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

California - USA
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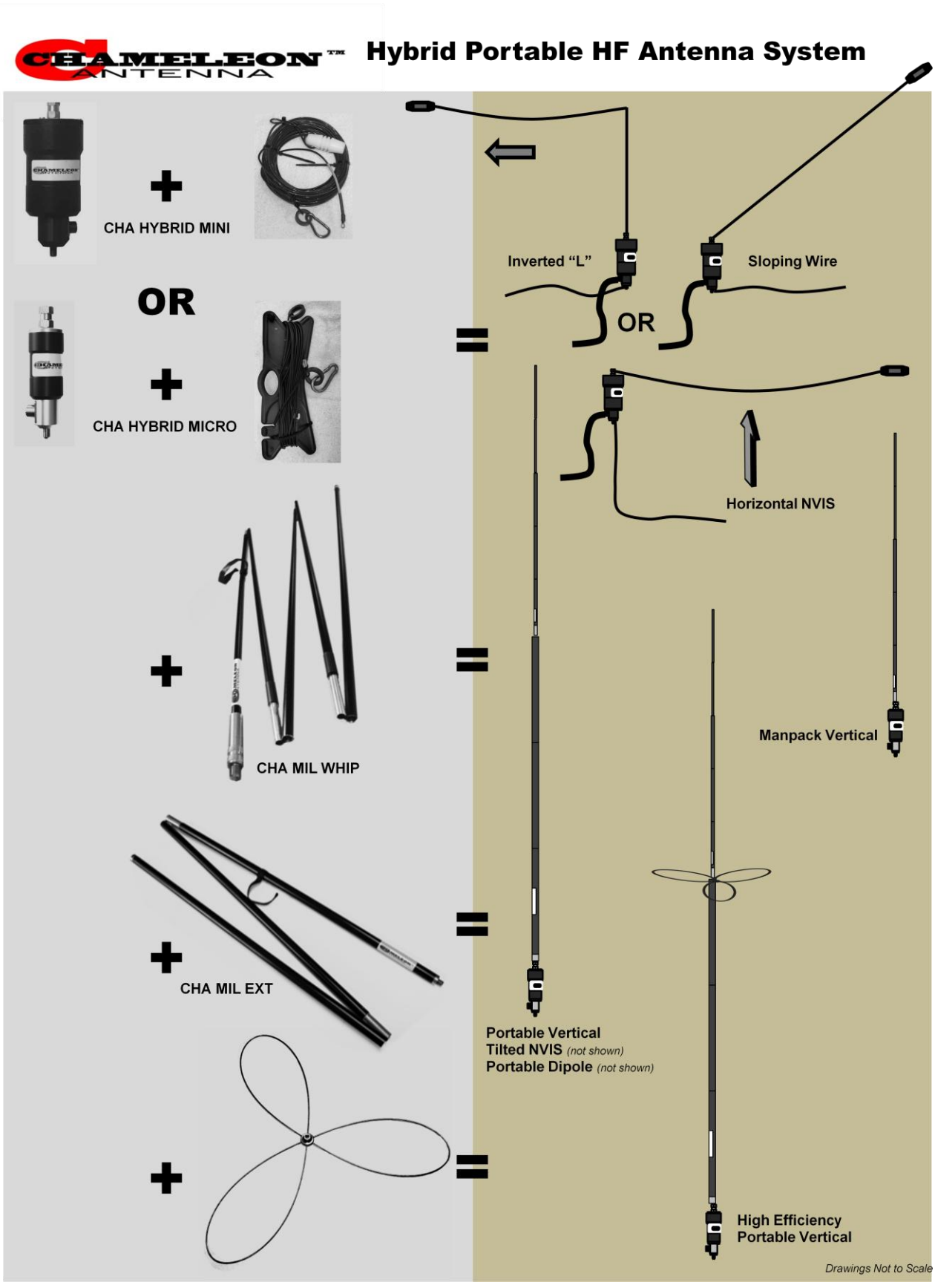
MADE IN U.S.A.

VERSATILE – DEPENDABLE – STEALTH – BUILT TO LAST


CHAMELEON ANTENNA
Hybrid Portable HF Antenna System
CHA HYBRID MINI
OR
CHA HYBRID MICRO
CHA MIL WHIP
CHA MIL EXT
Inverted "L"
OR
Sloping Wire
Horizontal NVIS
Manpack Vertical
Portable Vertical
Tilted NVIS (not shown)
Portable Dipole (not shown)
High Efficiency
Portable Vertical
Drawings Not to Scale

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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.

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 60 feet of wire. Available system options *(sold separately)* include a 10'8" military-style collapsible whip antenna (CHA MIL WHIP), a 6'6" collapsible extension (CHA MIL EXT), and a high efficiency capacity hat (CHA CAP HAT). The components of the CHA HYBRID - MINI / MICRO antenna system provide a continuum of portability and performance to meet your communications requirements. Operators that already have a CHA V1, V1L, or V2L mobile whip can also use them with the CHA HYBRID - MINI / MICRO base, although the MINI and MICRO bases are for stationary use only. You can even combine a CHA HYBRID - MINI / MICRO base with two CHA MIL whips, two CHA MIL EXT whip extensions, and a Chameleon Antenna™ Jaw Mount and Tripod to create a 34'6" portable horizontal dipole. 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 configuration has limited performance below 3.5 MHz). The CHA HYBRID - MINI / MICRO is perfect for military, government agencies, non-governmental organizations (NGOs), 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), First Responders and especially for Emergency Preparedness. It is also the antenna for hams that enjoy camping and hiking or those living in apartments and condominiums or developments with homeowners associations, deed restrictions, or CCRs (Covenants, Conditions & Restrictions). 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 requires a wide range antenna tuner or coupler. 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 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 HYBRID - MINI / MICRO is comprised of the following components, see plate (1):

a. Hybrid Base (Mini or Micro)

The Hybrid Base, see plate (1), provides a mounting base and impedance matching for the CHA HYBRID - MINI / MICRO antenna system.

b. Antenna Wire

The Antenna Wire, see plate (2), is a 60 foot length of black insulated wire.

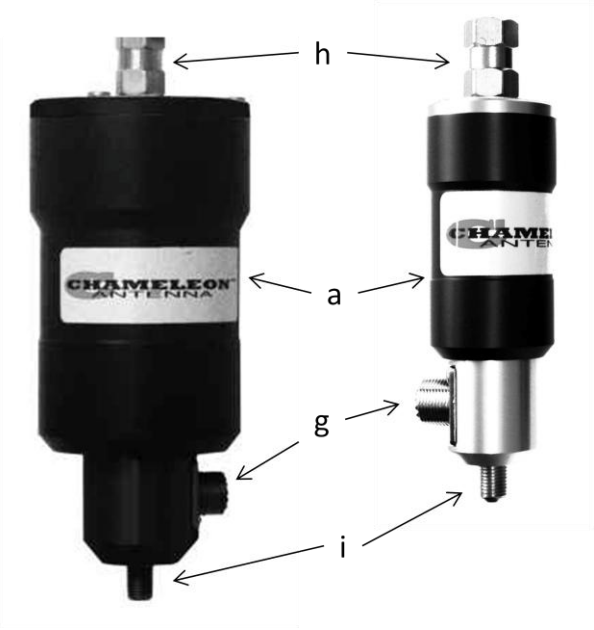

Plate 1. Hybrid Base, Mini (left) and Micro (right).

c. Isolation loop

An Isolation loop is permanently attached to the Wire Connector (f) end the CHA HYBRID MINI Antenna Wire (b) and both ends of the CHA HYBRID MICRO Antenna Wire.

d. Carabiner

The Carabiner is a removable pear-shaped stainless steel hooks with a spring-loaded gate.

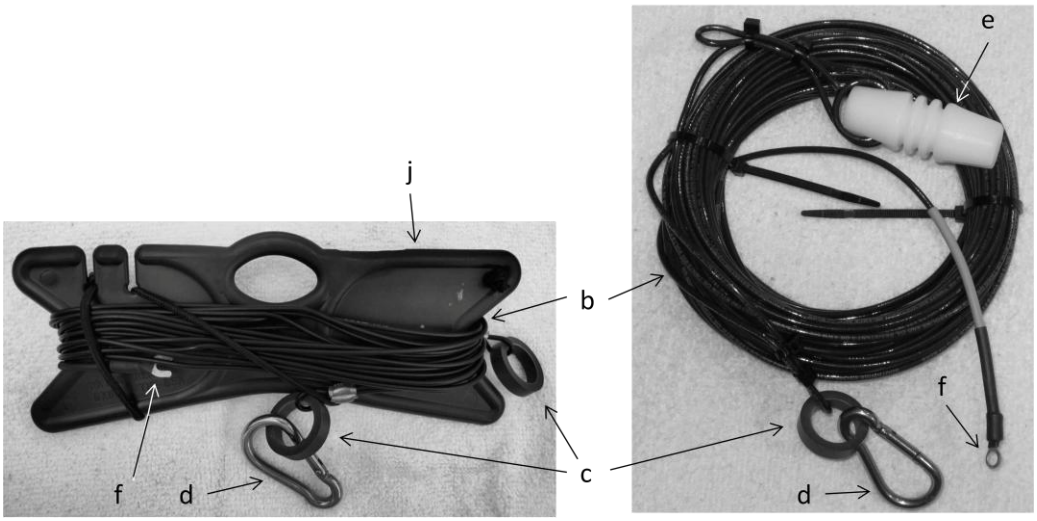

Plate 2. Antenna Wire.

e. Insulator

The Insulator is permanently attached to one end of the CHA HYBRID MICRO Antenna Wire (b).

f. Wire Connector

The Wire Connectors are located at one end of the Antenna Wires (b).

g. UHF Socket

The UHF Socket, SO-239, is located on the side of the Hybrid Base (a).

h. Antenna Connection

The Antenna Connection is located on the top of the Hybrid Base (a). 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 (a). It is a 3/8" x 24 (fine thread) male fitting.

j. Line Winder

The Line Winder is used to store the Antenna Wire (b). It enables rapid deployment and recovery of the CHA HYBRID MICRO antenna.

k. Antenna Shackle

The Antenna Shackle assembly, see plate (3), consists of a shackle, bolt, and nut. It is attached to the top of the Hybrid Base (a).

Antenna Configurations

Using the supplied components, the CHA HYBRID - MINI / MICRO can be deployed into a number of configurations. Seven configurations *(some configurations require optional components that are sold separately)*, see table (2), are

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
Tilted NVIS		↓			Omnidirectional
Portable Dipole		↓	↑		Bidirectional

Table 2. Antenna Configuration Selection.

described in this manual, each with unique performance characteristics. 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 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. Most configuration and frequency combinations will require a wide range 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 50 to 55 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.

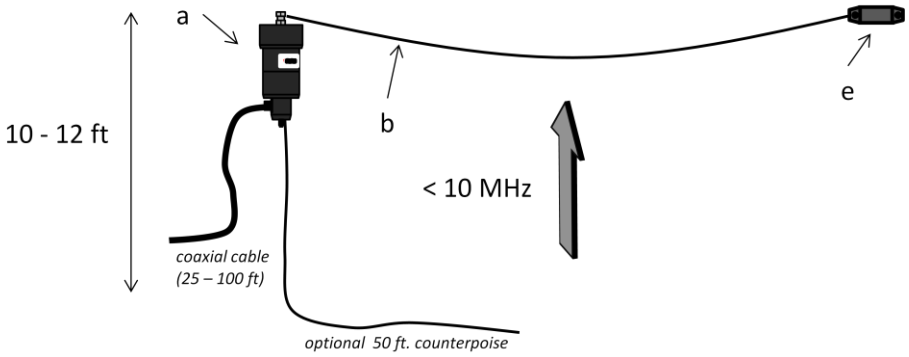

Figure 1. Horizontal NVIS Configuration.

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 (1) through (3) for the following steps.

2. If not already attached, connect a Carabiner (d) to the Isolation Loop (c) at the Wire Connector (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 Connector 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 *(not supplied)* snugly.

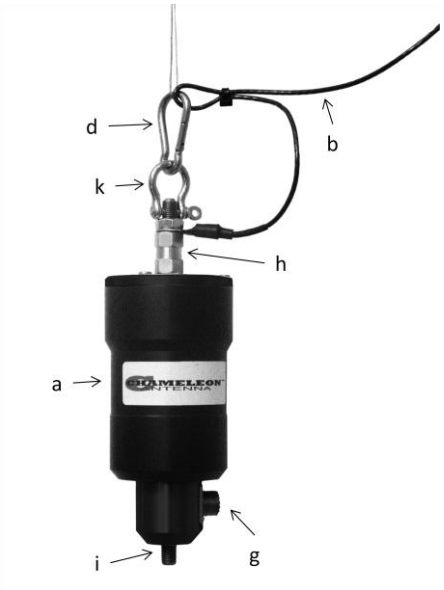

Plate 3. Hybrid Base Electrical and Mechanical Connections.

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 Loop (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

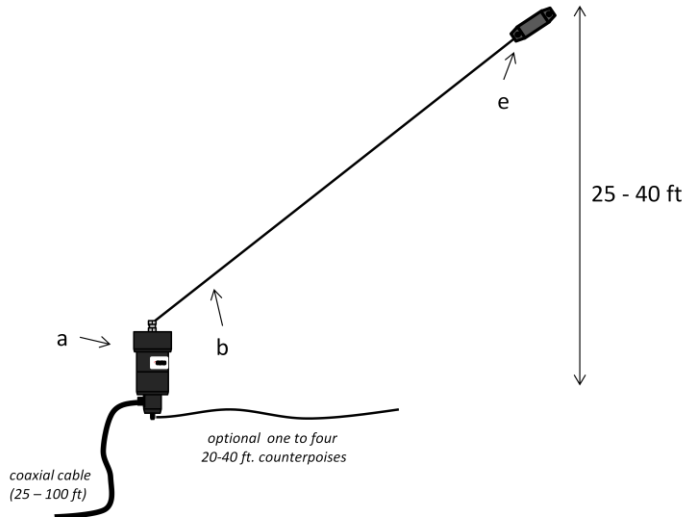

Figure 2. Sloping Wire Configuration.

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 20 to 40 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.

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 (1) through (3) for the following steps.

2. If not already attached, connect a Carabiner (d) to the Isolation Loop (c) at the Wire Connector (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 Connector 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 *(not supplied)* 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 Loop 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.

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 is 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 20 to 40 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.

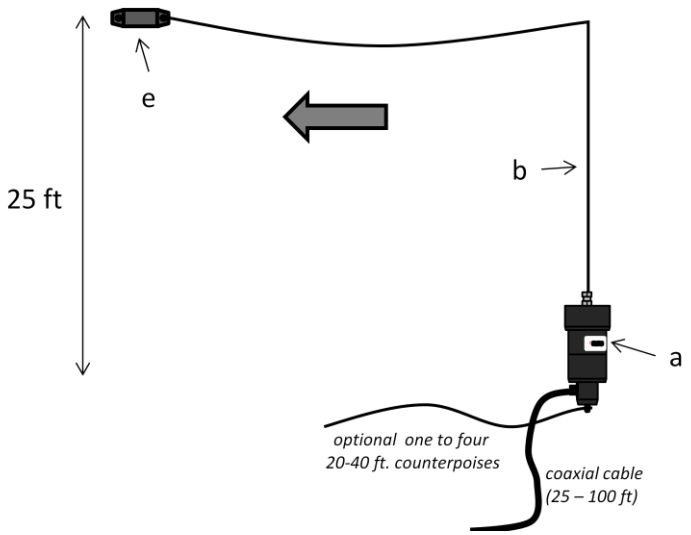

Figure 3. Inverted "L" Configuration.

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 (1) through (3) for the following steps.

2. If not already attached, connect a Carabiner (d) to the Isolation Loop (c) at the Wire Connector (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 Connector 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 *(not supplied)* 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.
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 Insulator (e) or Isolation Loop 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 manpackable, 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 60 foot antenna wire as the counterpoise. An antenna tuner or coupler is required on most frequencies.

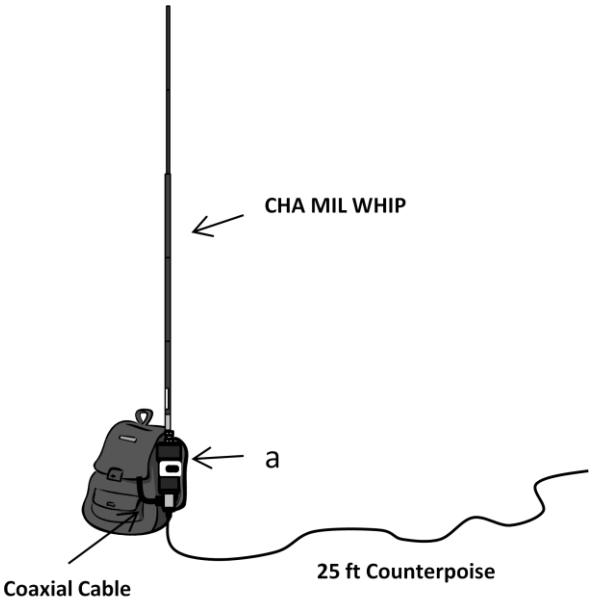

Figure 4. Manpack Vertical.

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 (1) and (3) 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 *(not supplied)* 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 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 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 with CHA MIL EXT 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 provides sky wave propagation, especially above 12 MHz. Using the optional CHA JAW MOUNT, the Portable Vertical can be mounted on almost any support, such as a camouflage netting support pole, fence post, picnic table, or the optional Chameleon Antenna™ Tripod. The antenna works better when mounted above the ground, but will provide satisfactory performance if ground mounted. One to four counterpoise wires, 25 feet in length should be used. You may also use the supplied 60 foot antenna wire as the counterpoise. All of these counterpoise options can be quickly deployed and will provide good performance. The antenna may also be attached to a standard 3/8" mobile mount on a stationary vehicle. No radials are required when mounted on a vehicle. An antenna tuner or coupler is required on most frequencies. Use the following procedure to install the Portable Vertical configuration.

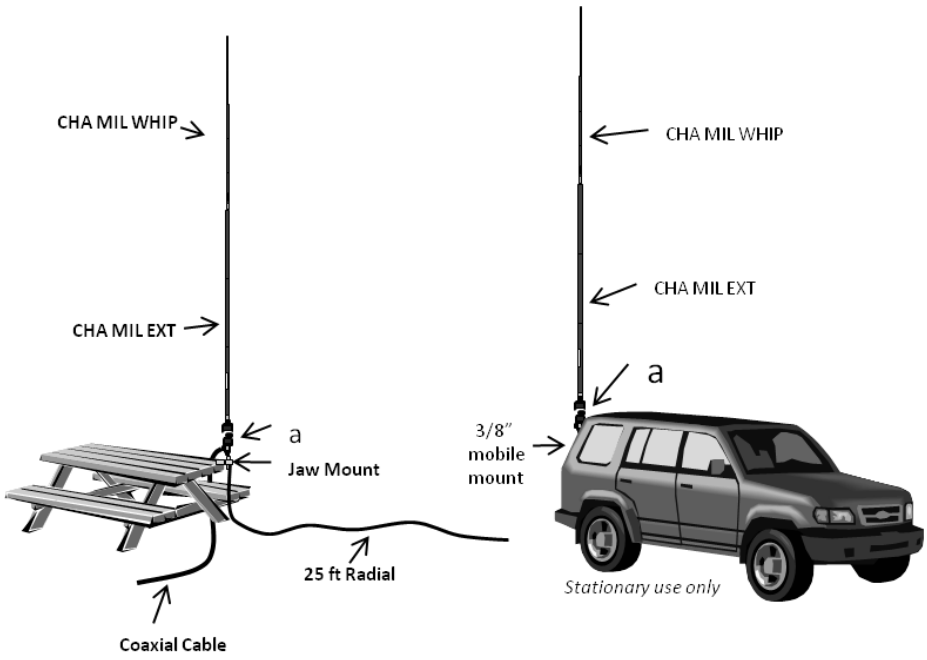

Figure 5. Portable Vertical.

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 to the support.

Refer to plates (1) and (3) 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 optional Counterpoise Kit.
5. Screw the Hybrid Base Counterpoise Connection into the 3/8" antenna mount of the Jaw Mount until finger tight.
6. 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

7. Extend the CHA MIL EXT 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. Connect the CHA MIL EXT to the Hybrid Base by carefully screwing it into the Antenna Connection until finger tight.
9. Extend the CHA MIL WHIP 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.
10. Connect the CHA MIL WHIP to the CHA MIL EXT by carefully screwing the 3/8" base stud into the top section 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.
12. Perform operational test.

High Efficiency Portable Vertical

The CHA HYBRID - MINI / MICRO and optional CHA MIL WHIP with CHA MIL EXT and Cha CAP HAT High Efficiency Portable Vertical configuration, see figure (6), is a broadband short to long 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 provides sky wave propagation, especially above 11 MHz. The capacity hat improves efficiency by causing the current in the antenna to be higher, thus reducing ground loss. This is important when using relatively short antennas on lower frequencies.

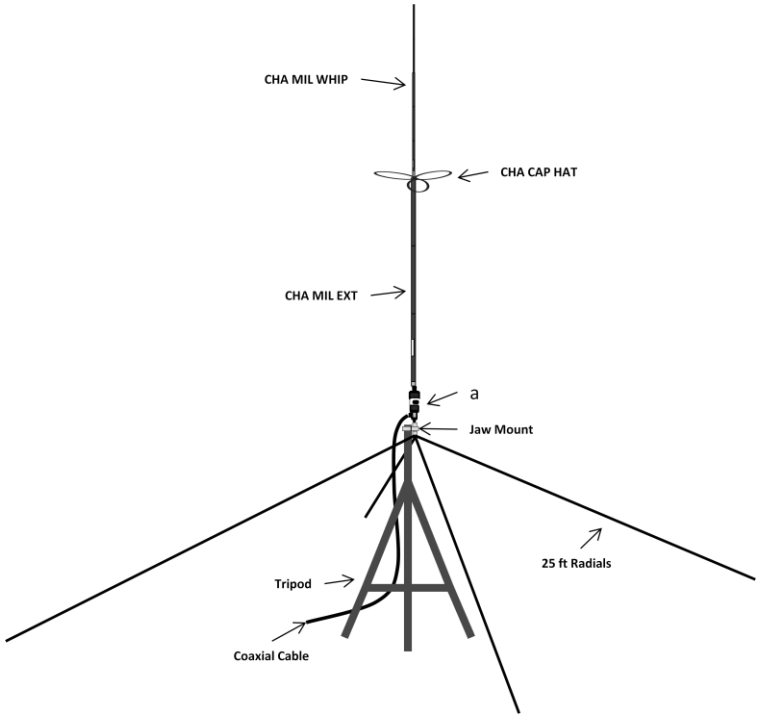

Figure 6. High Efficiency Portable Vertical.

Using the optional Jaw Mount, the Portable Vertical can be mounted on almost any support, such as a camouflage netting support pole, fence post, picnic table, or the optional Chameleon Antenna™ Tripod. The antenna works better when mounted above the ground, but will provide satisfactory performance if ground mounted. One to four counterpoise wires, 25 feet in length should be used. They can be quickly deployed and will provide good performance. The antenna may also be attached to a standard 3/8" mobile mount on a stationary vehicle. No radials are required when mounted on a vehicle. An antenna tuner or coupler is required on most frequencies.

Install the Capacity Hat

1. Follow the procedure for the Portable Vertical configuration, except add the following step between steps (9) and (10).
2. Install the CHA CAP HAT between the CHA MIL EXT and CHA MIL WHIP by screwing the 3/8" threaded fitting of the CHA CAP HAT into the top section of the CHA MIL EXT and the CHA MIL WHIP 3/8" base stud into the hub of CHA CAP HAT.

Tilted NVIS

The CHA HYBRID - MINI / MICRO and CHA MIL WHIP with CHA MIL EXT Tilted NVIS configuration, see figure (7), 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. You can mount it on a stationary vehicle which has a tilt-able 3/8" mobile antenna mount *(not supplied)* or any fixed support on which you can clamp the CHA JAW MOUNT and will enable the antenna to be raised to a height of around 10 feet. Using the optional Jaw Mount, the Tilted NVIS antenna can be mounted on almost anything, such as a camouflage netting support poles, fence post, tree limb, or the optional Chameleon Antenna™ Tripod. The Antenna Wire (b) or a stationary vehicle are used as the counterpoise in this configuration. An antenna tuner or coupler is required on most frequencies. The following procedure is used to install the Tilted NVIS configuration.

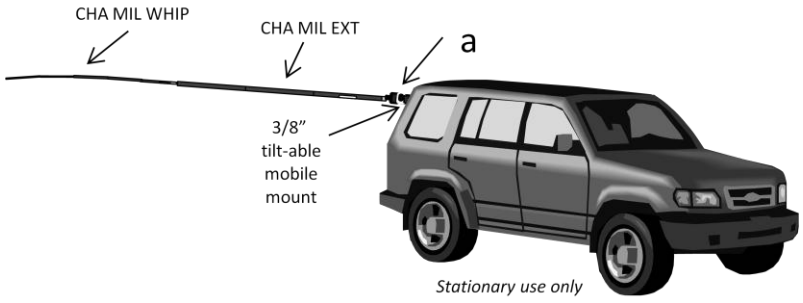

Figure 7. Tilted NVIS.

Site Selection and Preparation

1. Select a site to deploy the CHA HYBRID - MINI / MICRO Tilted NVIS configuration. The site must have The site must have a support that will allow the antenna to be raised to a height of around 10 feet and enough space for a counterpoise at least 25 feet in length. A stationary vehicle with a tilt-able 3/8" mobile antenna mount is also satisfactory.
2. If using the CHA JAW MOUNT, clamp it to the support.

Refer to plates (1), (3), and (4) 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 a secure place.

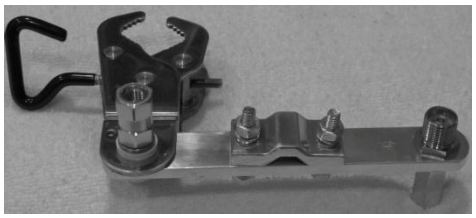

Plate 4. Dipole Jaw Mount.

Connect the Hybrid Base.

4. If using a counterpoise wire, place the terminal lug of the Antenna Wire over the Counterpoise Connection (i) on the Hybrid Base.
5. Screw the Hybrid Base Counterpoise Connection into one of the 3/8" antenna mount on the Dipole Jaw Mount until finger tight.
6. 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. *You will not be using the UHF Socket (SO-239) on the 3/8" antenna mount.*

Raise the Antenna

7. Extend the CHA MIL EXT 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. Connect the CHA MIL EXT to the Hybrid Base by carefully screwing it into the Antenna Connection until finger tight.
9. Extend the CHA MIL WHIP 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.
10. Connect the CHA MIL WHIP to the CHA MIL EXT by carefully screwing it into the top section until finger tight.

Extend the Counterpoise.

11. If not using a vehicle as the counterpoise, 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.
12. Perform operational test.

Portable Dipole

The CHA HYBRID - MINI / MICRO base with two CHA MIL WHIPs and two CHA MIL EXTs Portable Dipole configuration, see figure (8), is a broadband short to medium range HF/VHF-LO antenna. When used with the optional Chameleon Antenna™ Dipole Jaw Mount and Tripod, this configuration provides the ultimate in versatility and portability. This configuration will provide good NVIS propagation on lower frequencies.

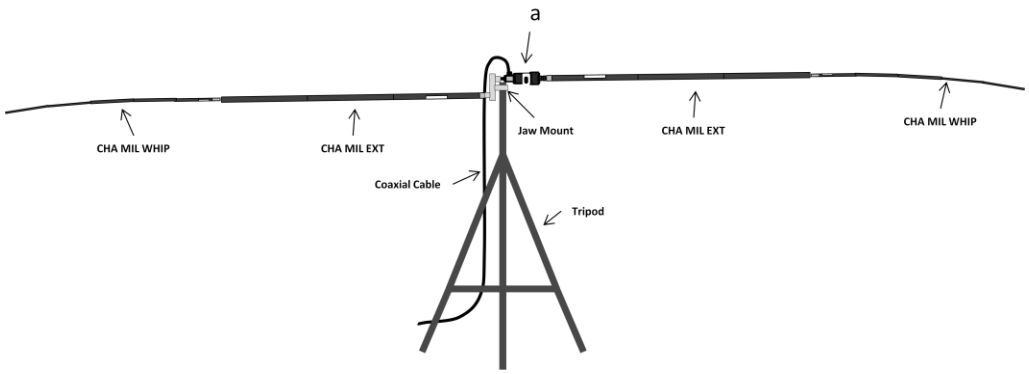

Figure 8. Portable Dipole.

It is predominately omnidirectional and also provides medium range sky wave propagation on frequencies above 10 MHz. An antenna tuner or coupler is required for most frequencies.

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. Clamp the Dipole Jaw Mount to the Tripod.

Refer to plates (1), (3) and (4) 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. Screw the Hybrid Base Counterpoise Connection (i) into the 3/8" antenna mount on the Jaw Mount until finger tight.
5. 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. *You will not be using the UHF Socket (SO-239) on the Jaw Mount.*

Raise the Antenna.

6. Extend the CHA MIL EXT 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.
7. Connect the CHA MIL EXT to the Hybrid Base by carefully screwing it into the Antenna Connection until finger tight.
8. Extend the CHA MIL WHIP 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 to the CHA MIL EXT by carefully screwing it into the top section until finger tight.

Extend the Counterpoise

10. Extend the CHA MIL EXT 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.
11. Connect the CHA MIL EXT to the Hybrid Base by carefully screwing it into the other 3/8" antenna mount on the Jaw Mount until finger tight.
12. Extend the CHA MIL WHIP 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.
13. Connect the CHA MIL WHIP to the CHA MIL EXT by carefully screwing it into the top section until finger tight.
14. Perform operational test.

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. Disconnect the antenna from the Hybrid Base.
7. HYBRID MINI: Roll (do not kink) the Antenna Wire and secure with a short length of Paracord.
8. HYBRID MICRO: Wind the Antenna Wire onto the Line Winder (e) and secure with attached shock cord.
9. CHA MIL EXT: 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. CHA MIL WHIP: 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.
11. CHA CAP HAT: 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. Pull the Stakes from the ground, if used.
13. Remove dirt from antenna components and inspect them for signs of wear.
14. Store components together.

Troubleshooting

1. If using the Antenna Wire (b), ensure Wire Connector is securely connected.
2. Inspect Antenna Wire or Whip for 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 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 Hybrid Base (a).

Specifications

- Frequency: (all configurations require a wide range antenna tuner or coupler)
    - CHA HYBRID MINI / MICRO: 1.8 MHz through 54 MHz continuous *(including all Amateur Radio Service bands 160m to 6m)*.
    - CHA MIL WHIP: 24 – 54 MHz *(whip only)*, 1.8 – 54 MHz *(with CHA HYBRID MINI / MICRO. Limited performance below 3.5 MHz.)*
    - CHA MIL WHIP with CHA MIL EXT: 12 – 54 MHz *(whip and extension only)*, 1.8 – 54 MHz *(with CHA HYBRID MINI / MICRO.)*
- Power:
    - CHA HYBRID MINI : 250 W continuous duty cycle (CW, AM, FM, RTTY), 800 W intermittent duty cycle (SSB and SSB-based digital modes)
    - CHA HYBRID MICRO: 50 W continuous duty cycle (CW, AM, FM, RTTY), 100 W intermittent duty cycle (SSB and SSB-based digital modes)
- RF Connection: UHF Plug (PL-259)
- SWR: Subject to frequency and configuration, but within limits of most wide range 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: 60 ft (maximum) and around 35 ft (minimum)
- CHA MIL WHIP: 10 ft 8 in extended, 29 in collapsed
- CHA MIL WHIP with CHA MIL EXT: 17 ft 4 in extended, 29 in collapsed

- Weight:
  - CHA HYBRID MINI: 1.5 lbs
  - CHA HYBRID MICRO: 1 lbs
  - CHA MIL WHIP: 1 lbs
  - CHA MIL WHIP with CHA MIL EXT: 2 lbs
- Personnel Requirements and Setup Time: one operator, less than 15 minutes (antenna wire), less than 5 minutes (whip).

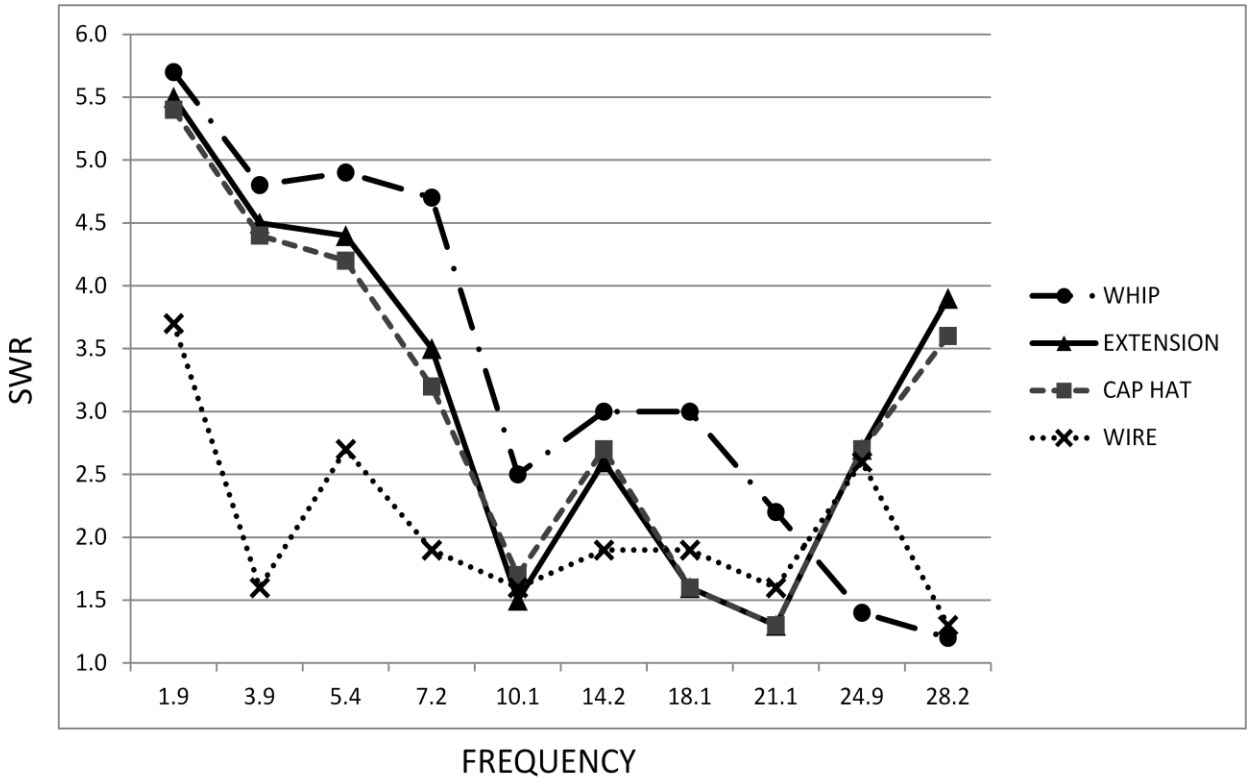

Figure 9. SWR by Frequency Graph.

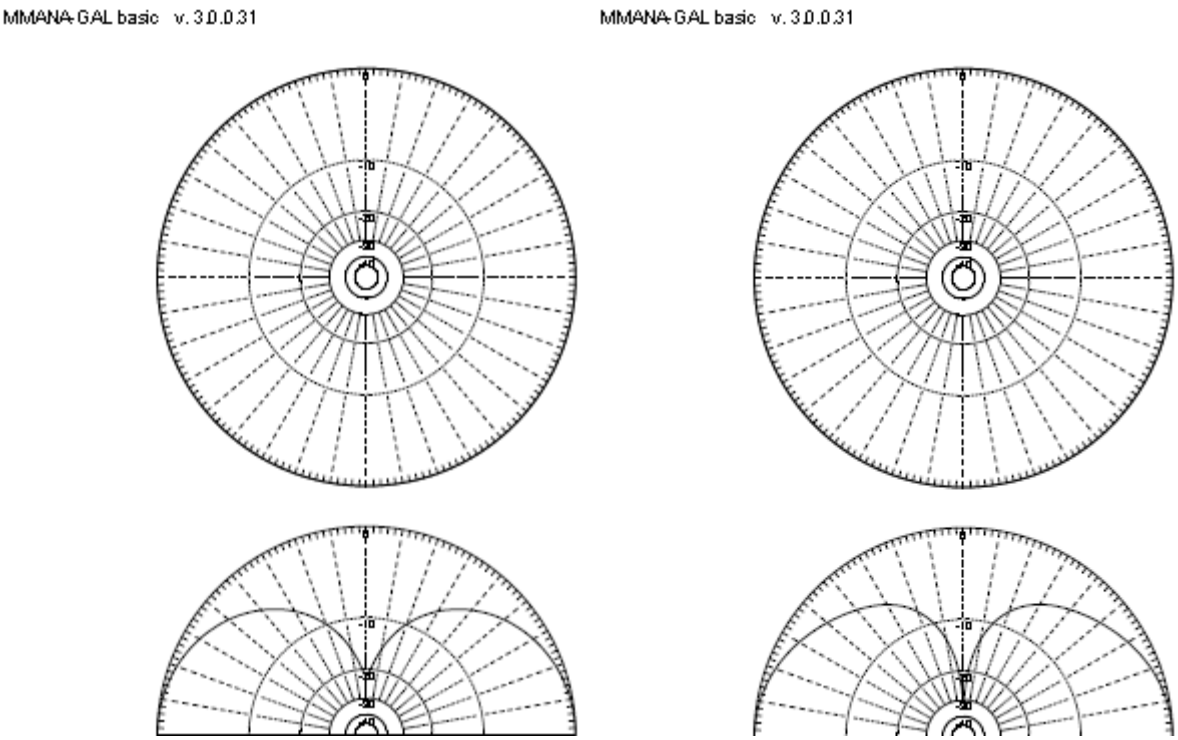

Figure 10. Manpack Vertical Far Field Plots 7 MHz (left), 14 MHz (right).

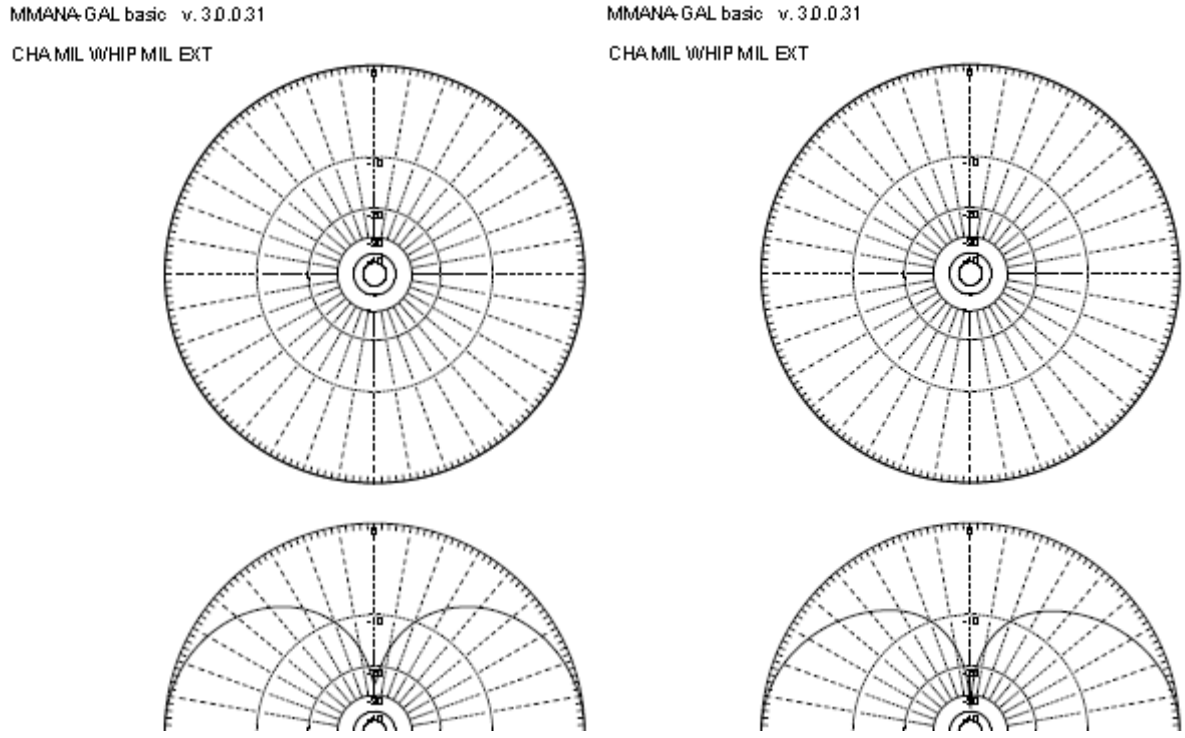

Figure 11. Portable Vertical Far Field Plots 7 MHz (left), 14 MHz (right).

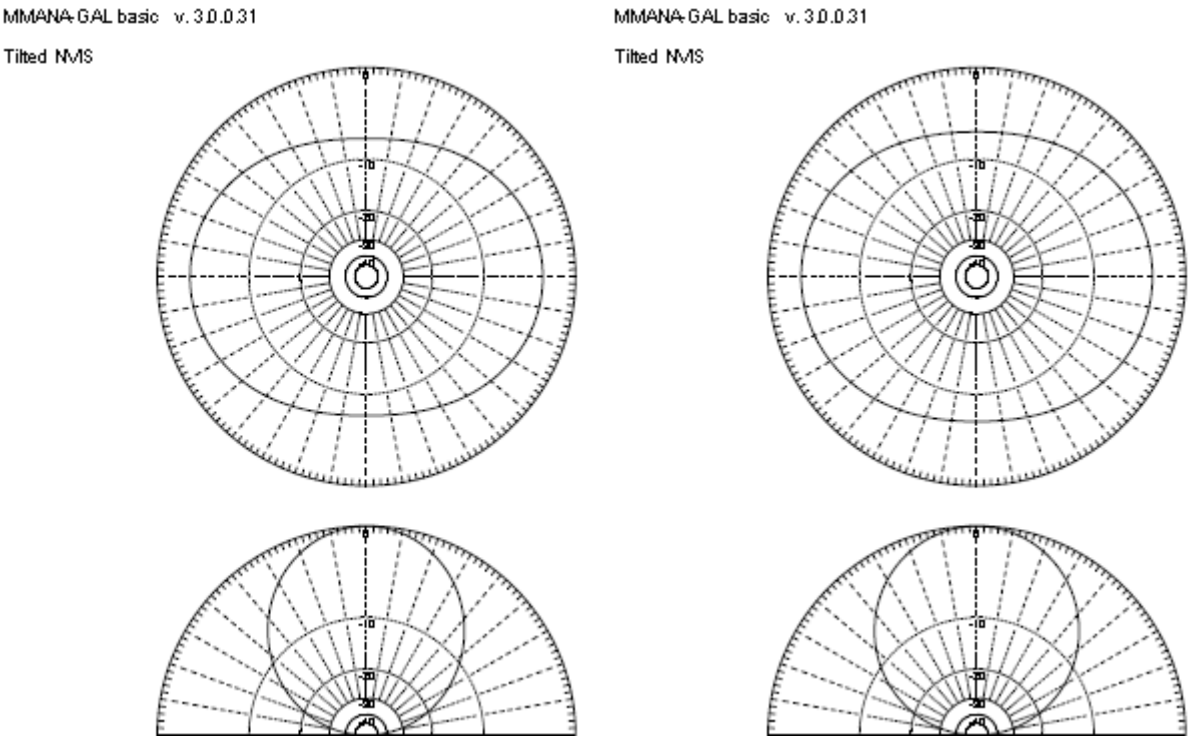

Figure 12. Tilted NVIS Far Field Plots 3.7 MHz (left), 7 MHz (right).

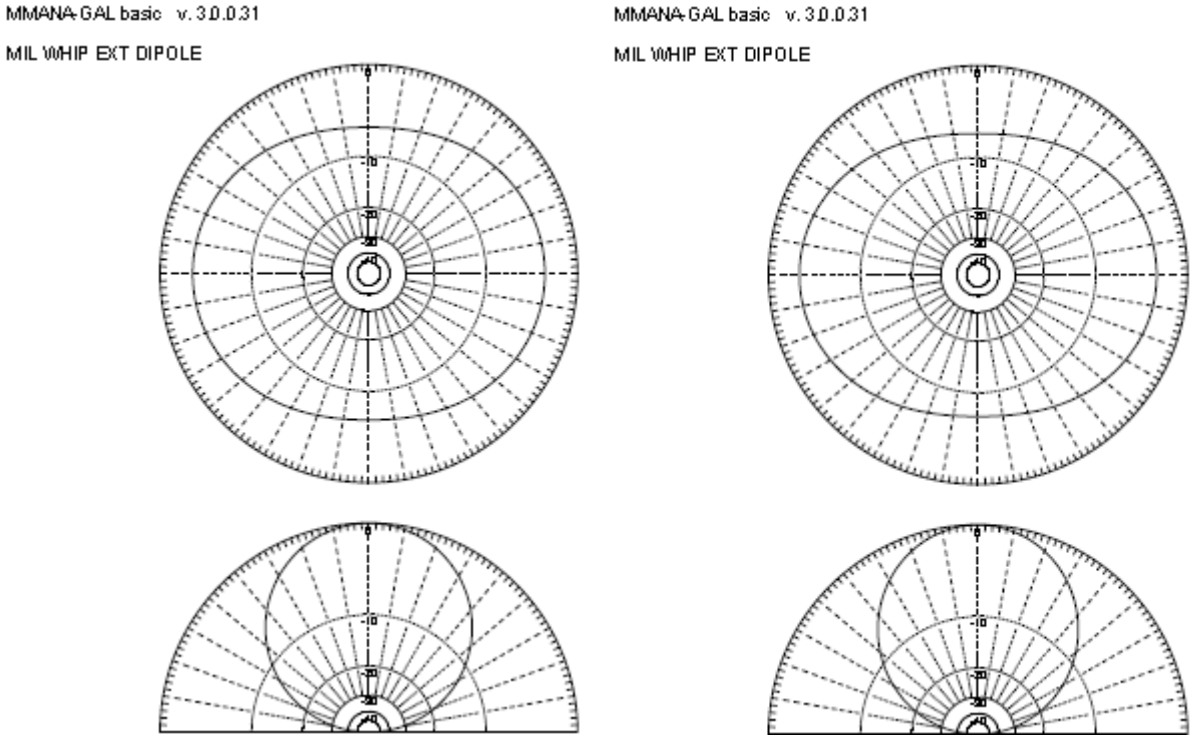

Figure 13. MIL WHIP EXT Dipole Far Field Plots 7 MHz (left) 14 MHz (right).

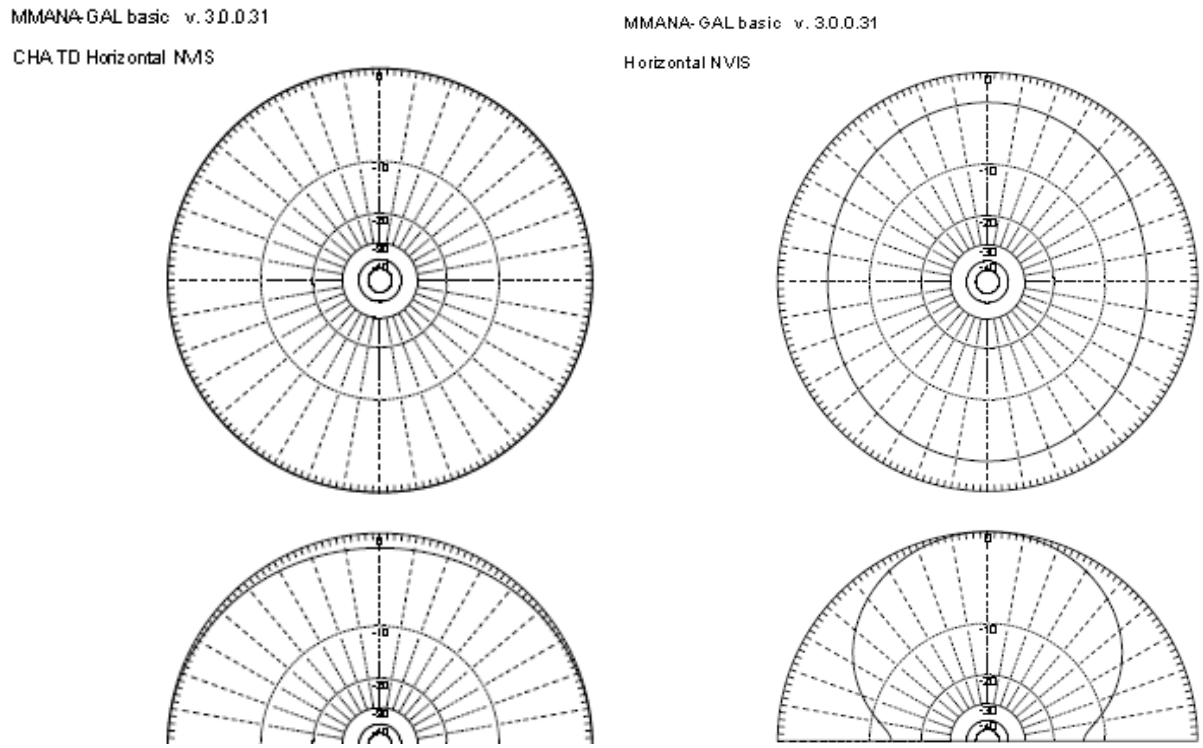

Figure 14. Horizontal NVIS Far Field Plots 3.7 MHz (left) 7 MHz (right).

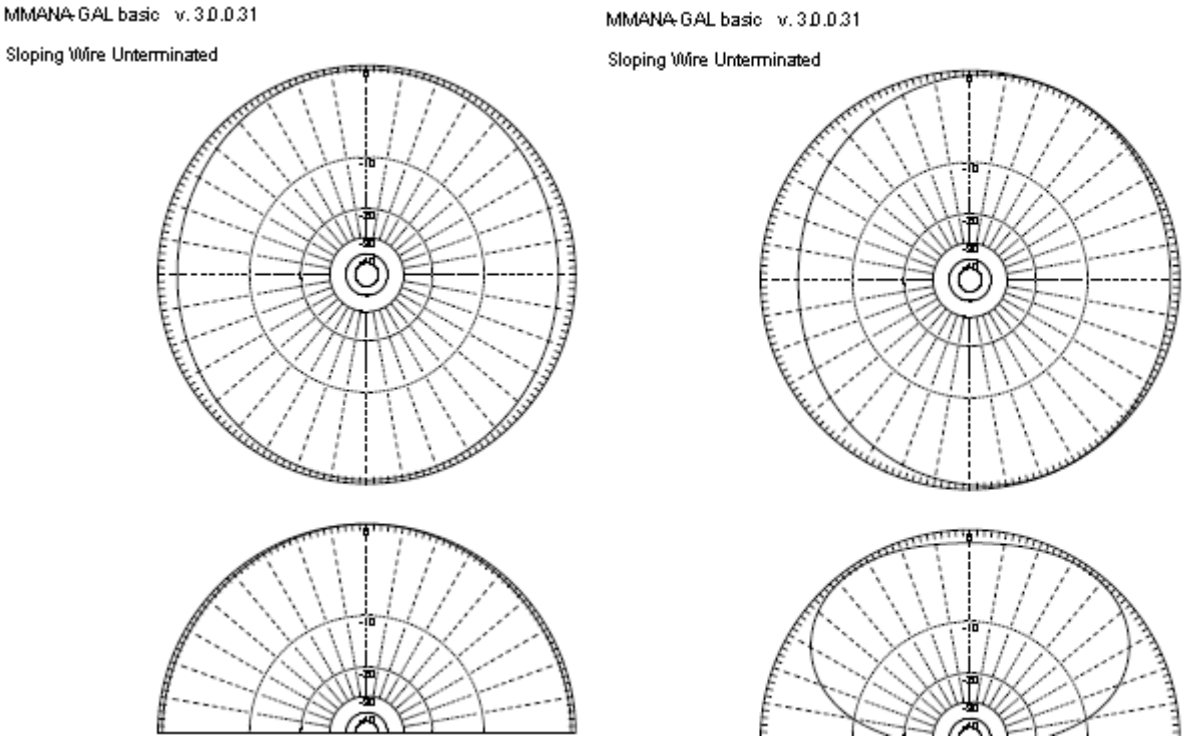

Figure 15. Sloping Wire Far Field Plots 7 MHz (left) 14 MHz (right).

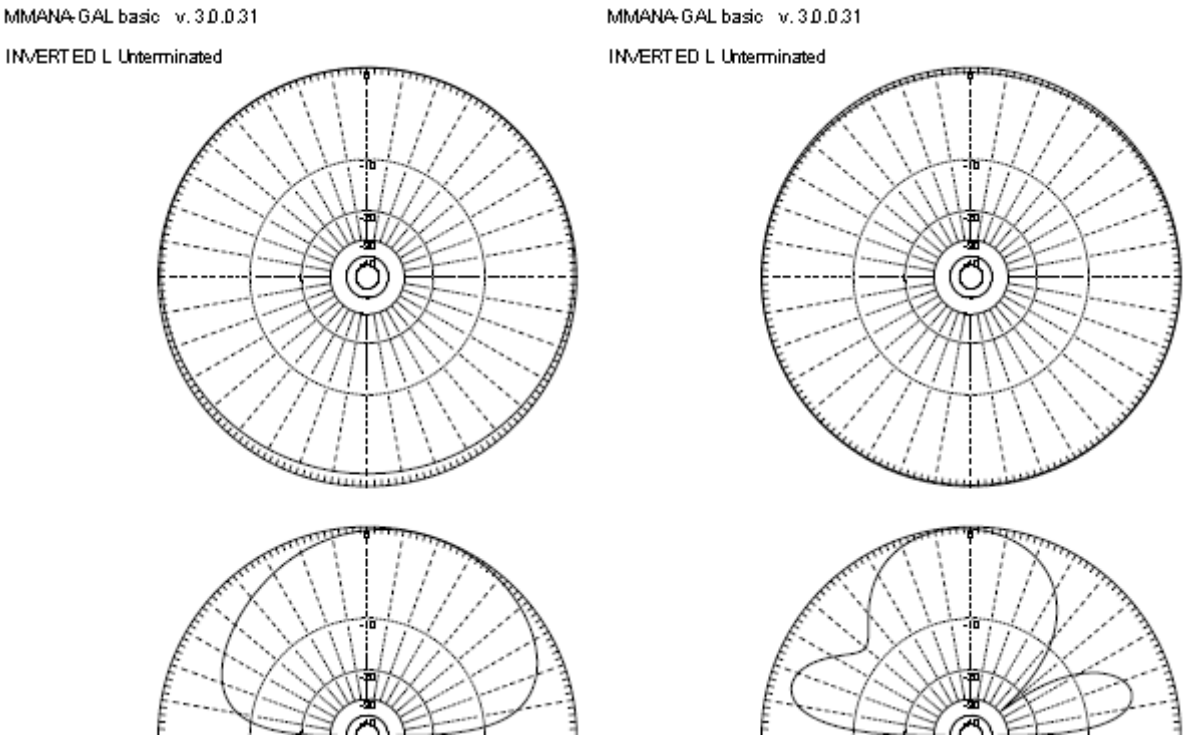

Figure 16. Inverted "L" Far Field Plots 7 MHz (left) 14 MHz (right).

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 EXT (whip extension).** The CHA MIL EXT whip extension has been designed to offer maximum portability and performance for those already using the portable CHA MIL whip for man-pack antenna system. This collapsible antenna extension is used with the CHA MIL to create a 17'4" long portable antenna. When combined with any HYBRID series antenna bases the CHA MIL EXT will operate at all frequencies in the 1.8-54 MHz band without any adjustment with most modern external antenna tuners.
- **Tripod.** This heavy duty antenna tripod can hold equipment up to 15.4 lbs. Compact and light weight, weighing 5.5 lbs, this 10 ft tripod will give you years of service. Made of Cold-Worked Carbon with special design locking system and double braced legs with an extra wide footprint for added stability. This tripod sets up in seconds, going from 3.25 ft when fully folded to 10 ft when completely extended. Can be used use with any type of antenna, indoor or outdoor.
- **Dipole Jaw Mount.** The Chameleon Dipole 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.** 50 feet of RG-58 with integrated RFI Choke. Used to connect the CHA HYBRID - MINI / MICRO to the radio set. This is a highly recommended accessory if you are not using a CHA RFI CHOKE.
- **RF Choke Assembly.** The CHA RFI CHOKE will prevent, greatly reduces or totally eliminates the RFI carried by the coax cable. It can be installed either at the antenna feed point or right behind the antenna tuner. This accessory is highly recommended if you are not using the Chameleon Antenna™ Coaxial Cable Assembly.

Recommended non-supplied accessories:

- The following hardware is needed to attach the counterpoise wires to the Hybrid Base, if not using the Jaw Mount:
  - One 3/8" x 24 (fine thread; not the common 3/8" x 16 course thread) stainless steel hex nut or wing nut.
  - One 3/8" stainless steel flat washer.
  - One 3/8" stainless steel split washer.
- Wide range antenna tuner or coupler. Required for most configurations.
- Flashlight.
- Multi-tool.
- Throwing weight and string.
- Mallet.
- SWR Power Meter.
- Multi-Meter.
- Small canvas or nylon bag to store antenna components.

Chameleon Antenna™ Products

The following products are available for purchase at Chameleon Antenna™.
Go to http://chameleonantenna.com *for ordering and more information.*

CHA F-LOOP – The CHA F-LOOP The F-LOOP was designed with weight, durability, portability, versatility and cost in mind. The unique craftsmanship of the CHA F-LOOP distinguishes itself from the competition. The antenna is built to last. The unit covers everything between 10M to 60M (or 29.700MHz to 5.300MHz) continuously. The unassembled antenna comes into a high quality MOLE tactical bag for easy carry and storage.

CHA WINDOM 40 – The CHA WINDOM 40 Antenna is designed for 40, 20, and 10 meters. Amateur Bands from 60 through 10 meters can be operated using an antenna tuner. Built with the portable operator in mind, it is very light weight, easy to set up, and comes with a military-style pouch.

CHA EMCOMM II - The CHA EMCOMM II Antenna has been specially designed for backup emergency HF system or permanent installation. The integral broadband impedance matching network allows broadband antenna tuning.

CHA SKYLOOP - The CHA SKYLOOP is a 250' full wave loop antenna cut for 80M. With the help of an antenna tuner, the CHA SKYLOOP will cover all the bands between 80M and 6M.

CHA HYBRID Vehicular Base - The CHA HYBRID Vehicular Base is designed to enhance the capabilities of the common HF radio application by allowing faster tuning operation across the HF bands including MARS/CAP frequencies. This antenna base has an integral broadband impedance matching network allowing broadband antenna tuning. The CHA HYBRID can be used mobile with the CHA V1L and V2L mobile antennas or stationary with the provided 30' wire.

CHA V1 Mobile Antenna - The CHA V1 antenna is our first and classic broadband HF mobile antenna that we designed. It has been updated from fiberglass to 7075 alloy and stainless steel.

CHA V1L Mobile Antenna - The CHA V1L antenna is a rugged multiband HF mobile antenna that can be erected in a minimum of time and space.

CHA V2L Mobile Antenna - The CHA V2L is a rugged multiband HF antenna designed for smaller vehicles.

CHA VHF/UHF Magnetic Mount Mobile Antenna - The CHA VHF/UHF is a simple but great dual band antenna for 2M and 70CM.

CHA MIL Whip - The CHA MIL whip is a broadband (28 to 54 MHz) monopole antenna designed for portable or man-pack radios requiring compact but rugged antenna systems. Its design has been borrowed from similar antennas utilized by many armies all over the world. The CHA MIL is very hardy, sturdy and portable (being collapsible). Un-mounted the entire antenna length is less than 29". The 5 aluminum sections are hold together by a piece of 1/8th inch US GI MIL SPEC shock cord. The CHA MIL Whip and a CHA HYBRID-MINI Base perfectly complements the capability of the CHA HYBRID - MINI / MICRO.

CHA MIL EXT Whip Extension - The CHA MIL EXT whip has been designed to offer maximum portability and performance for those already using the portable CHA MIL whip for man-pack antenna system. This collapsible antenna extension needs to be used with the CHA MIL to create a 17'4" long portable antenna. When combined with any HYBRID series antenna bases the CHA MIL EXT will operate at all frequencies in the 1.8-54 MHz band without any adjustment with most modern external antenna tuners.

CHA TD Tactical Dipole LITE - The CHA TD LITE (Tactical Dipole LITE) is a HF broadband antenna specially designed for portable HF communication where rapid deployment and simplicity of operation is essential but compactness is primordial. The antenna will operate at all frequencies in the 1.8-54 MHz band without any adjustment with most modern external antenna tuners. No masts or guying are required.

CHA TD Tactical Dipole - The CHA TD (Tactical Dipole) Antenna has been designed as an add-on for the CHA HYBRID - MINI / MICRO. The CHA TD is a HF broadband antenna specially designed for portable HF communication where rapid deployment and simplicity of operation is essential. The antenna will operate at all frequencies in the 1.8-30 MHz band without any adjustment with most modern internal antenna tuners. It is ideal for use in conjunction with modern, digitally configured, HF communication transceivers where features such as ALE and frequency hopping require true broadband capability. No masts or guying are required. The CHA TD can also be used without antenna tuner, as the SWR will stay under 2.5:1 between 10M and 80M and under 2.75:1 on 160M.

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.