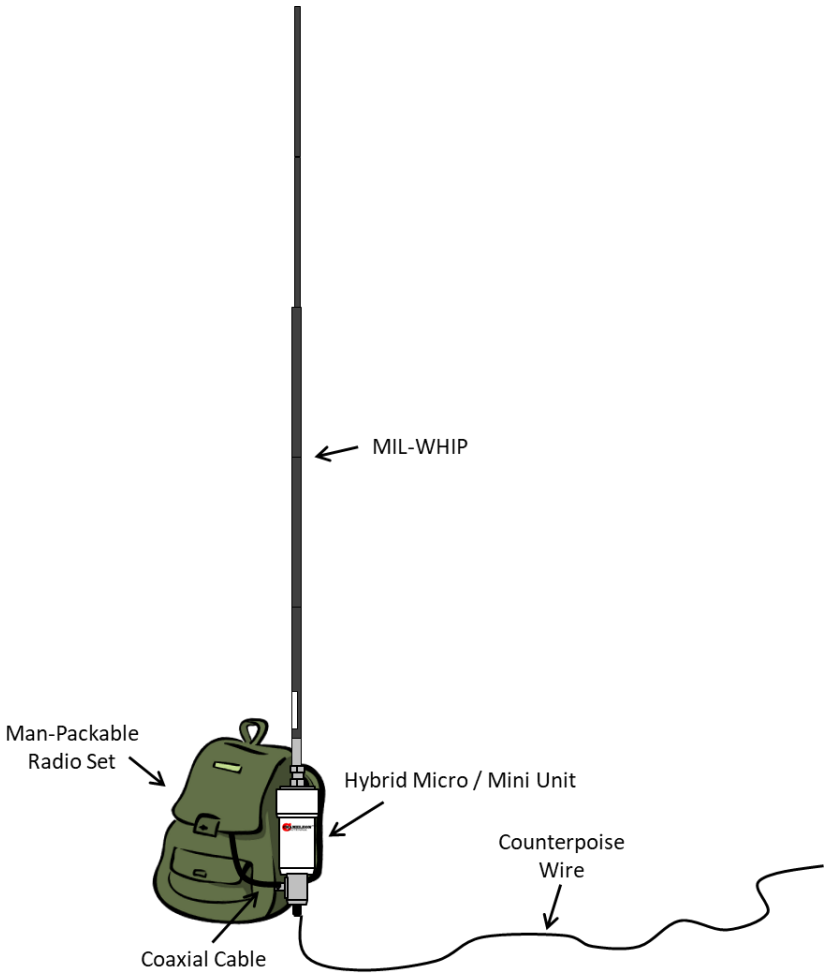


Figure 1. Manpack Vertical.

Site Selection and Preparation

1. Select a site to deploy the CHA MPAS 2.0 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) - (4) for the following steps.

2. If attached, remove the Antenna Shackle (j) from the Hybrid Micro/Mini Unit(a) by loosening the nut on the Antenna Shackle and then unscrewing the Antenna Shackle from the Antenna Connection (h).
3. Store in Sling Bag (u).

Connect the Hybrid Micro/Mini Unit.

4. Temporarily remove one nut from the Base Connection (i) of the Hybrid Micro.
5. Attach the Counterpoise Wire (k) to the Hybrid Micro/Mini Unit by placing the Wire Connector (f) over the Base Connection. Replace and tighten the nut until snug.
6. Connect the UHF Connector Plug at the Integrated RFI Choke end of the Coaxial Cable (t) to the UHF Connector Socket (g) on the Hybrid Micro. *A shorter 50 Ohm coaxial cable (not included) may be substituted to increase portability in this configuration.*

Raise the Antenna.

7. Extend the Whip Antenna (o) by unfolding the sections of the whip, starting with the section above the bottom section. Ensure each section is fully seated onto section below until the whip is fully extended.
8. Connect the Whip Antenna to the Hybrid Micro/Mini Unit by carefully threading the Whip Base (p) into the Antenna Connection until finger tight.

Extend the Counterpoise

9. Extend the Counterpoise Wire along the ground in any convenient direction.
10. Connect Coaxial Cable to Radio Set and perform an operational test.

Portable Vertical

The CHA MPAS 2.0 Portable Vertical configuration, is a broadband short to medium range HF/VHF-LO antenna. This configuration, see figure (2), uses six components from the CHA MPAS 2.0: MIL WHIP 2.0, MIL EXT 2.0, Hybrid Micro/Mini Unit, Counterpoise Wire, Spike Mount (or optional clamp mounts), and the Coaxial Cable. This configuration, which is especially designed to be both portable and effective, is omnidirectional and provides ground wave communication on frequencies between 1.8 – 54.0 MHz without using sky wave propagation. It also provides sky wave propagation, especially above 12 MHz. The antenna is normally ground mounted using the Spike Mount, but can be mounted on almost any support, such as a camouflage netting support pole, fence post, balcony rail, or picnic table using the optional CHA Universal Clamp Mount (CHA UCM) or JAW MOUNT. The optional counterpoise radials (CHA COUNTERPOISE KIT), capacity hat (CHA CAP HAT), and guying system (CHA UNIVERSAL GUYING SYSTEM) will improve the performance of the Portable Vertical configuration. An antenna tuner or coupler is required on

most frequencies below 10 MHz. Use the following procedure to install the Portable Vertical configuration.

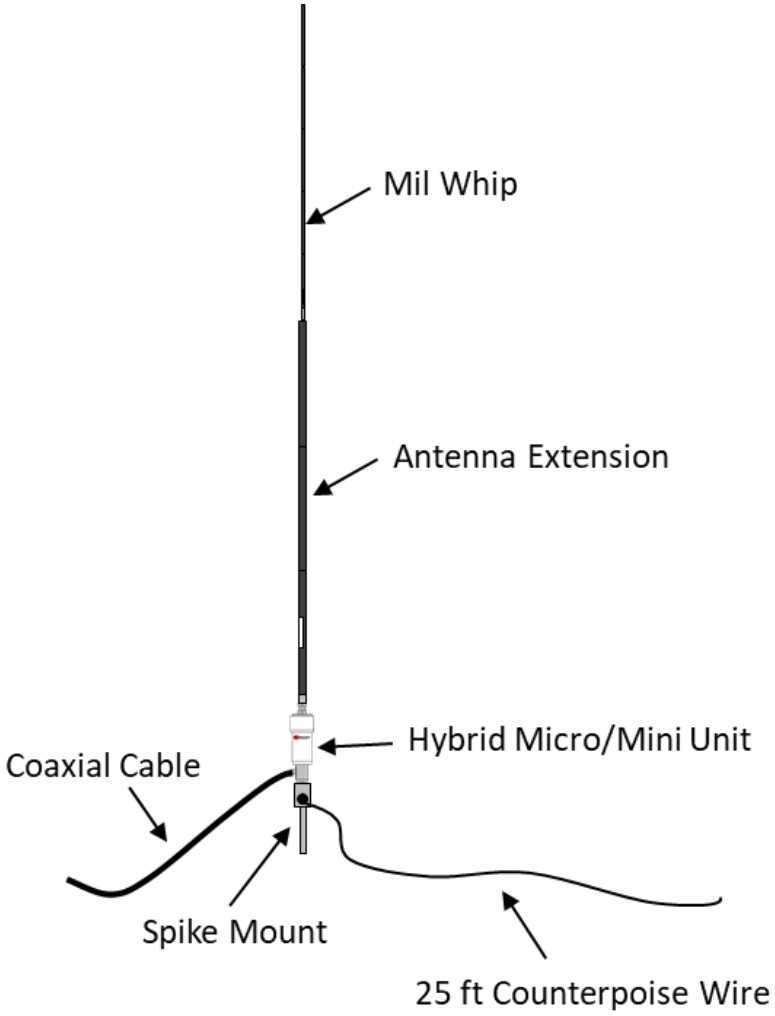


Figure 2. Portable Vertical.

Site Selection and Preparation

1. Select a site to deploy the CHA MPAS 2.0 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. Drive the Spike Mount (l) into the ground. Use a plastic mallet to avoid damage to the Spike Mount threaded socket.

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

3. If attached, remove the Antenna Shackle (j) from the Hybrid Micro/Mini Unit (a) by loosening the nut on the Antenna Shackle and then unscrewing the Antenna Shackle from the Antenna Connector (h).
4. If attached, remove the nuts from the Base Connection (i) on the bottom of the Hybrid Micro.

5. Store unused components in the Sling Bag (u).

Connect the Hybrid Micro. See figure (3).

6. Connect the Wire Connector (f) from the end of the Counterpoise Wire (k) to the Ground Connection (m) on the side of the Spike Mount.
7. Thread the Hybrid Micro/Mini Unit Base Connection into the Mount Connection (n) of the Spike Mount until finger tight.

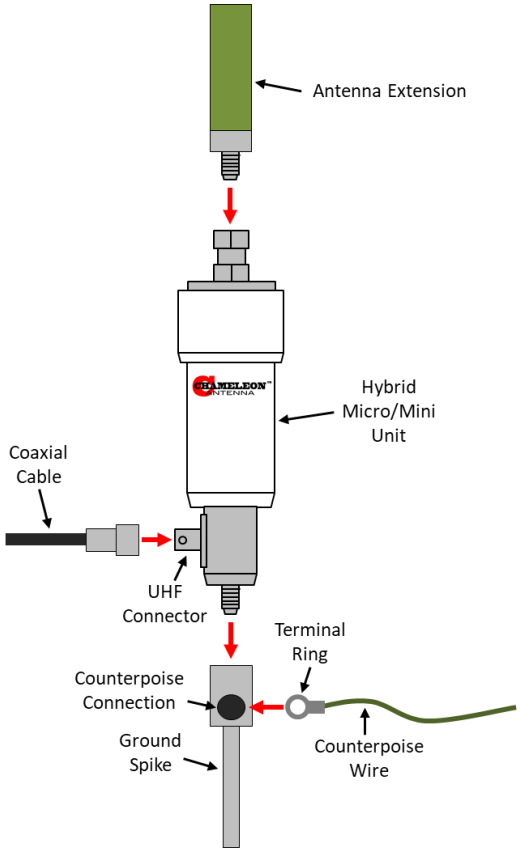


Figure 3. Portable Vertical Assembly.

8. Connect the UHF Connector at the end of the Coaxial Cable (t) with the RFI Choke into the UHF Connector Socket (g) on the Hybrid Micro/Mini Unit.

Raise the Antenna

9. Extend the Antenna Extension (q) by unfolding each section, starting at the top, and seating it onto the section below until all sections have been seated.
10. Extend the Whip Antenna (o) by unfolding the sections of the whip, starting with the section above the bottom section. Ensure each section is fully seated onto section below until the whip is fully extended.
11. Connect the Whip Antenna to the Antenna Extension by carefully threading Whip Base (p) into the Extension Connection (r) on top of the Antenna Extension until finger tight.
12. Connect the Antenna Extension to the Hybrid Micro/Mini Unit by carefully threading the Extension Base (s) on the bottom of the Antenna Extension into the Antenna Connection on top of the Hybrid Micro/Mini Unit until finger tight.

Extend the Counterpoise

13. Extend the Counterpoise Wire along the ground in any convenient direction.
14. Connect the Radio Set and perform an operational test.

Horizontal NVIS

The CHA MPAS 2.0 Horizontal NVIS configuration, see figure (4), 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 73 feet apart. The Horizontal NVIS configuration uses four components of the CHA MPAS 2.0: Hybrid Micro/Mini Unit, Antenna Wire, Counterpoise Wire, and the Coaxial Cable. Use the following procedure to install the Horizontal NVIS configuration.

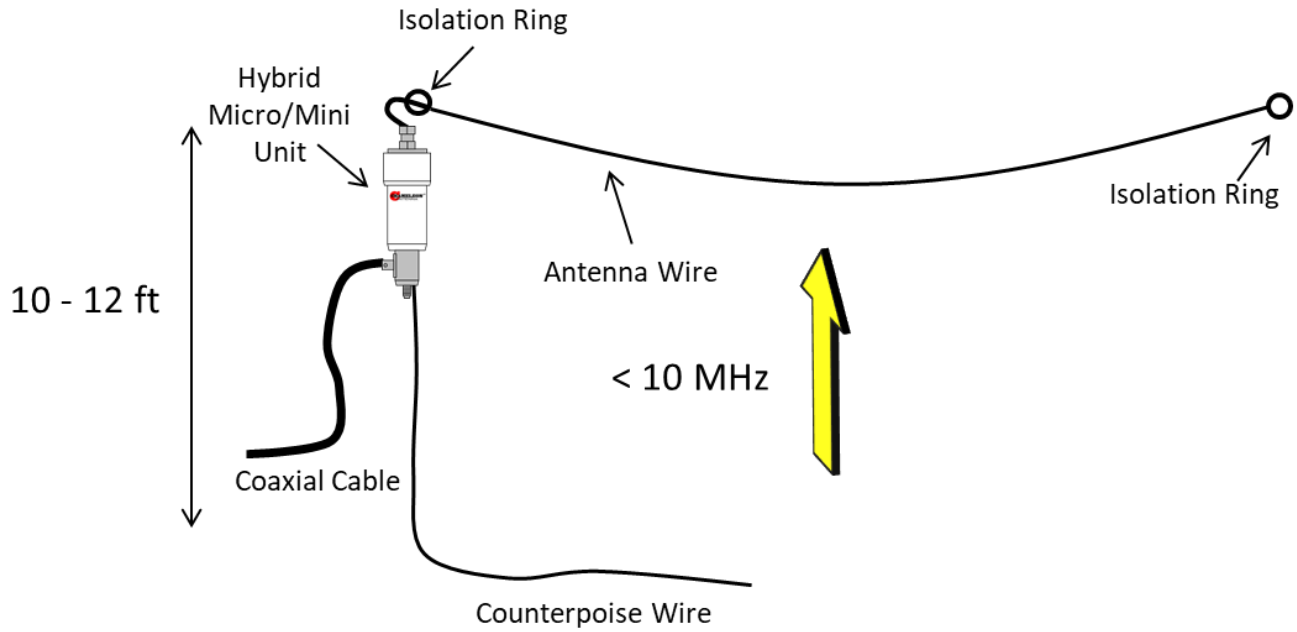


Figure 4. Horizontal NVIS Configuration.

Site Selection and Preparation.

1. Select a site to deploy the CHA MPAS 2.0 Horizontal NVIS configuration. The site must have two supports that will position the Hybrid Micro/Mini Unit and the end of the Antenna Wire to be at a height of between 10 and 12 feet and 73 feet apart. Lower heights may be necessary for NVIS in the desert, on a beach, or on snow covered ground.

Refer to plates (2)-(5) for the following steps.

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

Connect the Hybrid Micro.

3. Temporarily remove the Antenna Shackle (j) from the Antenna Connection (h). Place the Wire Connector from the Antenna Wire over the Antenna Connection and replace the Antenna Shackle. Tighten the nut snugly.
4. Connect the Carabiner from the Antenna Wire to the Antenna Shackle.
5. Temporarily remove the nut from the Base Connection (i) of the Hybrid Micro.
6. Connect the Wire Connector at the end of the Counterpoise Wire (k) to the Base Connection. Replace the nut and tighten snugly.
7. Connect the UHF Connector at the end of the Coaxial Cable (t) with the RFI Choke

to the UHF Connector Socket (g) on the Hybrid Micro.

Raise the Antenna.

8. Using a Bowline or similar knot, tie the end of a long length (25 feet or more) of Paracord *(not supplied)* to the Carabiner.

Plate 5. Hybrid Micro/Mini Unit Connections.

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 Micro/Mini Unit 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 Isolation Ring 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 horizontal, but not quite taut, and secure it to the support using a Round Turn and two Half Hitches.

Extend the Counterpoise.

14. Extend the Counterpoise Wire down from the Hybrid Micro/Mini Unit and then along the ground under the antenna, as shown in figure (4).
15. Connect the Radio Set and perform an operational test.

Sloping Wire

The CHA MPAS 2.0 Sloping Wire configuration, see figure (5), 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. The Sloping Wire configuration uses five of the CHA MPAS

2.0 components: Hybrid Micro/Mini Unit, Antenna Wire, Counterpoise Wire, Spike Mount, and the Coaxial Cable. Use the following procedure to install the Sloping Wire configuration.

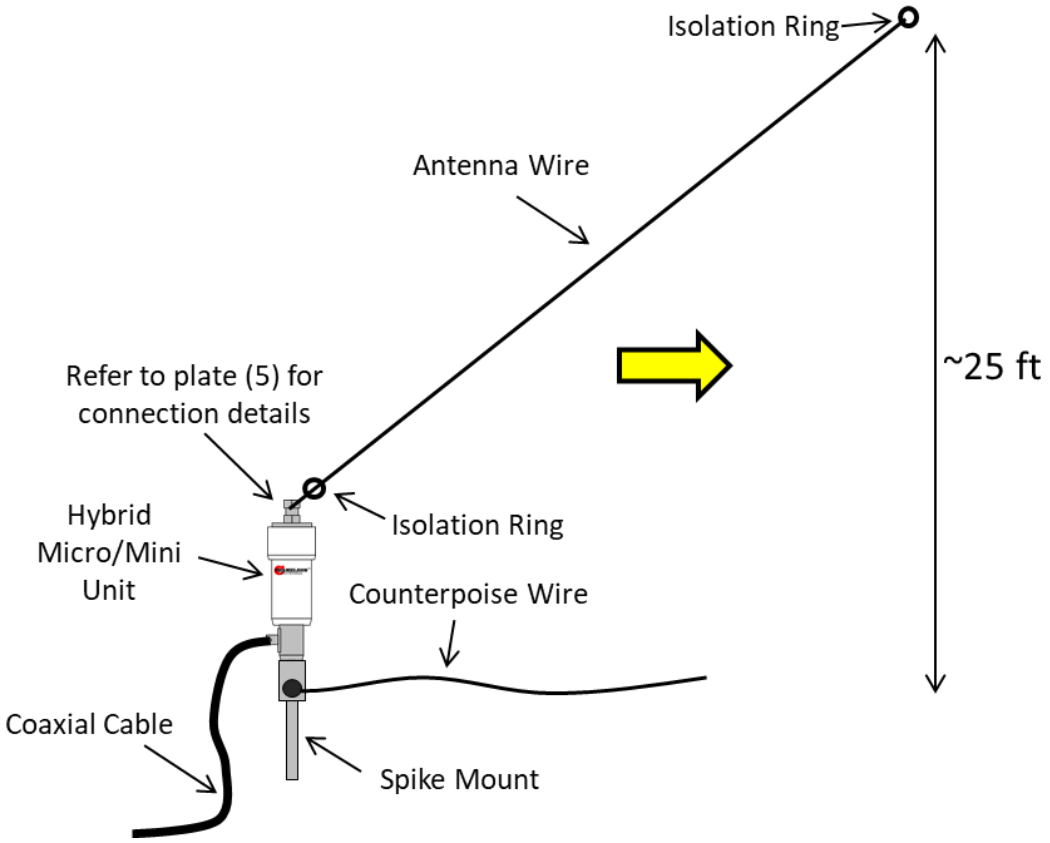


Figure 5. Sloping Wire Configuration.

Site Selection and Preparation.

1. Select a site to deploy the CHA MPAS 2.0 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) - (5) for the following steps.

Raise the Antenna.

2. Using a Bowline, or similar knot, tie a long length (50 feet or more) of Paracord *(not supplied)* to the Isolation Ring (c) at the far end of the Antenna Wire (b).
3. Using a throw weight or some other method, loop the Paracord over the support.
4. 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.
5. Fully extend the Antenna Wire so that it is not quite taut.

Install the Spike Mount.

6. Drive the Spike Mount (l) into the ground near the low end of the Antenna Wire.

Use a plastic mallet to avoid damage to the Spike Mount threaded socket.

7. If installed, remove the nuts from the Base Connection (i) of the Hybrid Micro/Mini Unit(a).
8. Store the nuts in the Sling Bag (u).
9. Thread the Base Connection of the Hybrid Micro/Mini Unit(a) into the Mount Connection (n) of the Spike Mount until hand tight.

Connect the Hybrid Micro.

10. If not already attached, connect a Carabiner (d) to the Isolation Ring at the Wire Connector (f) end of the Antenna Wire.
11. Temporarily remove the Antenna Shackle (j) from the Antenna Connection (h).
12. Place the Wire Connector from the Antenna Wire over the Antenna Connection and replace the Antenna Shackle. Tighten the nut snugly.
13. Connect the Carabiner from the Antenna Wire to the Antenna Shackle.
14. Connect the Wire Connector at the end of the Counterpoise Wire (k) to the Ground Connection (m) of the Spike Mount. Tighten snugly.
15. Connect the UHF Connector at end of the Coaxial Cable (t) with the RFI Choke to the UHF Connector Socket (g) on the Hybrid Micro.

Extend the Counterpoise.

16. Extend the Counterpoise Wire along the ground in any convenient direction.
17. Connect the Radio Set and perform an operational test.

End-Fed Inverted "L"

The CHA MPAS Inverted "L" configuration, see figure (6), 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. The End-Fed Inverted "L" configuration uses five of the CHA MPAS 2.0 components: CHA HYBRID MICRO, Antenna Wire, Counterpoise Wire, CHA SPIKE MOUNT, and CHA 50' COAX. Use the following procedure to install the Inverted "L" configuration.

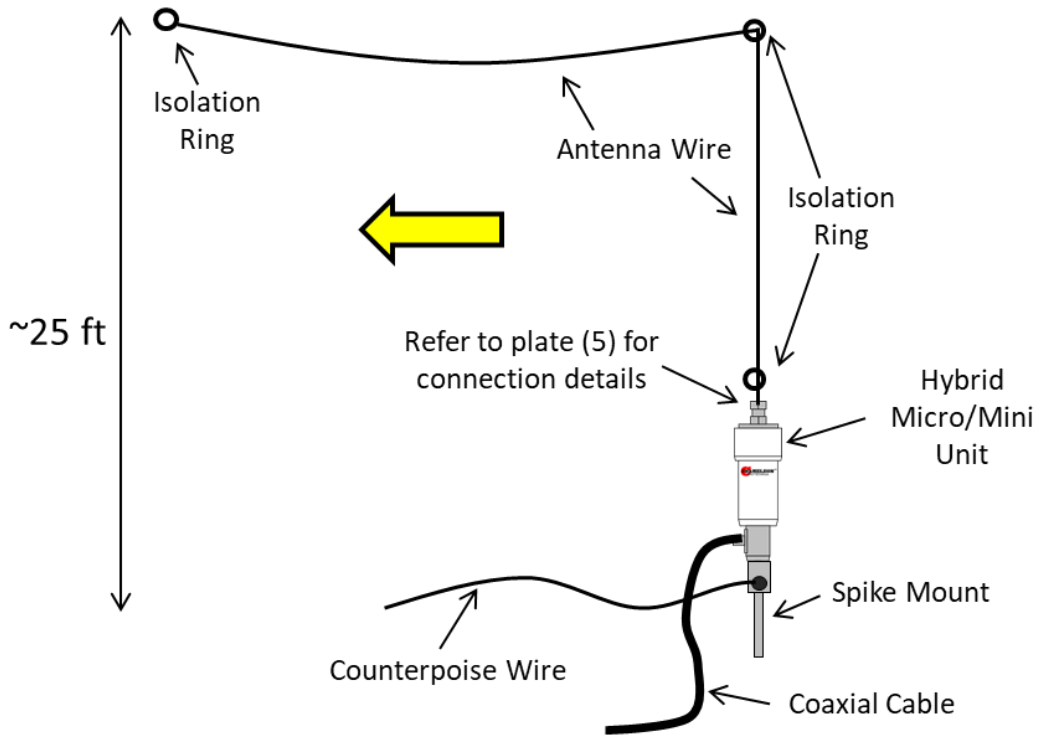


Figure 6. Inverted "L" Configuration.

Site Selection and Preparation.

1. Select a site to deploy the CHA MPAS Inverted "L" configuration. The site must have two supports that will position the corner of the "L" and the end of the Antenna Wire around 48 feet apart 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) - (5) for the following steps.

Install the Spike Mount.

2. Drive the Spike Mount (l) into the ground near one the supports. Use a plastic mallet to avoid damage to the Spike Mount threaded socket.
2. If installed, remove the nut(s) from the Base Connection (i) of the Hybrid Micro/Mini Unit(a).
3. Store the nut(s) in the Sling Bag (u).
4. Thread the Base Connection of the Hybrid Micro/Mini Unit into the Mount Connection (n) of the Spike Mount until hand tight.

Connect the Hybrid Micro.

5. If not already attached, connect a Carabiner (d) to the Isolation Ring at the Wire Connector (f) end of the Antenna Wire (b).
6. Temporarily remove the Antenna Shackle (j) from the Antenna Connection (h).
7. Place the Wire Connector from the Antenna Wire over the Antenna

Connection and replace the Antenna Shackle. Tighten the nut snugly.

8. Connect the Carabiner from the Antenna Wire to the Antenna Shackle.
9. Connect the Wire Connector at the end of the Counterpoise Wire (k) to the Ground Connection (m) of the Spike Mount. Tighten snugly.

Raise the Corner of the "L".

10. Using a Bowline, or similar knot, tie a long length (50 feet or more) of Paracord *(not supplied)* to the floating Isolation Ring (c) in the middle of the Antenna Wire.
11. Using a throw weight or some other method, loop the Paracord over the support.
12. Raise the corner of the "L" 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.

Raise the End of the Antenna.

13. Using a Bowline, or similar knot, tie a long length (50 feet or more) of Paracord to the Isolation Ring at the end of the Antenna Wire.
14. Using a throw weight or some other method, loop the Paracord over the support.
15. Raise and extend the end of the Antenna Wire to the desired height, so that the top of the antenna is horizontal and not quite taut, and secure it to the support using a Round Turn and two Half Hitches, or similar knot.
16. Connect the end of the Coaxial Cable (t) with the RFI Choke to the UHF Connector Socket (g) on the Hybrid Micro.

Extend the Counterpoise.

17. Extend the Counterpoise Wire along the ground in any convenient direction.
18. Connect the Radio Set and perform an operational test.

End-Fed Inverted "V"

The CHA MPAS Inverted "V" configuration, see figure (7), is a broadband medium to long range HF antenna. This configuration tends to be bidirectional, favoring broadside to the antenna and will provides effective ground and sky wave propagation. The End-Fed Inverted "V" configuration uses five of the CHA MPAS 2.0 components: Hybrid Micro/Mini Unit, Antenna Wire, Counterpoise Wire, Spike Mount, and the Coaxial Cable. Use the following procedure to install the Inverted "V" configuration.

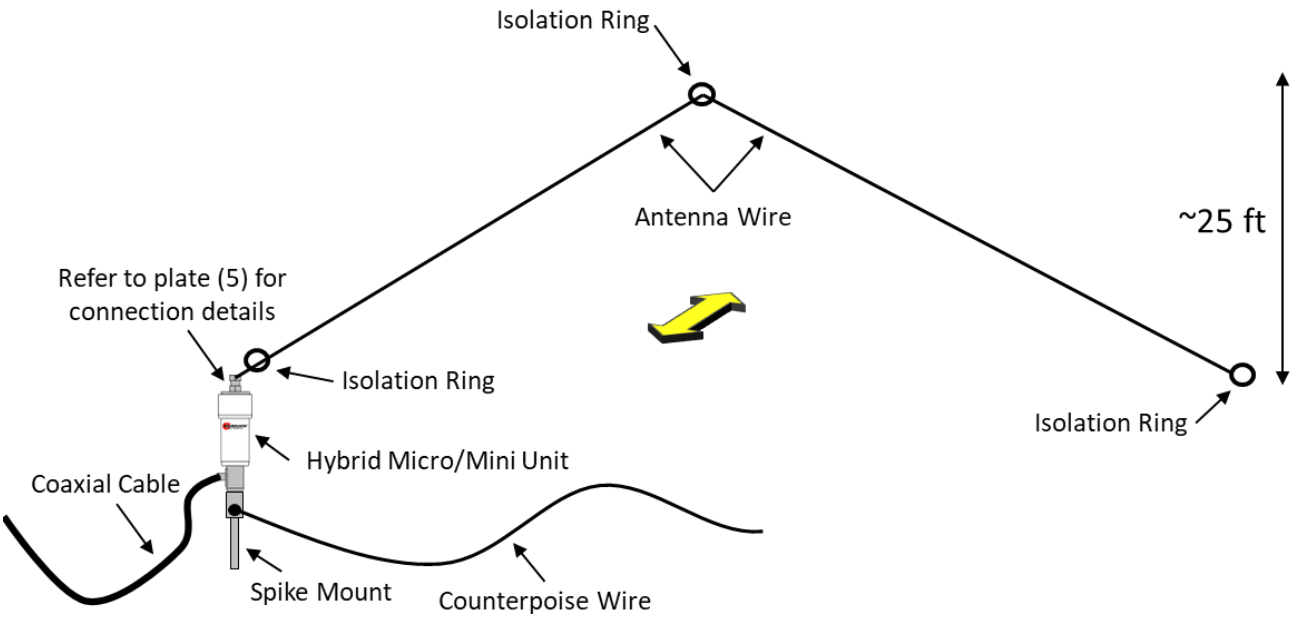


Figure 7. Inverted "V" Configuration.

1. Select a site to deploy the CHA MPAS Inverted "V" configuration. The site must have one center support, around 25 feet high and with 27 feet on each side for the ends of the antenna. 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 (5) for steps (2) – (8).

Raise the Center of the antenna.

2. Using a Bowline, or similar knot, tie a long length (50 feet or more) of Paracord *(not supplied)* to the floating Isolation Ring (c) in the middle of the Antenna Wire (b).
3. Using a throw weight or some other method, loop the Paracord over the support.
4. Raise the center 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. *For optimum performance, the center should be <u>less than</u> 37 feet high.*

Install the Spike Mount.

5. Drive the Spike Mount (l) into the ground, near the location of the radio set, around 27 feet from the center of the antenna. Use a plastic or rubber mallet to avoid damage to the Spike Mount threaded socket.
6. If installed, remove the nuts from the Base Connection (i) of the Hybrid Micro/Mini Unit (a).
7. Store the nut(s) in the Sling Bag (u).
8. Thread the Base Connection of the Hybrid Micro/Mini Unit into the Mount Connection (n) of the Spike Mount until hand tight.

Connect the Hybrid Micro.

9. If not already attached, connect a Carabiner (d) to the Isolation Ring at the Wire Connector (f) end of the Antenna Wire.
10. Temporarily remove the Antenna Shackle (j) from the Antenna Connection (h).
11. Place the Wire Connector from the Antenna Wire over the Antenna Connection and replace the Antenna Shackle. Tighten the nut snugly.
12. Connect the Carabiner from the Antenna Wire to the Antenna Shackle.
13. Connect the Wire Connector at the end of the Counterpoise Wire (k) to the Ground Connection (m) of the Spike Mount. Tighten snugly.

Raise the End of the Antenna.

14. Using a Bowline, or similar knot, tie a short length (around six feet) of Paracord *(not supplied)* to the Isolation Ring at the end of the Antenna Wire.
15. Extend the end of the Antenna Wire so that it is not quite taut.
16. Drive a tent peg *(not supplied)* into the ground near the end of the extended antenna wire.
17. Secure the Paracord to the tent peg using a Round Turn and two Half Hitches, or similar knot.
18. Connect the end of the Coaxial Cable (t) with the RFI Choke to the UHF Connector Socket (g) on the Hybrid Micro.

Extend the Counterpoise.

19. Extend the Counterpoise Wire along the ground in any convenient direction.
20. Connect the Radio Set and perform an operational test.

Recovery Procedure

To recover the CHA MPAS 2.0, perform the following steps:

1. Disconnect the Coaxial Cable from the radio set.
2. Lower the antenna to the ground or disconnect the Hybrid Micro/Mini Unit from the Spike Mount.
3. Disconnect the Coaxial Cable from the Hybrid Micro.
4. Carefully roll (do not twist) the Coaxial Cable.
5. Disconnect, wind, and store the Counterpoise Wire.
6. If used, disconnect the Carabiner from the Antenna Shackle.
7. Disconnect the Antenna Whip, Antenna Extension, or Antenna Wire, depending upon configuration used, from the Hybrid Micro.
8. If used, wind the Antenna Wire onto the Line Winder and secure with attached shock cord.
9. If used, take down the Antenna Extension. Starting at the bottom, 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 provided sticky strap.
10. If used, take down the Whip Antenna (o). **VERY IMPORTANT!** Starting at the top, pull the section apart from the section below and fold the section above over the section below.

Repeat until all sections are apart. Secure the sections together with provided sticky strap. **It is very important to take down the CHA MIL 2.0 beginning at the top. Failure to begin at the top may cause premature failure of the internal connecting braided cord.**

11. Pull the Spike Mount from the ground, if used.
12. Check area for overlooked antenna components.
13. Remove dirt from antenna components and inspect them for signs of wear.
14. Inspect the bare aluminum joints of the Antenna Extension for signs of corrosion. **We recommend application of an anti-oxidant compound, such as Ideal Noalox (P/N 30-026), be applied to the CHA MIL EXT 2.0 bare aluminum joints to prevent corrosion.**
15. Store components together in the Sling Bag (u).

Troubleshooting

1. If using the Antenna Wire, ensure the Wire Connector is securely connected.
2. Inspect the Antenna Wire or Whip for breakage, corrosion, or signs of strain.
3. Ensure the UHF Connector Plugs are securely tightened.
4. Inspect the Coaxial Cable 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. *Most problems with antenna systems are caused by the coaxial cables and connectors.*
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 the Hybrid Micro/Mini Unit.

Specifications

- Frequency: *(all configurations require an antenna tuner or coupler)*
    - CHA HYBRID MICRO/MINI UNIT/ MINI with 73' wire: 1.8 MHz through 54.0 MHz continuous *(including all Amateur Radio Service bands 160m to 6m)*.
    - CHA MIL 2.0: 1.8 – 54.0 MHz *(with CHA HYBRID MICRO/MINI UNIT/ MINI. Limited performance below 7 MHz.)*
    - CHA MIL 2.0 with CHA MIL EXT 2.0: 1.8 – 54.0 MHz *(with CHA HYBRID MICRO/MINI UNIT/ MINI.)*
- Power: CHA HYBRID MICRO: 100W SSB Phone, 25W All Other Modes Intermittent Commercial and Amateur Service (ICAS).
  CHA 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).
- Length:
    - Antenna Wire: 73 ft
    - CHA MIL 2.0: 9 ft 4 3/4 in extended, 17 in collapsed
    - CHA MIL EXT 2.0: 8 ft 9 in extended, 28 3/4 in collapsed
    - CHA MIL 2.0 with CHA MIL EXT 2.0: 18 ft 1 3/4 in extended
- Weight:
    - CHA HYBRID MICRO: 1 lbs.
    - CHA HYBRID MINI: 1.5 lbs.
    - CHA MIL WHIP: 12 oz.
    - CHA MIL WHIP with CHA MIL EXT: 1 lbs. 12 oz.
    - CHA MPAS 2.0 (all components): 8 lbs. 12 oz.
- Personnel Requirements and Setup Time: one operator, less than 15 minutes (wire antenna configurations), less than 5 minutes (vertical antennas).
- SWR: Subject to frequency and configuration, but within limits of most wide range antenna tuners or couplers. Figure (8) shows a graph of SWR by frequency for a typical deployment.
- CHA MPAS 2.0 Configuration Far Field Plots are shown in figures (9) through (14).

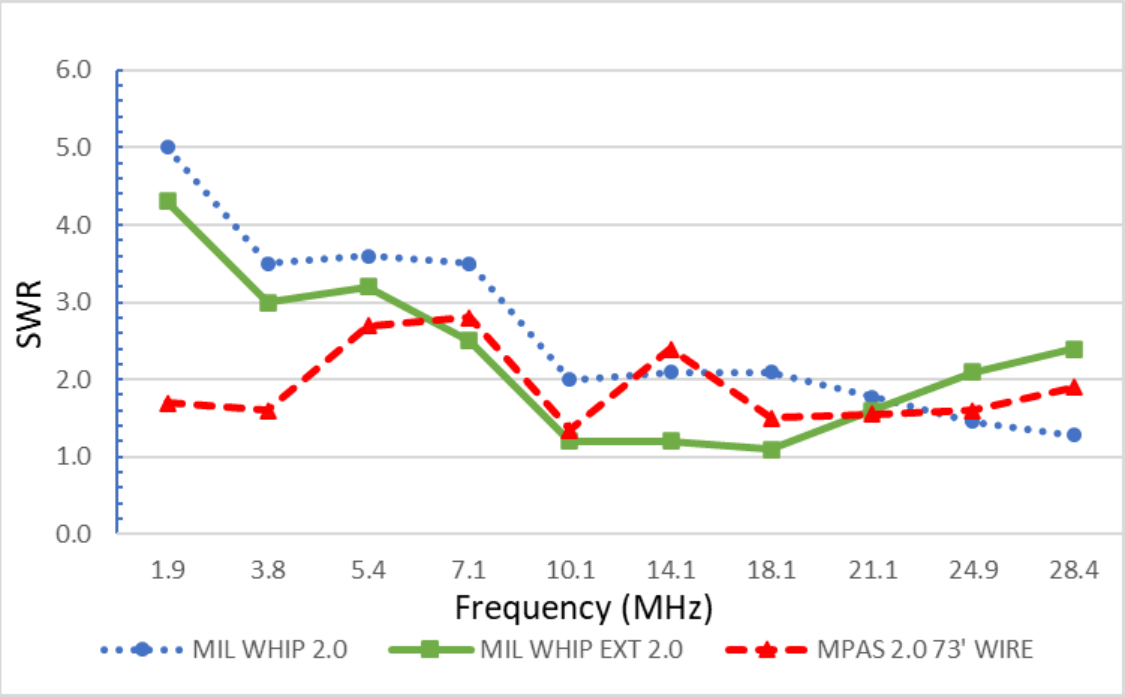


Figure 8. SWR by Frequency Graph.

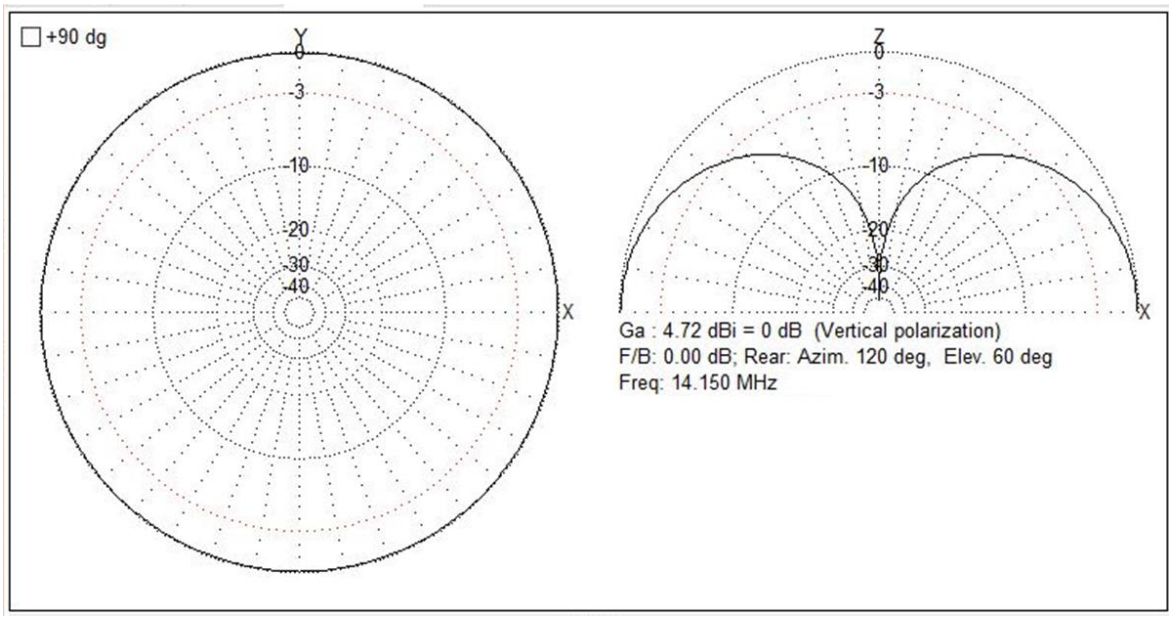


Figure 9. Manpack Vertical Far Field Plot 14 MHz.

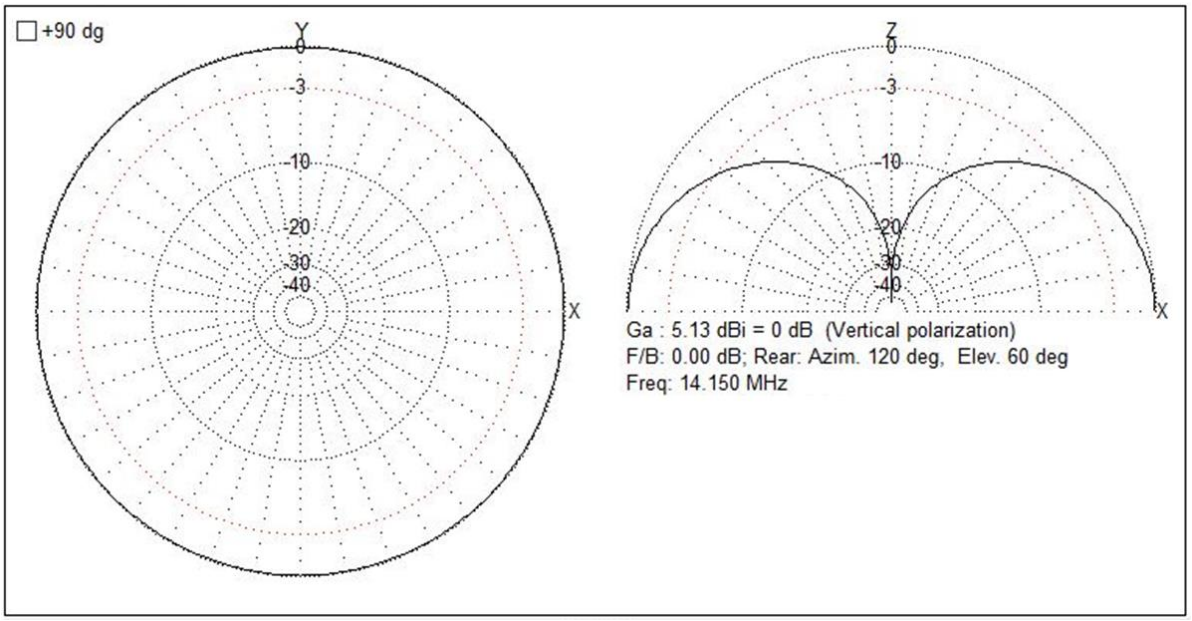


Figure 10. Portable Vertical Far Field Plot 14 MHz.

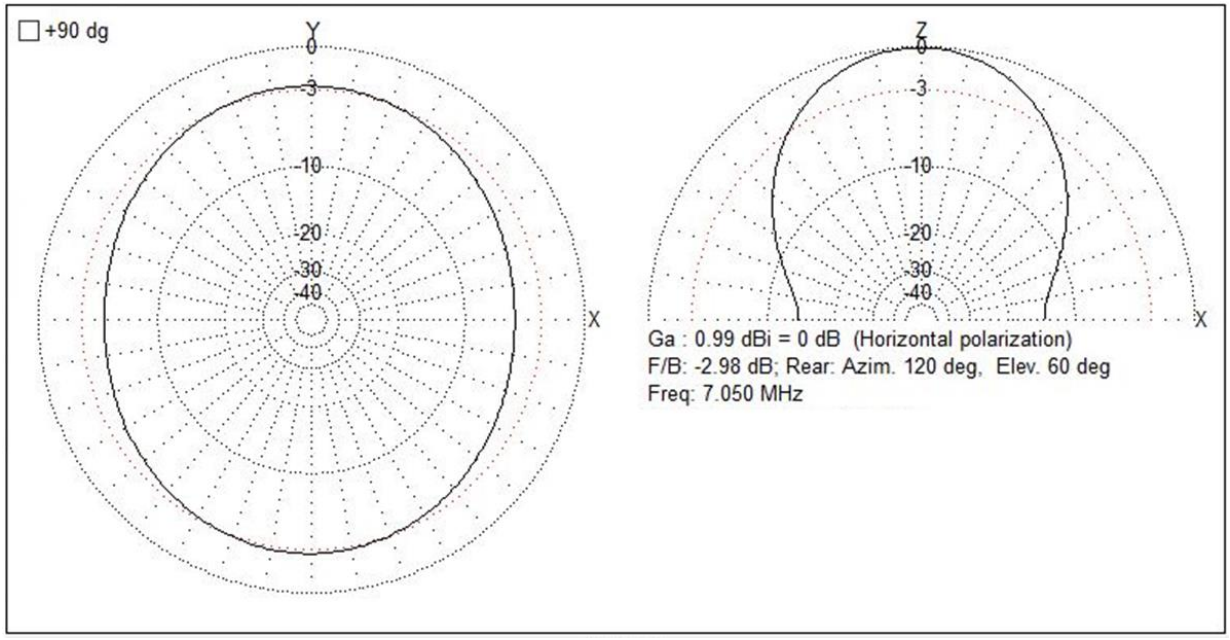


Figure 11. Horizontal NVIS Far Field Plot 7 MHz.

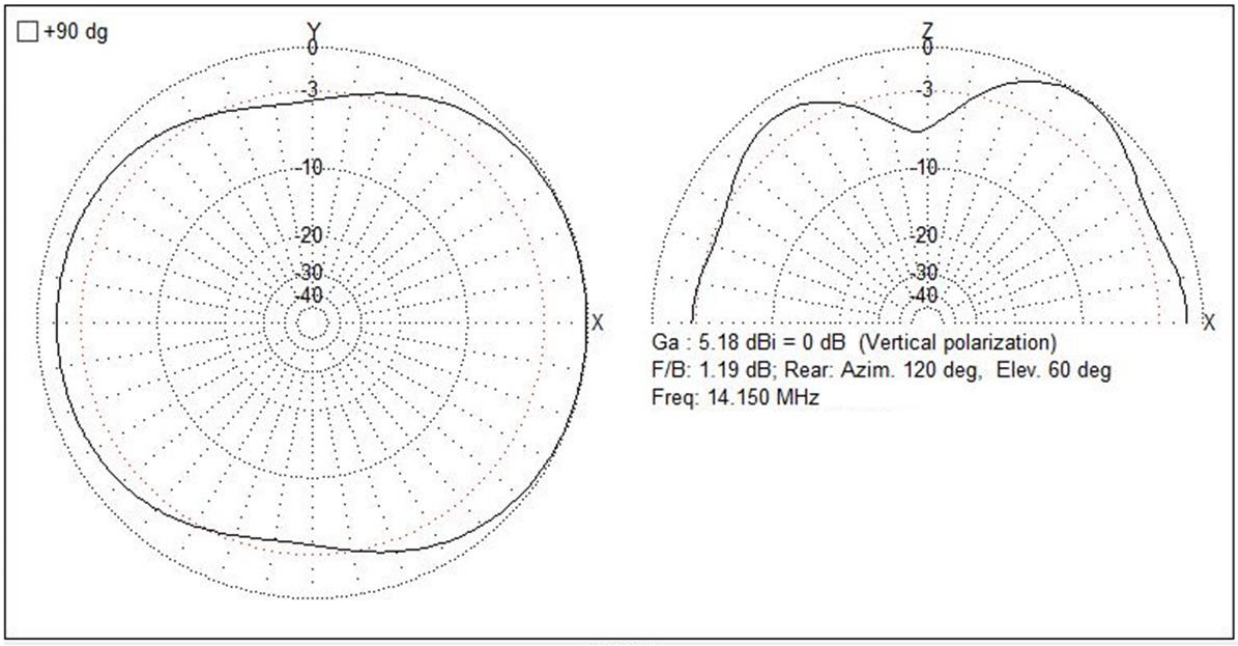


Figure 12. Sloping Wire Far Field Plot 14 MHz.

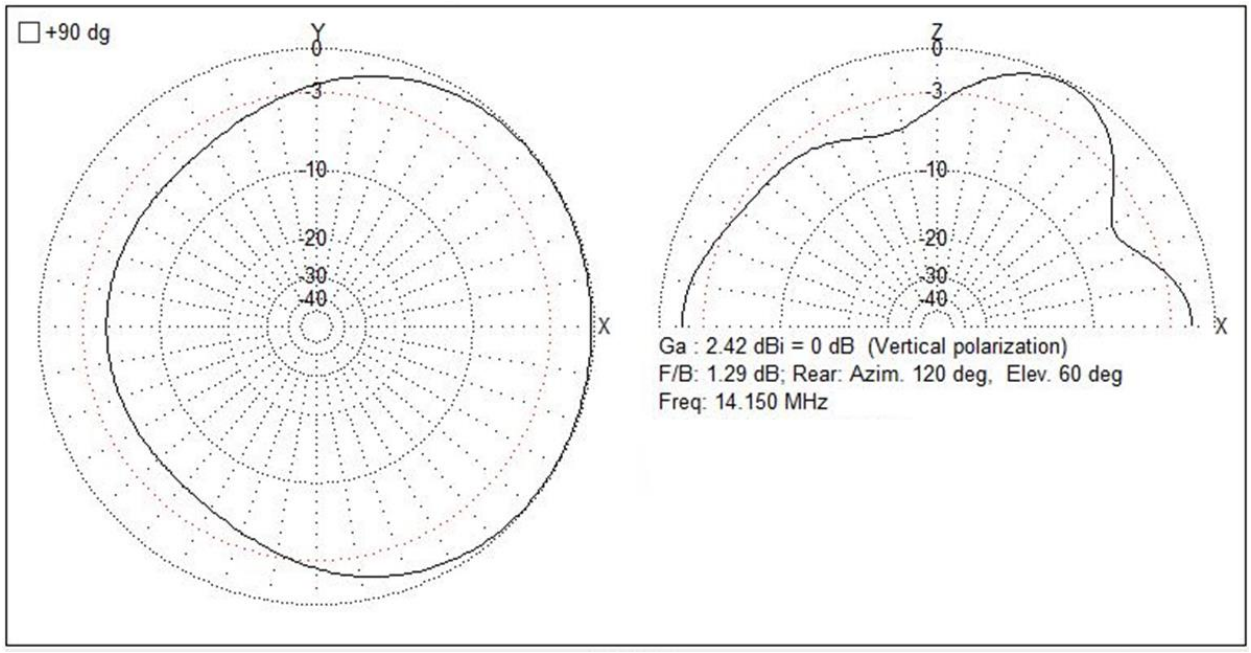


Figure 13. Inverted "L" Far Field Plot 14 MHz.

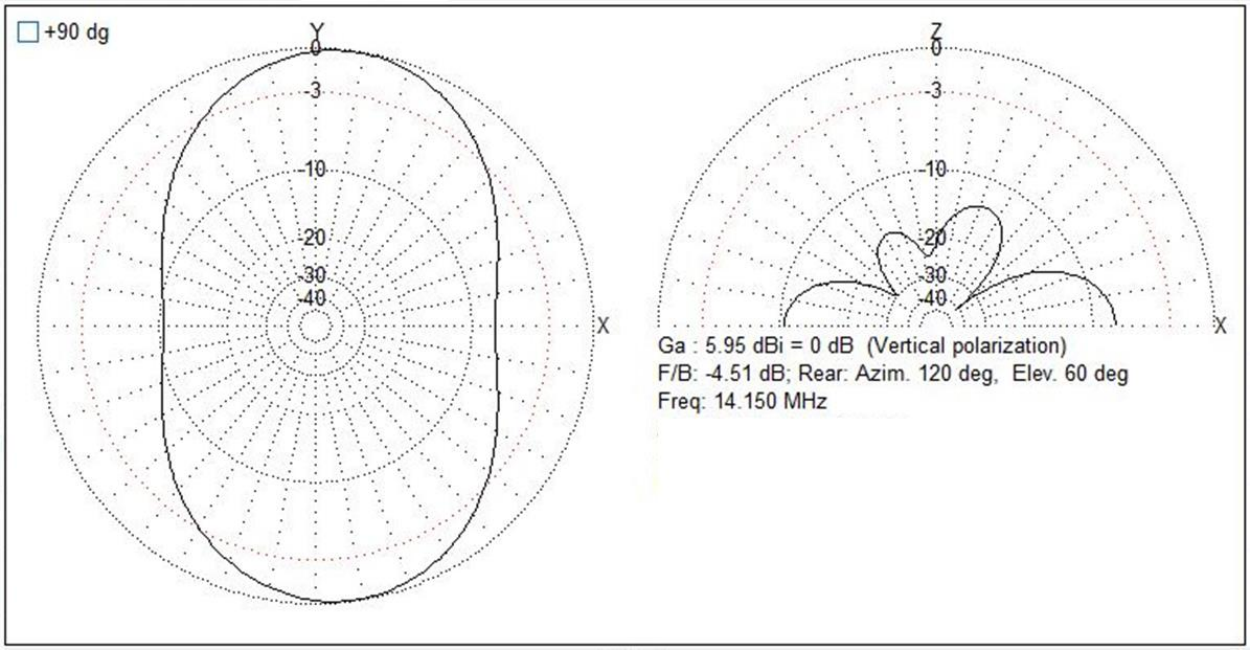


Figure 14. Inverted "V" Far Field Plot 14 MHz.

Accessories

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

- **Counterpoise Kit.** The CHA 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.
- **Capacity Hat.** The CHA CAP-HAT has been designed to enhance the radiation of any screw together HF antenna.
- **Guying System.** The Universal Guying System (CHA UGS) is recommended to stabilize the assembled CHA MIL 2.0 and CHA MIL EXT 2.0 vertical during high winds.
- **Jaw Mount.** The CHA 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.
- **Universal Clamp Mount.** The Universal Clamp Mount (CHA UCM) is a heavy-duty clamp mount designed for surfaces such as a picnic table, post, or railing.
- **Tent Stakes.** Tent Stakes are used for guying the vertical antenna or anchoring wire antennas.

Recommended non-supplied accessories:

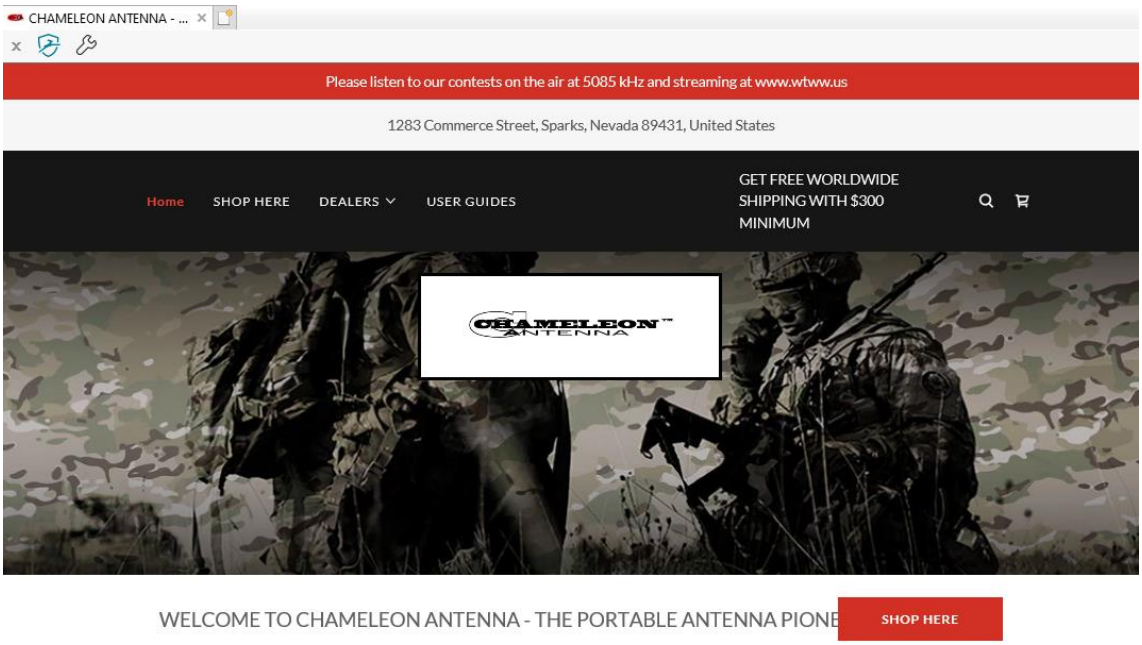
- 50 ft. of paracord for use with the wire antenna configurations.
- Plastic mallet.
- Flashlight.
- Multi-tool.
- Throwing weight and string.
- Ideal 30-030 Noalox Anti-Oxidant Compound.

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

Please go to http://chameleonantenna.com for information about additional quality antenna products available for purchase from Chameleon Antenna™ – The Portable Antenna Pioneer. Warranty information is also available on the website.



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