Single and Multi-Band Pocket HF Antenna Series (CHA Pocket Series) Operator’s Manual

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MADE IN U.S.A.

VERSATILE – DEPENDABLE – STEALTH – BUILT TO LAST

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

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

Introduction

Thank you for purchasing and using one of the new Chameleon Antenna™ Single and Multi-Band Pocket High Frequency (HF) Series antennas (CHA Pocket Series). The CHA Pocket Series are a series of single and multi-band HF antennas that can literally fit in your pocket when not in use. There are three models available: a 40-6 Meter Off-Center Fed Dipole (OCFD), 40 Meter Dipole, and a 20 Meter Dipole. They are shown in plate (1).

Plate 1. Pocket HF Antenna Series

This series of antennas are designed for ultra-light (all are 7 oz. or less) low power (QRP) portable operation. When running low power, an effective antenna is essential to actually making contacts - these are full-size antennas with full-size performance, but built with lightweight materials and miniaturized components. They were designed to complement the exciting new lineup of lightweight, battery operated, HF portable transceivers available from Icom, Yaesu, Elecraft, Xiegu, and other manufacturers and are perfect for Parks On The Air (POTA), Summits On The Air (SOTA) and other portable expeditions.

In addition to ultra-light QRP portable operation, an antenna in this series would be ideal as an emergency backup antenna for a base station or as a temporary antenna in a camp ground, motel, apartment, or condominium – their stealthy design makes them barely noticeable. Several antennas in the series are configurable to facilitate Near-Vertical Incident Sky wave (NVIS) communication. All models are suitable for Amateur Radio Emergency Service (ARES) / Radio Amateur Civil Emergency Service (RACES), Salvation Army Team Emergency Radio Network (SATERN), and amateur radio operators (hams) involved in field communication and disaster response.

The CHA Pocket Series can be deployed by the operator in the field in approximately 20 minutes, using a tree or light-weight telescopic pole.

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 Pocket Series antenna.

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 Pocket Series antennas 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).

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.

Antenna Series Descriptions

The general characteristics of the CHA Pocket Series are shown in Table (2). Each model is described in detail below.

Antenna Model	Bands	Ground	Short	Medium	Long
40m OCFD	40-6	↑	↓	↕	
40m Dipole	40		↓	↕	
20m Dipole	20	↑		↑	↑

Key:
Ground = 0 to 90 miles **Short = 0 - 300 miles** **Medium = 300 – 1500 miles** **Long > 1500 miles**
Lower ↓ = 1.8 – 10 MHz **Upper (↑ = 10 – 30 MHz)**

Table 2. Pocket Series Antenna Characteristics.

40 Meter Off-Center Fed Dipole

40 through 20 meters are the most useful bands for portable QRP operation. These bands will enable the portable operator to have both daytime and nighttime capability for short (using NVIS), medium, and long-range communication. Also, the antenna itself is a manageable size for portable operations – even more so with the CHA Pocket OCFD! Figure (3) shows a self-supporting Inverted V field installation using a 13-foot lightweight fiberglass telescoping "Crappie" pole.

An OCFD is different from a standard dipole antenna because the feed point is not in the center of a half wavelength antenna, but offset so that around 1/3 of the antenna is on one side of the feed point and 2/3 on the other. This changes the impedance of the feed point so it can no longer be directly fed with 50 Ohm coaxial cable. But, when fed with the matching transformer, the results are an effective multi-band antenna (a wide-range antenna tuner is necessary on some bands).

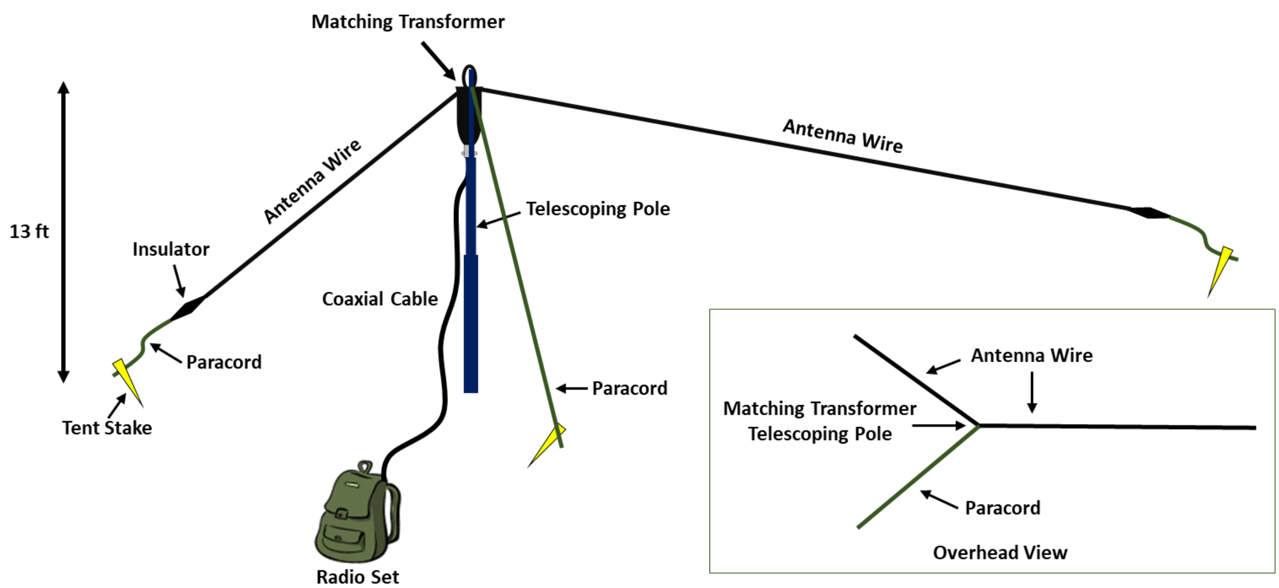


Figure 3. Self-Supporting 40 Meter OCFD Field Installation.

Specifications:

Bands: 7.0 – 54.0 MHz (40 – 6 meter amateur bands)

Power: 50W SSB, 20W all other modes

SWR: Frequency dependent, but less than 2.0:1 from 7.0 – 7.3 MHz and 14.0 – 14.35 MHz. See Figure (4).

Connector: BNC

Length: 68 ft 9 in.

Installation Height: Matching Transformer height (as shown in self-supporting example) approximately 13 ft.; 25 ft. or higher for optimal performance.

Weight: 7 Oz.

Tuner Required: Yes, except on the 40 and 20 meter amateur bands

NVIS: Yes

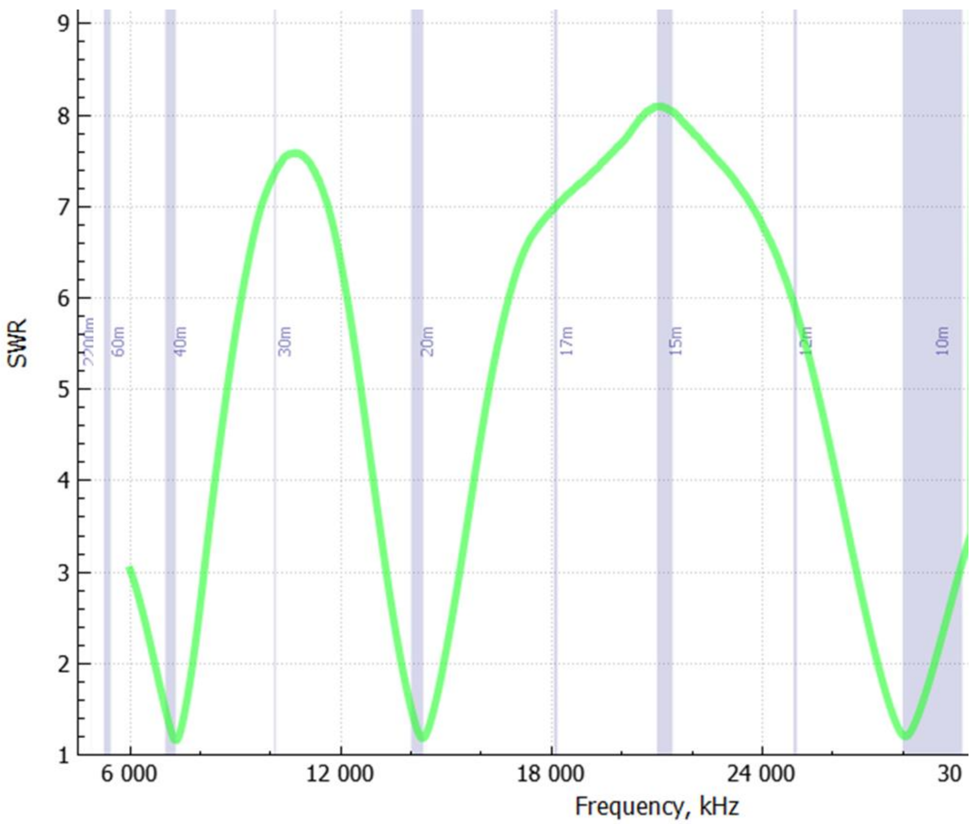


Figure 4. 40 Meter OCFD SWR by Frequency.

40 Meter Dipole

40 meters is arguably the most popular band for portable QRP operation. It will enable the portable operator to have dependable short (using NVIS) to medium range communication during the day and medium and long-range communication at night. Also, the antenna itself is a manageable size for portable operations – even more so with the CHA Pocket OCFD!

The 40 Meter Dipole can be installed as a Flat-Top or Inverted V. The Inverted V, shown in Figure (5), is a good field configuration because it requires only one support and reduces the antenna footprint.

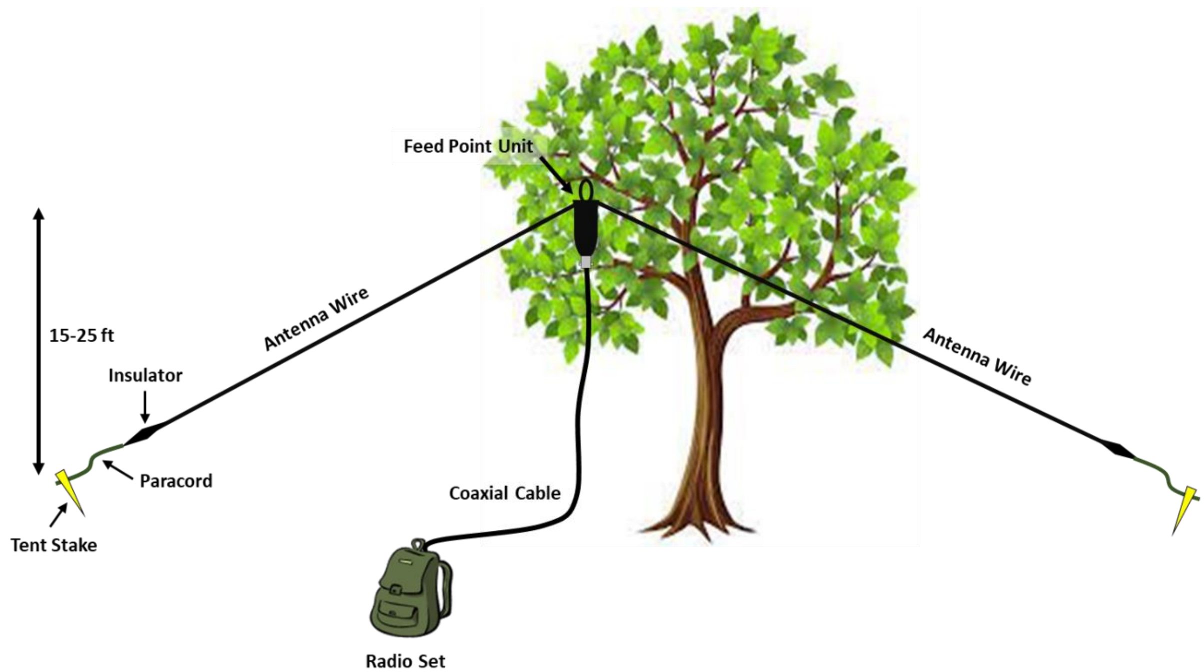


Figure 5. Typical 40 Meter Dipole Field Installation.

Specifications:

Bands: 7.0-7.3 MHz (40 meter amateur band)

Power: 50W SSB, 20W all other modes

SWR: Less than or equal to 2.0:1

Connector: BNC

Length: 66 ft. 4 in.

Installation Height: Center height around 15-25 ft.

Weight: 6 Oz.

Tuner Required: No

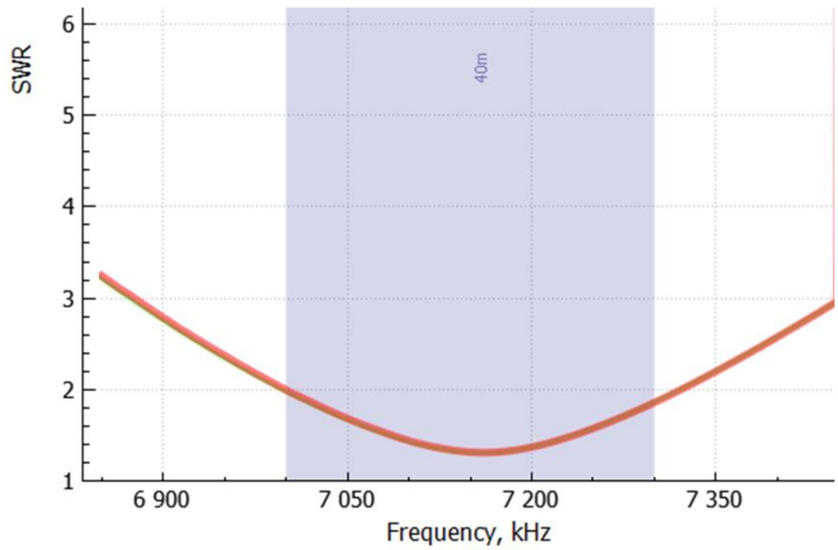


Figure 6. 40 Meter Dipole SWR by Frequency.

20 Meter Dipole

The CHA Pocket 20 Meter Dipole is probably the easiest, lightest, and smallest antenna you can take into the field. It requires only one support, such as a small tree or a lightweight fiberglass telescoping "Crappie" pole. The antenna can be configured as a Flat-Top or Inverted V. Figure (9) shows a self-supporting Inverted V Beam; ideal for field installation. This antenna will have some directivity in the direction of the opening of the "V", as seen from above (see inset).

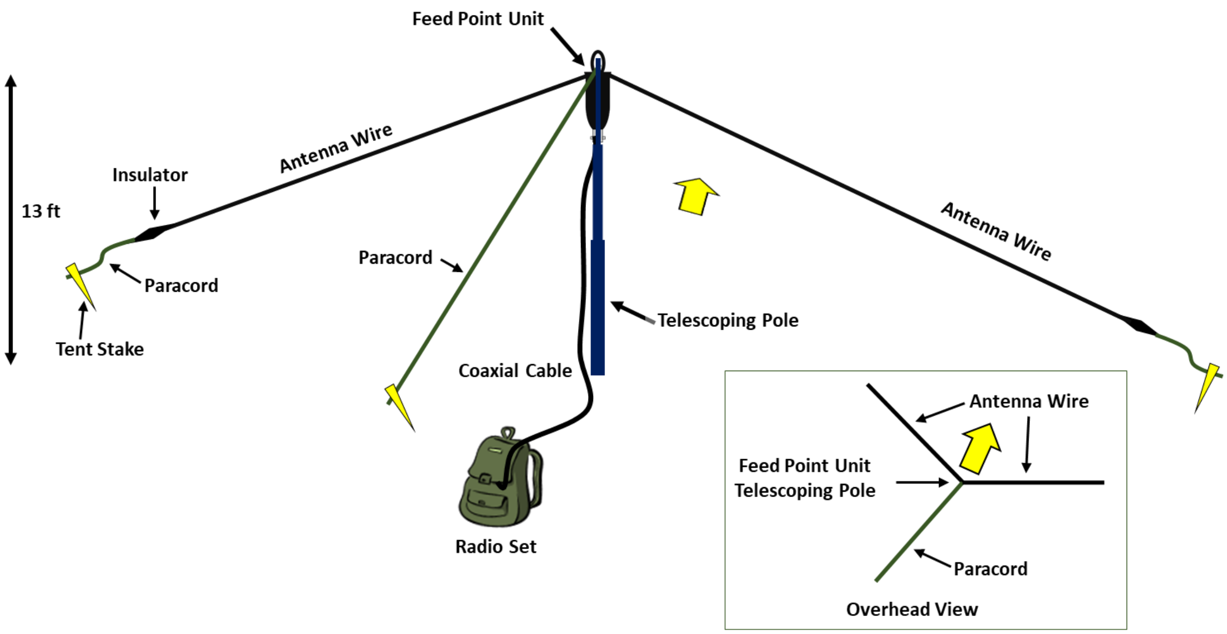


Figure 9. Self-Supporting 20 Meter Dipole Field Installation.

Specifications:

Bands: 14.0-14.35 MHz (20 meter amateur band)
Power: 50W SSB, 20W all other modes
SWR: Less than or equal to 2.0:1.
Connector: BNC
Length: 32 ft. 8 in.
Installation Height: Center height 13 ft (as shown in self-supporting example). 17 ft. is ideal for Flat Top (Horizontal Dipole) installation.
Weight: 6 Oz.
Tuner Required: No

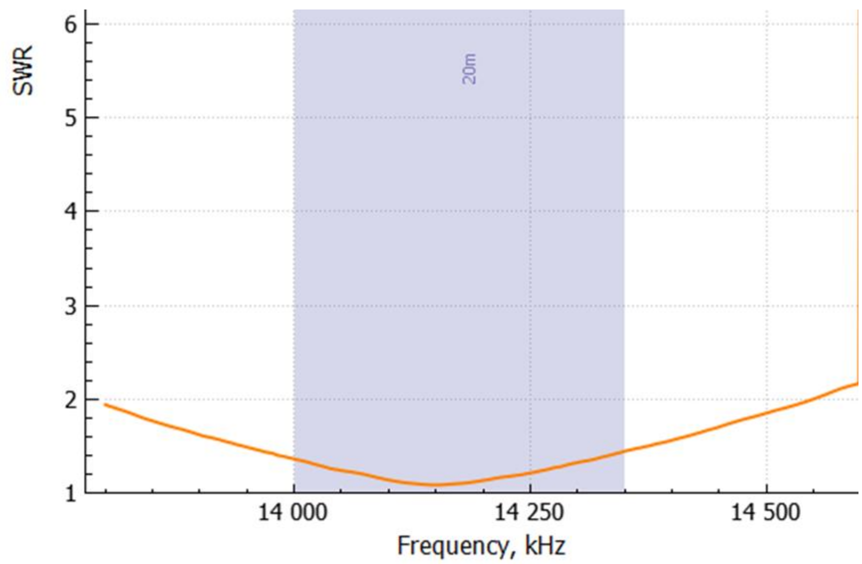


Figure 10. 20 Meter Dipole SWR by Frequency.

Dipole and OCFD Antenna Installation

The CHA Pocket Series Dipole and OCFD Antennas are comprised of the components shown in plate (2). The letter references are used to identify components in the installation procedure. The antennas can be installed as a Flat-Top (Horizontal Dipole) or Inverted V. Use the procedure below to install the Dipole and OCFD antennas.

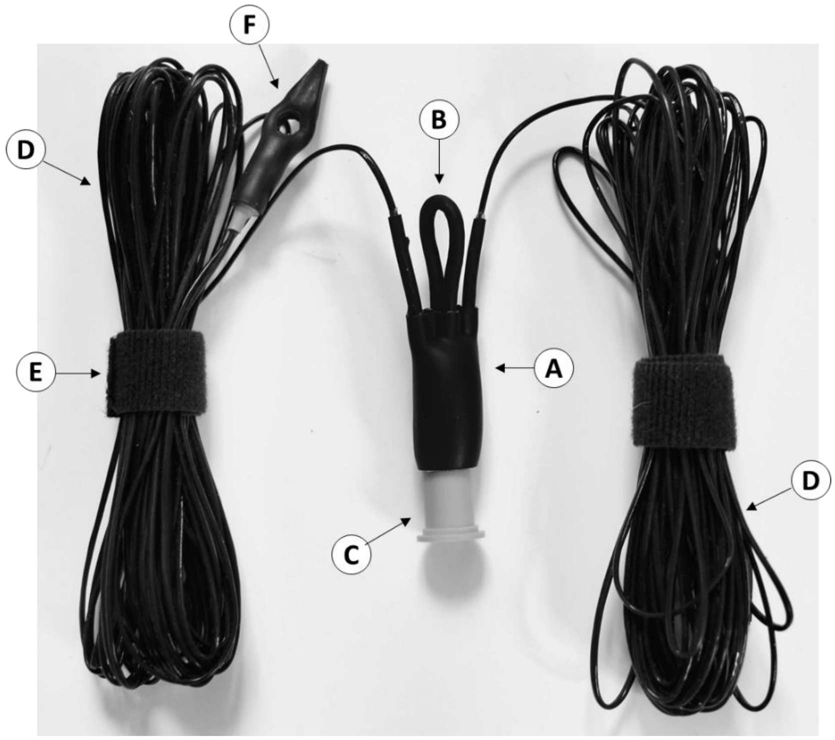


Plate 2. Dipole and OCFD Components.

- **A. Matching Transformer / Feed Point Unit**
- **B. Suspension Loop**
- **C. BNC Connection**
- **D. Antenna Wire**
- **E. Velcro Strap**
- **F. End Insulator**

Installation Procedure:

1. Select a site suitable for installation of the Dipole or OCFD antenna.
2. Using a Bowline or similar knot, tie a length of Paracord to the Suspension Loop (B) on top of the Matching Transformer / Feed Point Unit (A).
3. Connect the Coaxial Cable to the BNC Connector (C) on the bottom of the Feed Point Unit.
4. If using a telescoping pole, the Feed Point Unit can be secured to the pole using something like a Bongo Tie, otherwise loop the Paracord over a tree branch or other support.
5. Unwind the Antenna Wires (D) in the general directions in which they will be installed.

6. Raise the Feed Point Unit to the desired height and secure the free end of the Paracord.
7. If using a telescoping pole, two legs of the antenna can be used as guys. Attach a length of Paracord to the pole for the third guy line.
8. Using a Bowline or similar knot, tie lengths of Paracord to both End Insulators (F).
9. Secure the free ends of the Paracord to the end supports, such that the antenna wires have a slight sag.
10. Connect Coaxial Cable to Radio Set and perform an operational test.

Recovery Procedure

To recover the CHA Pocket Series Antenna, perform the following steps:

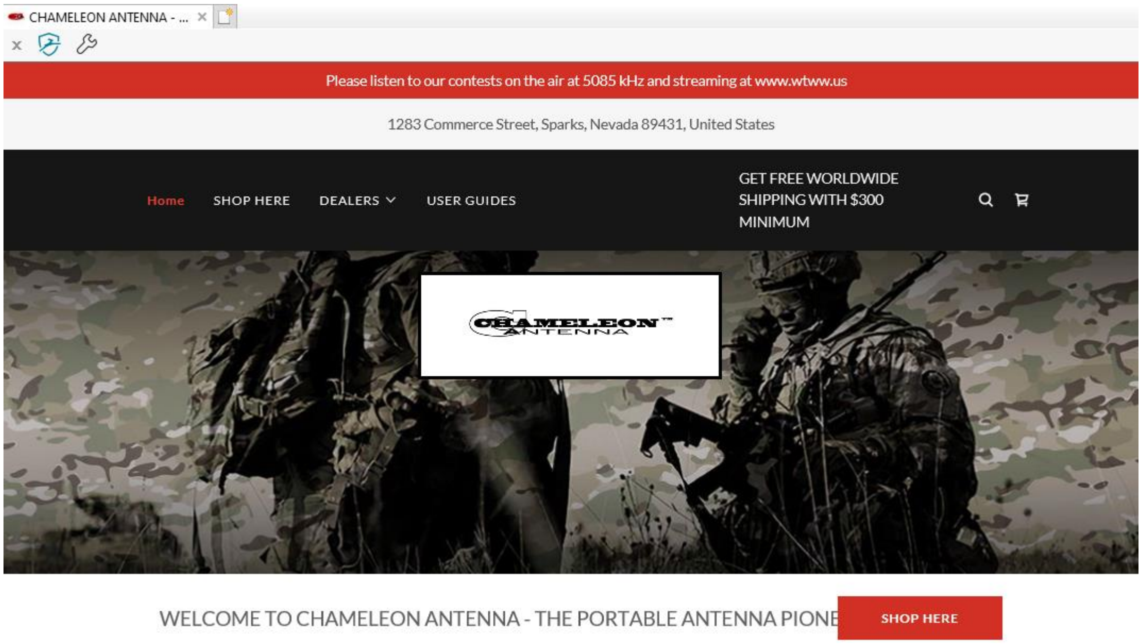
1. Disconnect the Coaxial Cable from the Radio Set.
2. Lower the antenna to the ground.
3. Disconnect the Coaxial Cable from the Matching Transformer / Feed Point Unit. Reinstall protective cap on BNC Connection.
4. Carefully roll (do not twist) the Coaxial Cable.
5. Neatly roll up the Paracord. Note: The Paracord may be left tied to the Suspension Loops.
6. Neatly roll up the Antenna Wires. Secure using Velcro Straps.
7. Remove dirt from antenna components and inspect them for signs of wear.
8. Place all antenna components into a carry Bag for storage and to be ready for next deployment.

Troubleshooting

1. Ensure the Coaxial Cable is securely connected.
2. Inspect Antenna and Coaxial Cable for cuts in insulation or exposed shielding. Replace if damaged.
3. If still not operational, connect a Standing Wave Ratio (SWR) Power Meter and check SWR.
4. If SWR is greater than 8:1, replace Coaxial Cable. *Most problems with antenna systems are caused by the coaxial cables and connectors.*
5. Check your frequency to ensure you are operating within the specified frequency range of the antenna.
6. If still not operational, contact Chameleon Antenna™ for technical support. Be sure to provide the specific indications of the problem (e.g., "My antenna tuner can't find a match when tuning up and I don't hear anything while receiving."). Also, provide details, such as antenna model, configuration, frequency, and what steps you have taken to troubleshoot the problem.

Chameleon Antenna™ Products

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



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.