



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

California - USA

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VERSATILE – DEPENDABLE – STEALTH – BUILT TO LAST



HF Modular Portable Antenna System

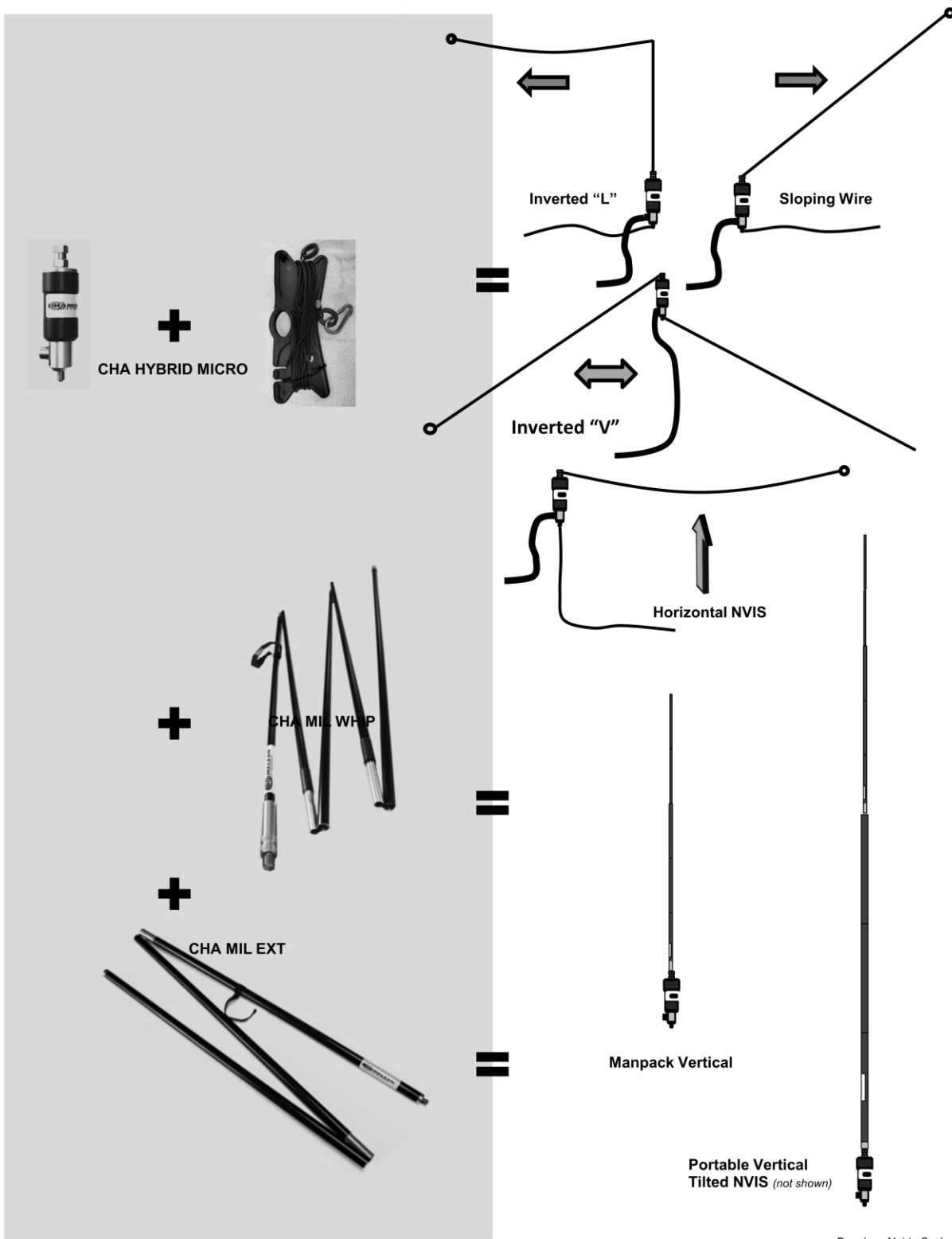


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Be aware of overhead power lines when you are deploying the CHA MPAS antenna system. You could be electrocuted if the antenna gets near or contacts overhead power lines.

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Introduction

Thank you for purchasing and using the Chameleon Antenna™ High Frequency (HF) Modular Portable Antenna System (CHA MPAS). The CHA MPAS is designed to be the most versatile, high performance, and rugged portable / manpackable HF antenna available using the “LEGO® BLOCK” approach, as described by Survival Tech Nord. The core components of the antenna system, see plate (1), are: a CHA HYBRID-MICRO portable base, 60 feet of wire, a 10’8” military-style collapsible whip antenna (CHA MIL WHIP), and a clamp-style antenna mount (CHA JAW MOUNT). Available system options (*sold separately*) include, a 6’6” collapsible extension (CHA MIL EXT), rugged counterpoise kit, and coaxial cable assembly with integrated Radio Frequency Interference (RFI) choke. The components of the CHA MPAS provide a continuum of portability and performance to meet your communications requirements.



Plate 1. MPAS Core Components.

The integral broadband impedance matching network transformer of the CHA HYBRID-MICRO 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 MPAS is perfect for 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 is configurable to facilitate Near-Vertical Incident Sky wave (NVIS) communication and is totally waterproof. The CHA MPAS 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 MPAS.

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

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

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

Parts of the Antenna

The CHA MPAS is comprised of the following components and sub-components, see plate (2):

a. Hybrid Micro Base

The Hybrid Micro Base provides a mounting base and impedance matching for the CHA MPAS.

b. Antenna Wire

The Antenna Wire is a 60 foot length of black insulated wire.

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.



Plate 2. Hybrid Micro Antenna.

d. Carabiner

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

e. 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.

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 Micro Base (a).

h. Antenna Connection

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

j. 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 Micro Base (a).

Antenna Configurations

Using the supplied components, the CHA MPAS can be deployed into a number of configurations. Seven configurations (*some configurations require optional components that are sold separately*), see table (2), are described in this manual, each with unique performance characteristics.

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

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 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.

Manpack Vertical

The CHA MPAS Manpack Vertical configuration, see figure (1), 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. Use the following procedure to install the Manpack Vertical configuration.

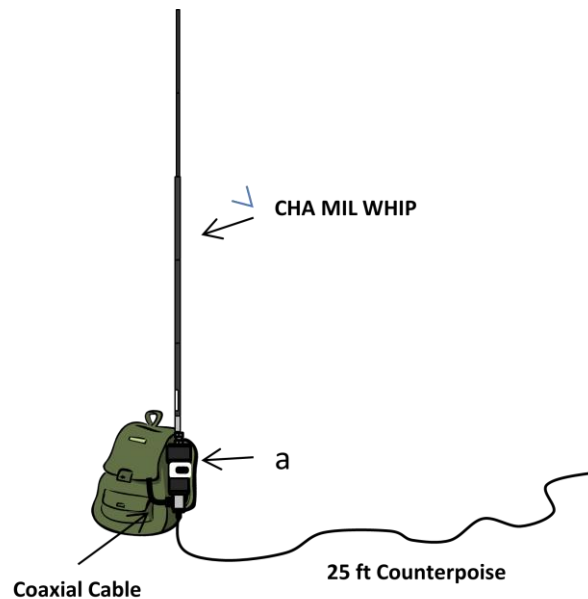


Figure 1. Manpack Vertical.

Site Selection and Preparation

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

Refer to plates (2) and (3) for steps (2) through (6).

2. If attached, remove the Antenna Shackle (j) from the Hybrid Micro 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 Micro Base.

3. Attach a counterpoise wire to the Hybrid Micro 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 Micro 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 Micro 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. You can use the supplied Antenna Wire (b), optional Counterpoise Kit, or any wire at least 25 feet in length.
8. Perform operational test.

Portable Vertical

The CHA MPAS with the optional CHA MIL EXT comprise the Portable Vertical configuration, see figure (2), which 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, 3/8" heavy duty mobile mount, 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. You may also use the supplied 60 foot antenna wire as the counterpoise. The antenna may also be attached to a standard 3/8" mobile mount on a stationary vehicle. No counterpoise is required when the antenna is mounted on a vehicle. An antenna tuner or coupler is required on most frequencies. Use the following procedure to install the Portable Vertical configuration.

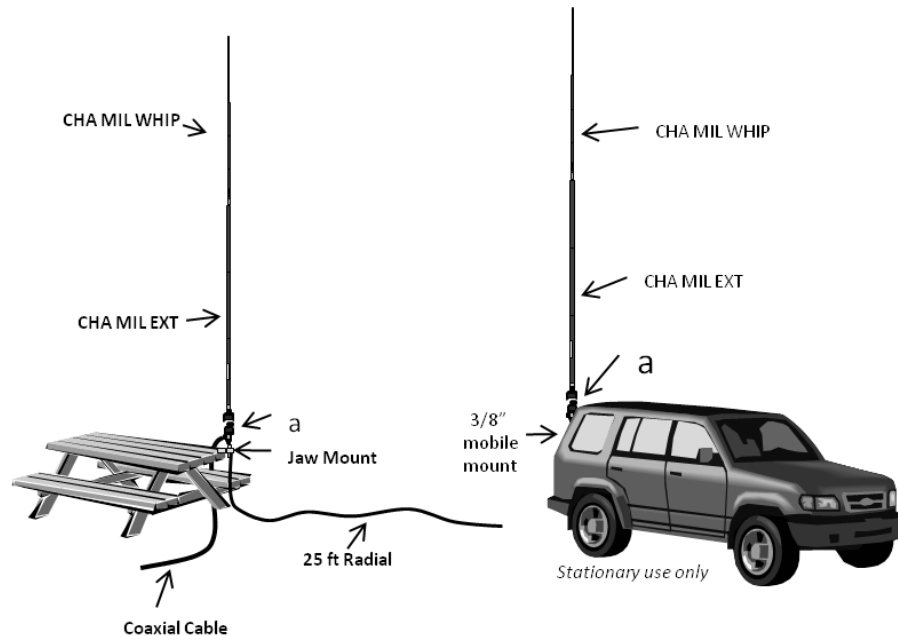


Figure 2. Portable Vertical.

Site Selection and Preparation

1. Select a site to deploy the CHA MPAS 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 a CHA JAW MOUNT or other 3/8" antenna mount to the support.

Refer to plates (2) through (4) for steps (3) – (8).

3. If attached, remove the Antenna Shackle (j) from the Hybrid Micro 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.

Connect the Hybrid Micro Base.

4. If used, place the terminal lugs of the counterpoise wires over the Counterpoise

Connection (i) on the Hybrid Micro Base. You can use either the Antenna Wire (b) or optional Counterpoise Kit.

5. Screw the Hybrid Micro Base Counterpoise Connection into the 3/8" antenna 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 Micro 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 Micro Base by carefully screwing it into the Antenna Connection until finger tight, see plate (3).
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

9. Extend the counterpoise wire(s) along the ground in any convenient direction. The end of the counterpoise wire(s) can be secured to the ground with a tent stake.
11. Perform operational test.

Horizontal NVIS

The CHA MPAS Horizontal NVIS configuration, see figure (3), 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.

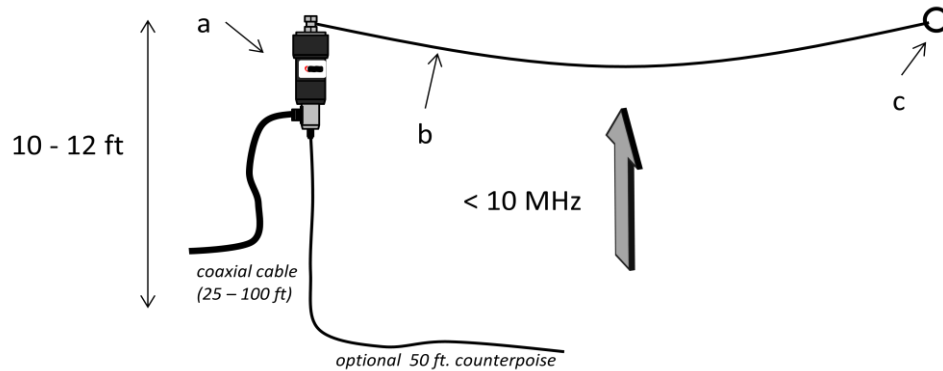


Figure 3. Horizontal NVIS Configuration.

Site Selection and Preparation.

1. Select a site to deploy the CHA MPAS Horizontal NVIS configuration. The site must have two supports that will position the Hybrid Micro Base and the end of the Antenna Wire to be at a height of between 10 and 12 feet and 60 feet apart. Higher or lower heights may be used, but may reduce NVIS performance.

Refer to plates (2) and (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 Micro Base.

3. Temporarily remove the Antenna Shackle (j) 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.

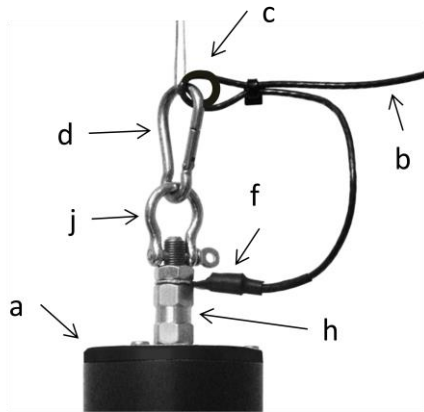


Plate 3. Hybrid Micro Electrical and Mechanical Connections.

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 Micro 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.

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 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 Isolation Loop 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 antenna.
15. Perform operational test.

Sloping Wire

The CHA MPAS Sloping Wire configuration, see figure (4), 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

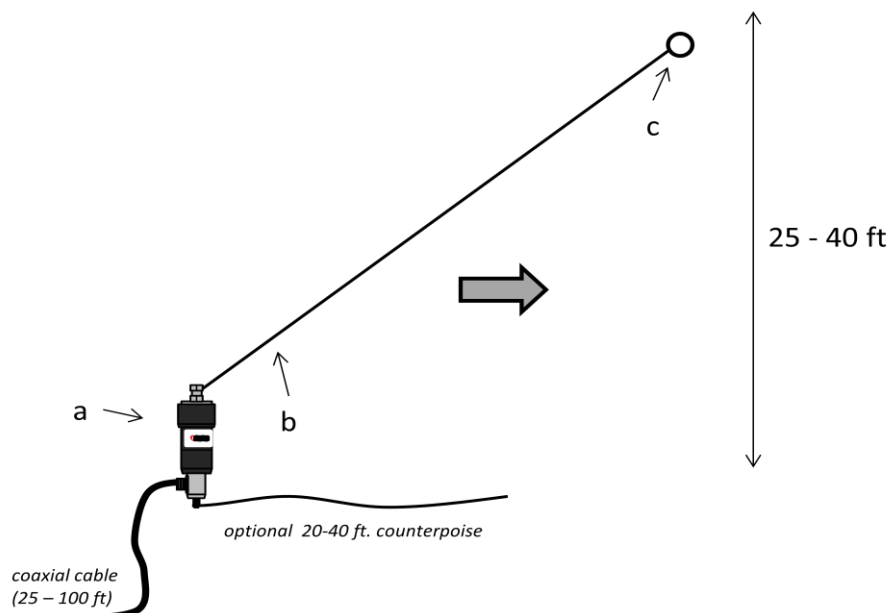


Figure 4. Sloping Wire Configuration.

hastily deployed. This configuration is predominately omnidirectional, becoming slightly unidirectional towards the end of the antenna wire as the frequency increases. The Sloping Wire requires one support and should be mounted at a height of 25 to 40 feet for best performance. A counterpoise wire, with a length of 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 Sloping Wire configuration.

Site Selection and Preparation.

1. Select a site to deploy the CHA MPAS 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) and (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 Micro Base.

3. Temporarily remove the Antenna Shackle (j) 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 Micro Base.

Raise the Antenna.

8. Using a Bowline, or similar knot, tie a long length (50 feet or more) of Paracord to 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 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 Micro 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 "V"

The CHA MPAS Inverted "V" configuration, see figure (5), is a broadband short to long range HF antenna. This configuration will provide good NVIS and medium range sky wave propagation on all frequencies and long range sky wave propagation above 14 MHz. It is omnidirectional below 11 MHz and bidirectional towards the ends of the antenna above 11 MHz. This is a good configuration for EMCOMM when communication is needed both inside and outside an affected region and the region is too large or mountainous for effective VHF coverage. The Inverted "V" requires one support in the center of the antenna wire and should be mounted at a height of around 30 feet for best performance. A 60 foot long counterpoise, which is not supplied, is required. Use the following procedure to install the Inverted "V" configuration.

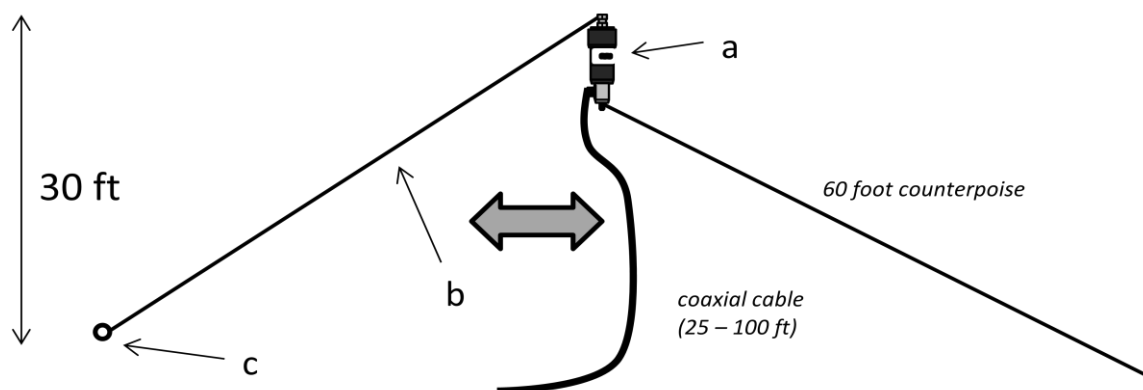


Figure 5. Inverted "V" Configuration.

Site Selection and Preparation.

1. Select a site to deploy the CHA MPAS Inverted "V" configuration. The site must have a support that will position the center of the antenna at a height of around 30 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) and (3) for steps (3) – (11).

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 Micro Base.

3. Temporarily remove the Antenna Shackle (j) 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. Using a Bowline or similar knot, tie the end of a long length of Paracord to the Carabiner.
7. Connect a 60 foot counterpoise wire to the Counterpoise Connection (i). Tighten the nut (*not supplied*) snugly.
8. 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 Micro Base.

Raise the Antenna.

9. Using a throw weight or some other method, loop the Paracord over the support.
10. Raise the center of the antenna to the desired height and secure it to the support using a Round Turn and two Half Hitches, or similar knot.

Extend the Antenna.

11. Using a Bowline or similar knot, tie the end of a short length (around 4 feet) of Paracord to the Isolation Loop at the end of the Antenna Wire.
12. Fully extend the Antenna Wire until it is not quite taut.
13. Drive a stake into the ground around two feet from the end of the Antenna Wire and tie the Paracord from the Antenna Wire to the stake using two Half Hitches, or similar knot.

Extend the Counterpoise.

14. Using a Bowline, or similar knot, tie the end of a short length of Paracord to the free end of the counterpoise wire.
15. Fully extend the counterpoise wire, in an opposite direction from the Antenna Wire, until it is not quite taut.
16. Drive a stake into the ground around two feet beyond the end of the counterpoise wire and tie the Paracord from the end of the Antenna Wire to the stake using two Half Hitches, or similar knot.
17. Perform operational test.

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. 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.

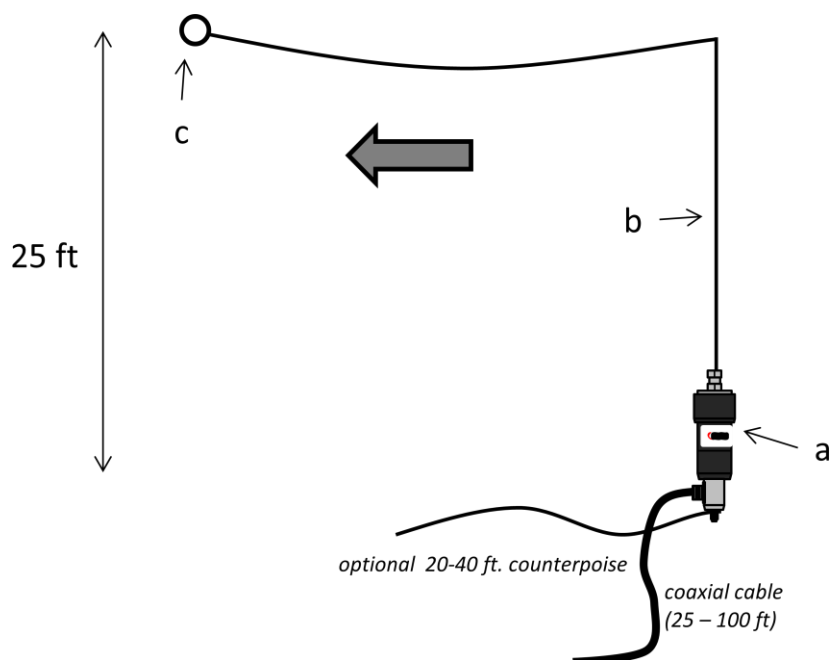


Figure 6. Inverted “L” Configuration.

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 35 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) and (3) for steps (3) – (12).

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 Micro Base.

3. Temporarily remove the Antenna Shackle (j) 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 Micro 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 Micro 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 Micro 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 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.

Tilted NVIS

The CHA MPAS Tilted NVIS configuration, see figure (7), is a broadband short range HF/VHF-LO antenna. This 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 CHA 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.

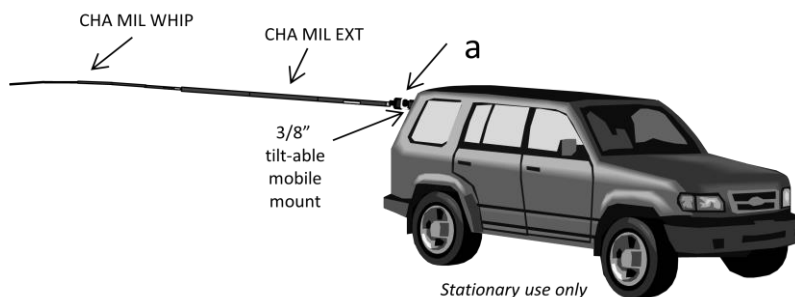


Figure 7. Tilted NVIS.

Site Selection and Preparation

1. Select a site to deploy the CHA MPAS Tilted NVIS configuration. 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 (2) through (4) for steps (3) – (8).

3. If attached, remove the Antenna Shackle (j) from the Hybrid Micro 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.

Connect the Hybrid Micro Base.

4. If using a counterpoise wire, place the terminal lug of the Antenna Wire over the Counterpoise Connection on the Hybrid Micro Base.

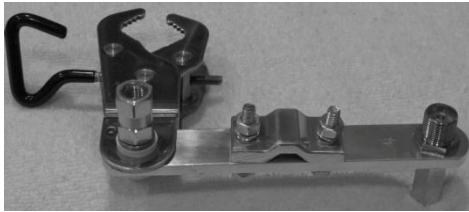


Plate 4. CHA JAW MOUNT.

5. Screw the Hybrid Micro Base Counterpoise Connection (i) into one of the 3/8" antenna mount on the CHA JAW MOUNT or mobile 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 Micro 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 Micro 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.

Recovery Procedure

To recover the CHA MPAS, 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 Base (a) from the antenna mount.
3. Disconnect the Coaxial Cable from the Hybrid Micro Base (a).
4. Carefully roll (do not twist) the Coaxial Cable.
5. Disconnect, wind, and store the counterpoise wire(s), if used.
6. Untie the Paracord from the Hybrid Micro Base and Antenna Wire (b), as applicable and wind on line winder.
7. Disconnect the antenna from the Hybrid Micro Base.
8. 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. Pull the Stakes from the ground, if used.
12. Remove dirt from antenna components and inspect them for signs of wear.

13. 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 Micro Base (a).

Specifications

- Frequency: (all configurations require a wide range antenna tuner or coupler)
 - CHA HYBRID 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 MICRO.*)
- Power: 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)
- 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 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).
- MPAS Configuration Far Field Plots are shown in figures (9) through (15).
- 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.

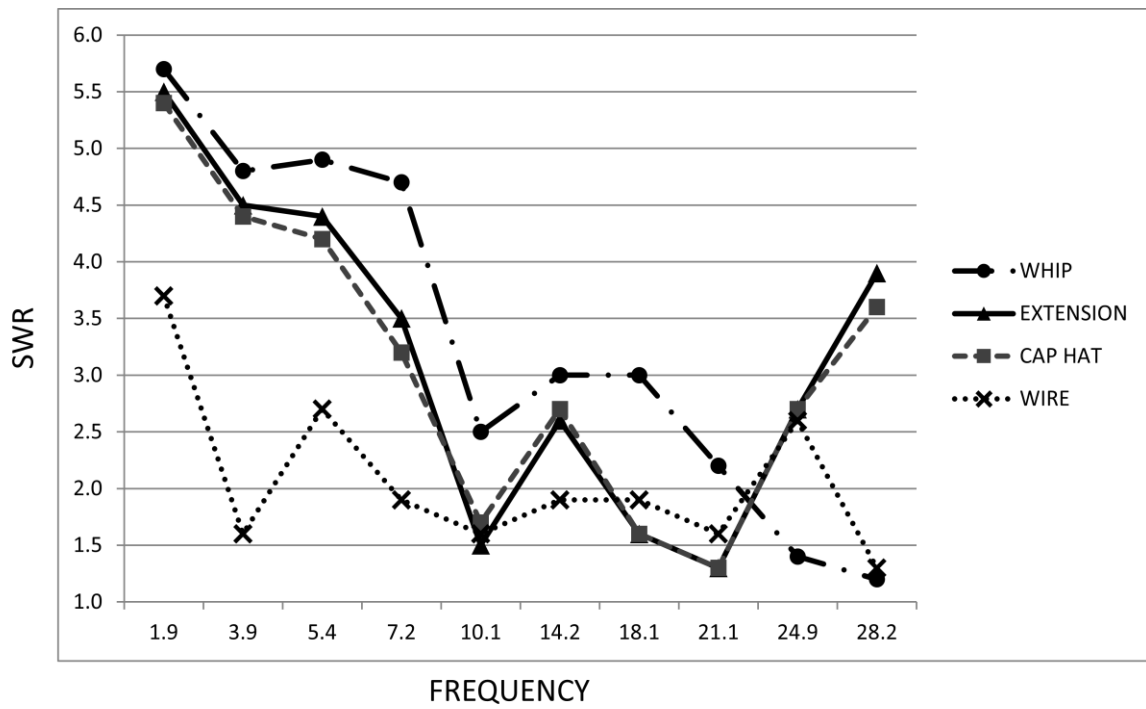


Figure 8. SWR by Frequency Graph.

MMANA-GAL basic v. 3.0.0.31

MMANA-GAL basic v. 3.0.0.31

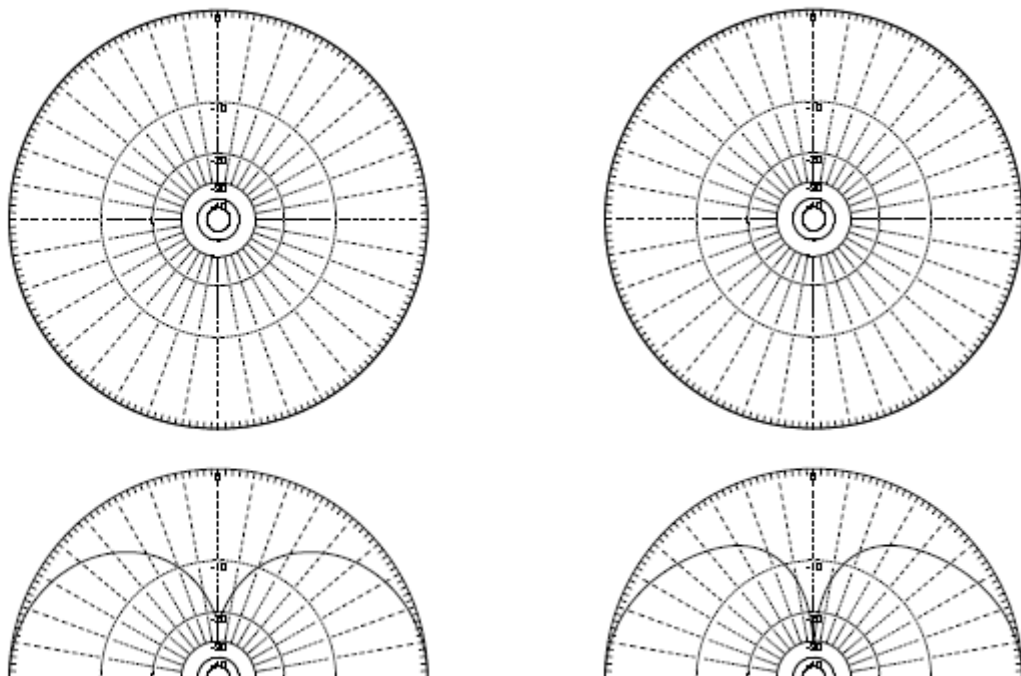
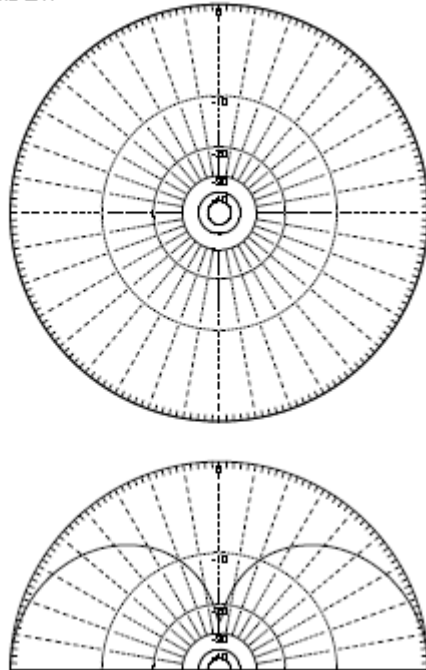


Figure 9. Manpack Vertical Far Field Plots 7 MHz (left), 14 MHz (right).

MMANA-GAL basic v.3.0.0.31
CHAMIL WHIP MIL EXT



MMANA-GAL basic v.3.0.0.31
CHAMIL WHIP MIL EXT

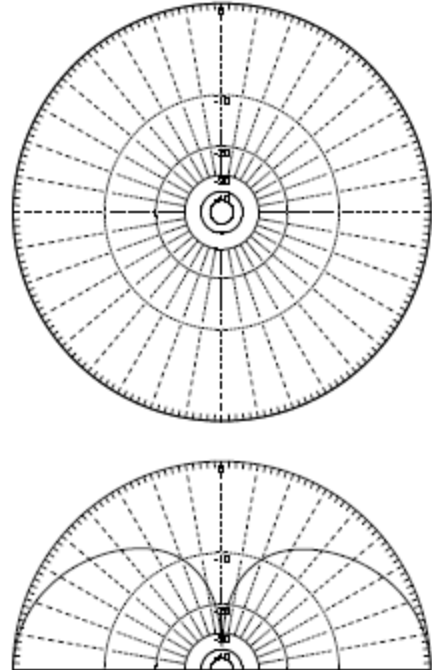
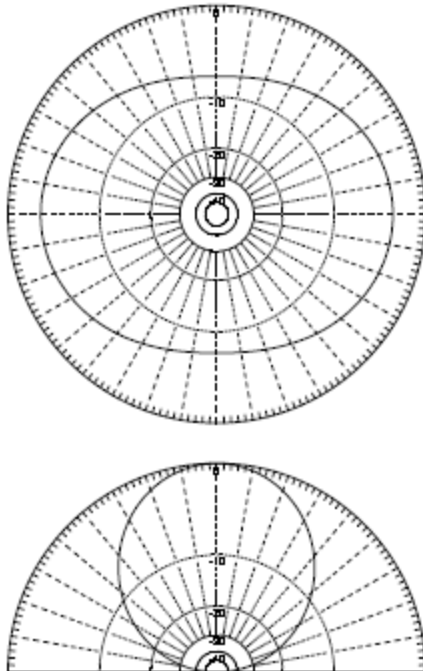


Figure 10. Portable Vertical Far Field Plots 7 MHz (left), 14 MHz (right).

MMANA-GAL basic v.3.0.0.31
Tilted NVIS



MMANA-GAL basic v.3.0.0.31
Tilted NVIS

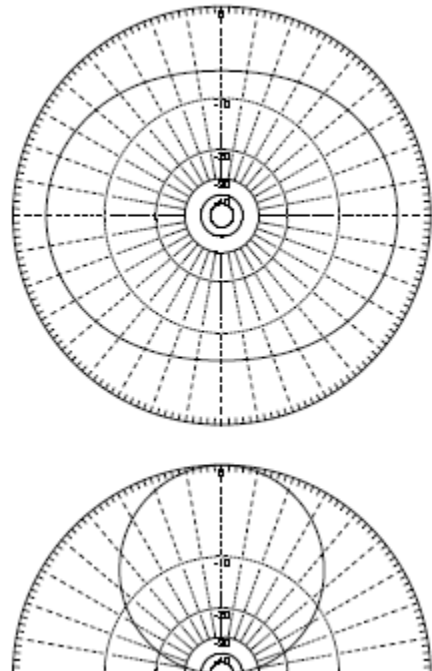
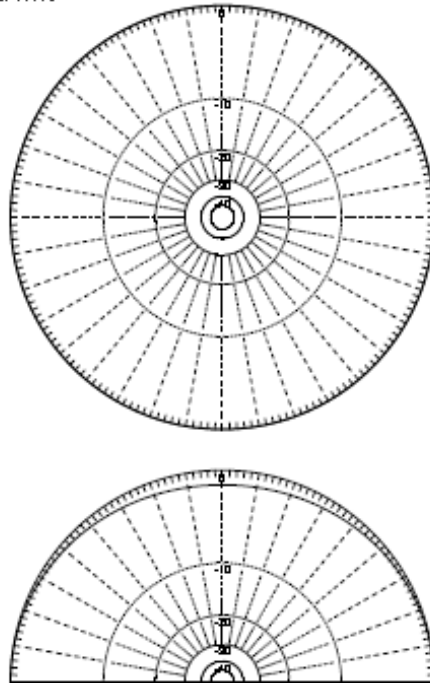


Figure 11. Tilted NVIS Far Field Plots 3.7 MHz (left), 7 MHz (right).

MMANA-GAL basic v. 3.0.0.31

CHA TD Horizontal NVIS



MMANA-GAL basic v. 3.0.0.31

Horizontal NVIS

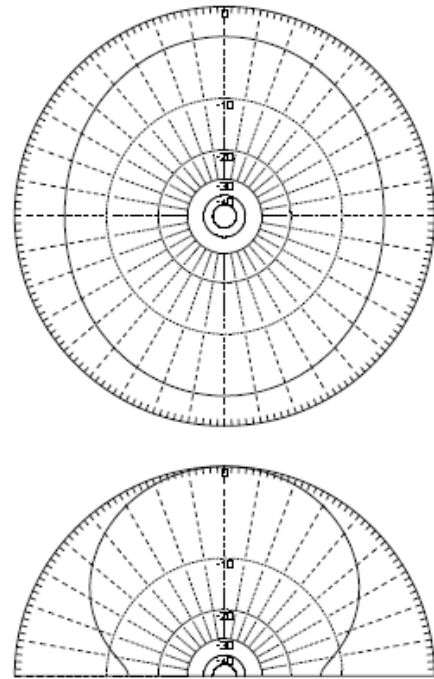
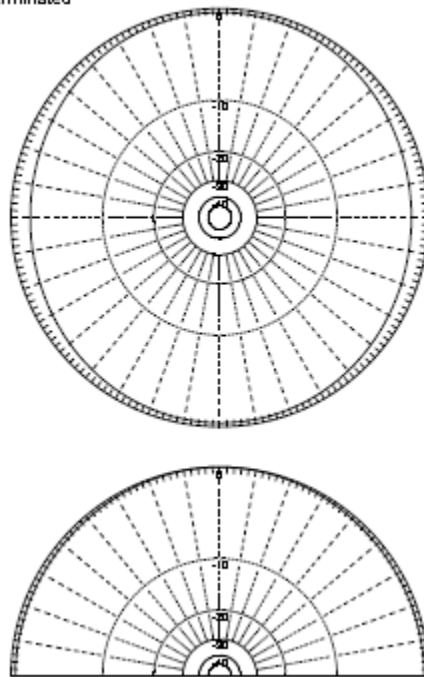


Figure 12. Horizontal NVIS Far Field Plots 3.7 MHz (left) 7 MHz (right).

MMANA-GAL basic v. 3.0.0.31

Sloping Wire Unterminated



MMANA-GAL basic v. 3.0.0.31

Sloping Wire Unterminated

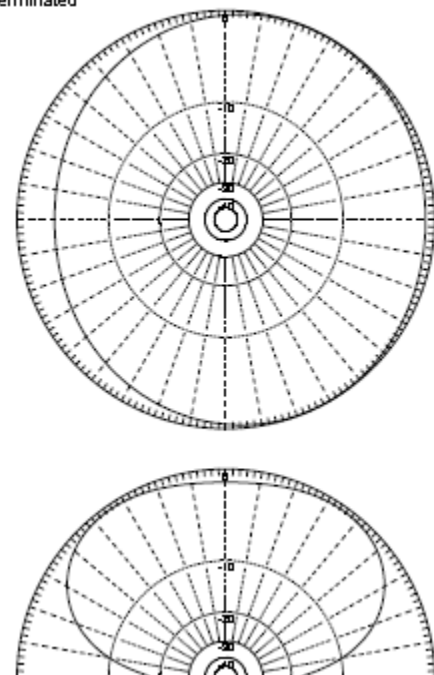
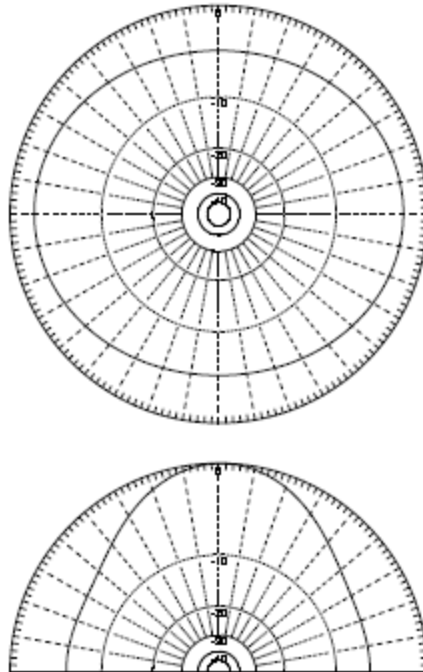


Figure 13. Sloping Wire Far Field Plots 7 MHz (left) 14 MHz (right).

MMANA-GAL basic v. 3.0.0.31
MPAS Inverted V



MMANA-GAL basic v. 3.0.0.31
MPAS Inverted V

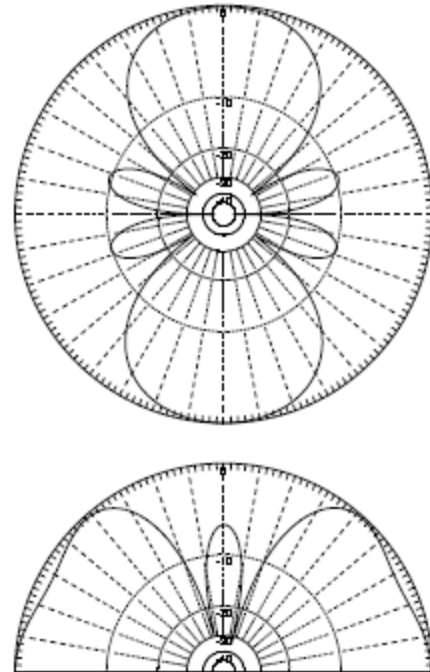
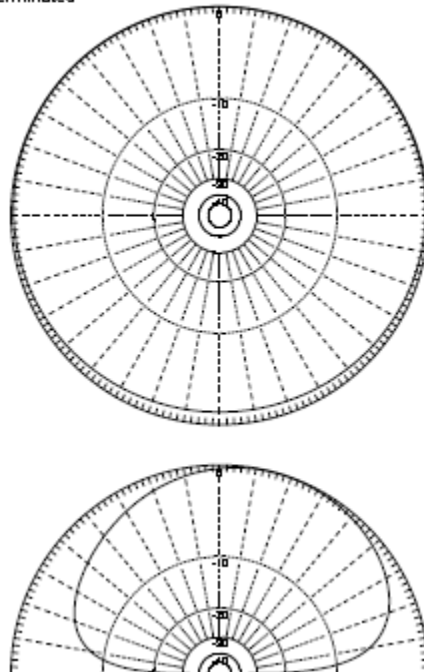


Figure 14. Inverted "V" Far Field Plots 7 MHz (left) 14 MHz (right).

MMANA-GAL basic v. 3.0.0.31
INVERTED L Unterminated



MMANA-GAL basic v. 3.0.0.31
INVERTED L Unterminated

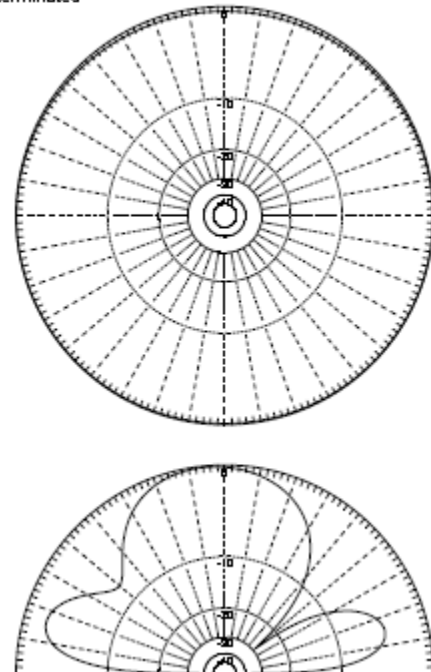


Figure 15. Inverted "L" Far Field Plots 7 MHz (left) 14 MHz (right).

Accessories

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

- **CHA SPIKE MOUNT.** The CHA SPIKE is a must have accessory for use with the MPAS. It is highly portable and enables easy ground mounting of the MPAS.
- **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.
- **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.
- **60 Foot Antenna Wire Assembly.** Same as supplied. One additional assembly is recommended to enable assembly of the Inverted "V" configuration.
- **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.
- **Capacity Hat.** The CHA CAP-HAT has been designed to enhance the radiation of any screw together HF antennas.
- **50' Paracord and Line Winder Assembly.** One assembly is recommended to enable installation of the CHA MPAS wire configurations.
- **Coaxial Cable Assembly.** 50 feet of RG-58 with integrated RFI Choke. Used to connect the CHA MPAS 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 Micro 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.
- Two tent stakes.
- Mallet.

- SWR Power Meter.
- Multi-Meter.
- Small canvas or ballistic 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 P-LOOP 2.0 - The CHA P-LOOP 2.0 was designed with portability, ease of use simplicity, ruggedness and high performance in mind. Unlike any other similar antennas on the market, the CHA P-LOOP 2.0 is made with premium materials that are precisely manufactured and assembled in the USA! This is an exciting new product from Chameleon Antenna. Easily deployable HF magnetic loop antennas, also called small transmitting loops, have been routinely used for many years in military, diplomatic, and shipboard HF communication links, where robust and reliable general coverage radio communication is a necessity. Covers 7.0-29.7 MHz.

CHA F-LOOP 2.0 – The CHA F-LOOP 2.0 was designed with portability, ease of use simplicity, ruggedness and high performance in mind. Unlike any other similar antennas on the market, the CHA F-LOOP 2.0 is made with premium materials that are precisely manufactured and assembled in the USA! Easily deployable HF magnetic loop antennas, also called small transmitting loops, have been routinely used for many years in military, diplomatic, and shipboard HF communication links, where robust and reliable general coverage radio communication is a necessity. Covers 3.5-29.7 MHz.

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 Mini – Portable HF Antenna Base - The CHA HYBRID-MINI Base is the portable version of the regular HYBRID. The unit can be differentiated by the color of the lid and the base connector, which is black instead of gray. The HYBRID-MINI is also smaller and about 50% lighter than the regular HYBRID. An external antenna tuner is required to provide a low VSWR. The connector provided with the antenna is a SO-239 sealed. The entire unit is also waterproof. The HYBRID-MINI will serve as impedance transformer matching network and will greatly reduce the VSWR at the load for the following antennas: V1, V1L, V2L and MIL.

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 a primary consideration. 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 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. The antenna will work successfully supported by trees, masts, the tops of vehicles or any convenient object or structure. 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.

CHA FT-817 BRACKETS 2.0 – CHA FT-817 Brackets are built exclusively by the skilled machinists of Chameleon Antenna™. It is a military-style pair of precision fabricated brackets and high quality carrying strap for the popular Yaesu FT-817 series portable QRP transceiver. The CHA FT-817 Brackets will ruggedize and help protect your FT-817 from the many hazards of field operations.

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