Portable Light Weight 40 Meter Off-Center Fed Dipole (CHA OCF40) Operator's Manual

Nevada - USA
WWW.CHAMELEONANTENNA.COM

VERSATILE – DEPENDABLE – STEALTH – BUILT TO LAST

Rev. 10/2/2023

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Be aware of overhead power lines when you are deploying the CHA OCF40. 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 the Chameleon Antenna™ Portable 40 Meter Lightweight Off-Center Fed Dipole (CHA OCF40) antenna, shown in plate (1). The CHA OCF40 is a very lightweight and backpackable medium power antenna -- intended for extreme portable use, such as: Parks On the Air (POTA), Summits On the Air (SOTA), and other outdoor QRP radio adventures where an effective antenna is required. Chameleon Antenna™ designed the CHA OCF40 to complement the new generation of small multi-band/multi-mode QRP transceivers, like the Icom IC-705, Xiegu G90 or X6100, LAB 599 TX500, or the Yaesu FT-817/818.

The CHA OCF40 antenna works without a tuner on the 40, 20, 10, and 6 meter Amateur Service Bands and with a tuner on 60, 30, 17, 15, and 12 meters - enabling operation on the most popular POTA and SOTA bands.

The CHA OCF40 includes a lightweight matching transformer, a total of 66 feet of light gauge antenna wire in two segments on a line winder, and a small carry pouch - just add a lightweight telescoping pole or a convenient tree and you're on the air. 25 ft. of super small and light RG-316 with an integrated RFI Choke is available as an option to make your lightweight portable antenna kit complete. Having an effective antenna for POTA and SOTA has just got very simple with the CHA OCF40!

Plate 1. CHA OCF40 Antenna.

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 OCF40.

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 man-caused events.

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 time of day 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.

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

Frequency	Distance	Frequency	Distance
2 MHz	88 miles	14 MHz	33 miles
4 MHz	62 miles	18 MHz	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.

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 or an online service, 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 either a chart or 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. To use NVIS propagation, the frequency selected must be below the critical frequency. Therefore, NVIS propagation 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. The CHA OCF40 is not specifically designed for NVIS propagation, but will provide some NVIS capability.

CHA OCF40 Components

The CHA OCF40 is comprised of the following components, see plate (2).

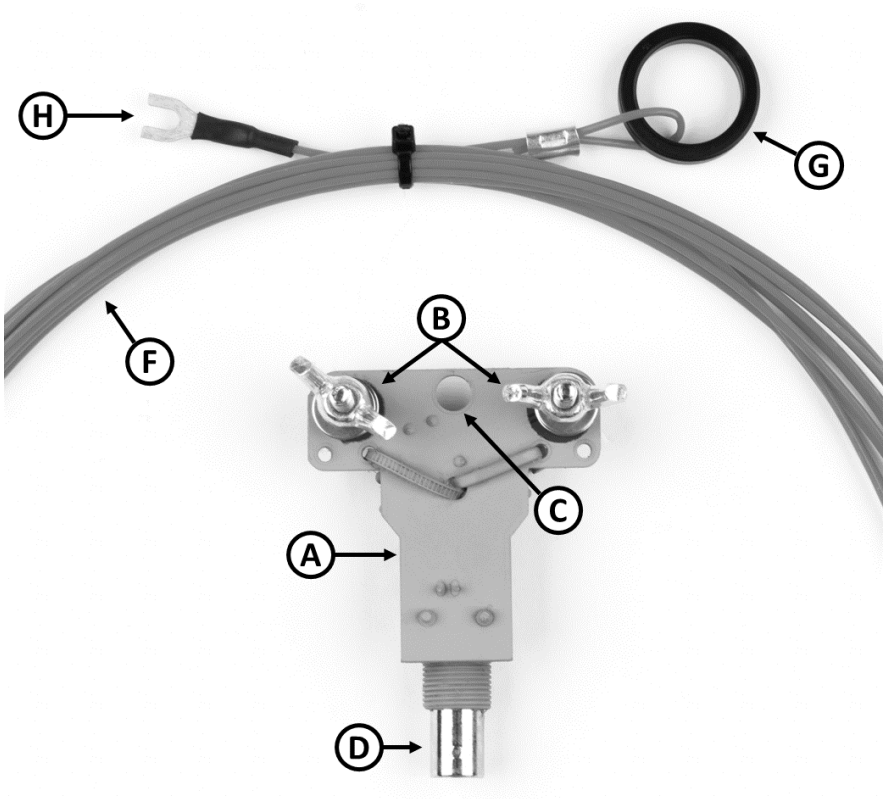


Plate 2. Antenna Components.

A. **Matching Transformer.** The Matching Transformer matches the impedance of the Off-Center Fed Dipole (OCFD) antenna to the Coaxial Cable. It also acts as the center insulator and support.

B. **Wire Connectors.** The Wire Connectors enable connection of the Antenna Wires to the Matching Transformer.

C. **Suspension Hole.** The Suspension Hole is used to attach the line used to suspend the center of the OCFD antenna.

D. **BNC Socket.** The BNC Socket is used to connect the Coaxial Cable to the Matching Transformer.

E. **Line Winder.** The Line Winder *(not pictured)* is used to store the Antenna Wire.

F. **Antenna Wire.** There are two Antenna Wires: one long segment (around 44 ft.) and one short segment (around 22 ft.).

G. **Insulator Ring.** The Insulator Ring is located at the far end of the Antenna Wires.

H. **Terminal Lug.** The Terminal Lugs are located at the near ends of the Antenna Wires and are used to physically attach and electrically connect the Antenna Wires to the Matching Transformer.

I. **Coaxial Cable.** The Coaxial Cable *(not pictured/optional component)* is used to connect the Radio Set to the Matching Transformer. It is 25 feet of RG-316 coaxial cable with BNC Plugs on each end and an integrated RFI Choke.

J. **Carry Bag.** A small Carry Bag *(not pictured)* is included to store the components of the antenna when not in use.

Installation

Installation of the CHA OCF40 is very quick and easy. The CHA OCF40 can be installed as an Inverted "V" or as a horizontal dipole. Installation of the CHA OCF40 as a horizontal dipole, especially if mounted lower than normal (around 10 – 15 feet high), will enhance Near Vertical Incidence Skywave (NVIS) performance. Most POTA / SOTA operators will install the CHA

OCF40 as an Inverted "V" because it requires only one center support. Follow the procedure below to install the CHA OCF40 antenna. Refer to figure (1).

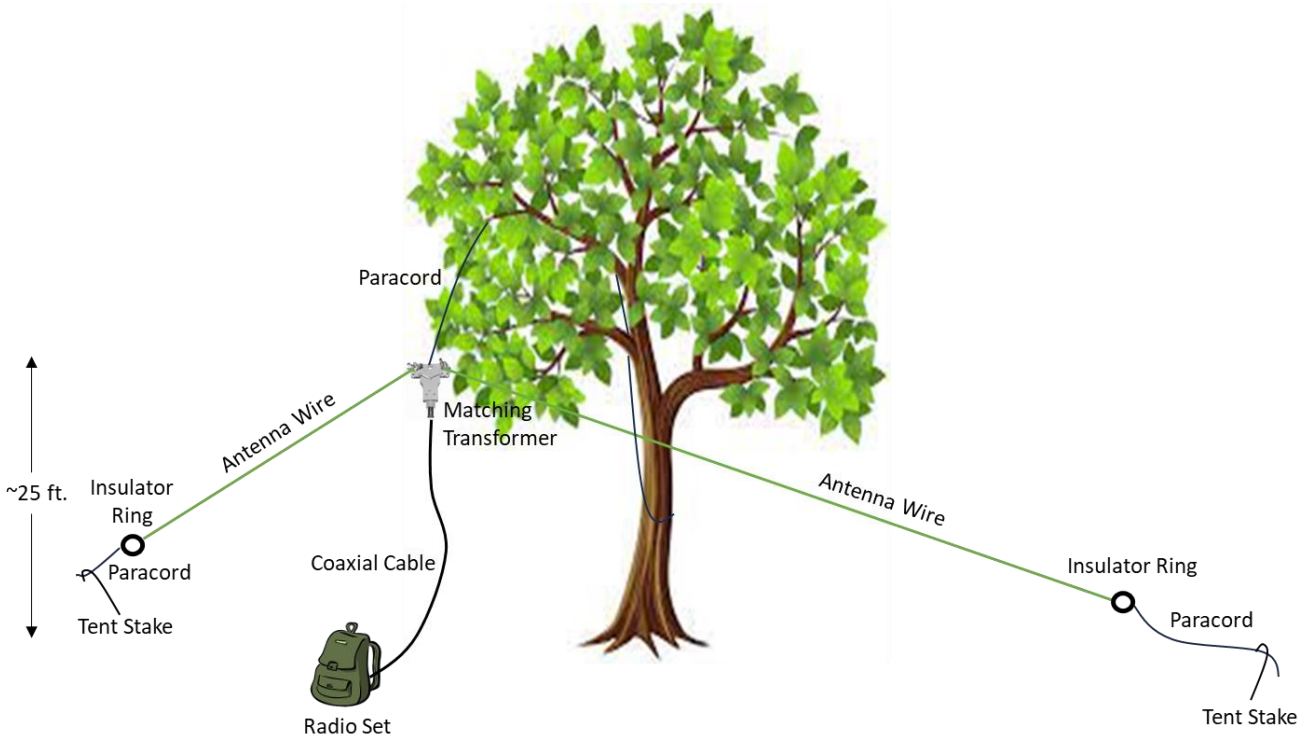


Figure 1. CHA OCF40 Inverted "V" Configuration.

1. Select a site large enough (around 60 ft.) to permit setup of the antenna. The location also needs a support, such as a tree, or a location for a lightweight telescoping mast.
2. Using a bowline or other knot, attach a long length of paracord to the Suspension Hole (C) at the top of the Matching Transformer (A).
3. Using an arborist throw weight or other method, loft the other end of the paracord over the support.
4. Secure the unattached end to the support using a round turn and two half hitches or similar knot.
5. Connect one end of the Coaxial Cable (I) to the BNC Socket (D) at the bottom of the Matching Transformer.
6. Attach the Terminal Lug (H) at the end of the short Antenna Wire (F) to one of the Wire Connectors (B) on the Matching Transformer *(it doesn't matter which one)*.
7. Attach the Terminal Lug at the end of the long Antenna Wire to the other Wire Connector on the Matching Transformer.
8. Unwind the short Antenna Wire from the Line Winder (E) and loosely

position it on the ground in the direction it will be when raised.

9. Using a bowline or other know, attach a short length of paracord to the Insulator Ring (G) on the short Antenna Wire.
10. Unwind the long Antenna Wire from the Line Winder and loosely position it on the ground in the direction it will be when raised and opposite of the short Antenna Wire.
11. Using a bowline or other know, attach a short length of paracord to the Insulator Ring on the long Antenna Wire.
12. Untie the support paracord from step (4) and raise the Matching Transformer to a height around 25 ft. *The antenna can be installed at a lower height, which may affect performance.*
13. Secure the paracord to the support using a round turn and two half hitches or similar knot.
14. Fully extend the short Antenna Wire.
15. Tie the paracord from the short Antenna Wire to the end support or use a Tent Stake driven into the ground and tension the wire so that it has a slight sag.
16. Full extend the long Antenna Wire in the opposite direction of the short Antenna Wire.
17. Tie the paracord from the long Antenna Wire to the end support or use a Tent Stake driven into the ground and tension the wire so that it has a slight sag.
18. Connect the other end of the Coaxial Cable to the radio set.
19. Perform an operational check.

Recovery Procedure

To recover the CHA OCF40, perform the following steps:

1. Disconnect the Coaxial Cable from the radio set.
2. Untie the ends of the antenna.
3. Lower the antenna.
4. Disconnect the Coaxial Cable from the Matching Transformer.
5. Carefully roll (do not twist) the Coaxial Cable.
6. Disconnect the Antenna Wires from the Matching Transformer.
7. Wind the Antenna Wires onto their individual Line Winders.
8. Secure Tent Stakes (if used) and paracord.
9. Check deployment area for misplaced antenna components.
10. Remove dirt from antenna components and inspect them for signs of wear.
11. Store components together in the provided Carry Bag.

Troubleshooting

1. Ensure Antenna Wires and Coaxial Cable are securely attached and connected.
2. Inspect antenna components, especially the Coaxial Cable and Matching Transformer, for breakage or signs of strain. Replaced damaged components.
3. Be sure to check any patch cables or adapters used.
4. If still not operational, connect a Standing Wave Ratio (SWR) Power Meter and check SWR.
5. If after tuning, the SWR is still greater than 7:1, replace Coaxial Cable assembly. *Most problems with antenna systems are caused by the coaxial cables, connectors, and adapters.*
6. If still not operational, contact Chameleon Antenna™ for technical support.

Accessories

Many antenna accessories and SOTA / POTA friendly batteries are available for purchase from Chameleon Antenna™. Go to www.chameleonantenna.com for current prices and availability.

- **Coaxial Cable.** 25 ft. of lightweight RG-316 Coaxial Cable with an integrated RFI Choke is available as a recommended option for the CHA OCF40.

Specifications

- **Frequency Range:** No tuner: 40, 20, 10, and 6 meter Amateur Radio Service bands. 60, 30, 17, 15, and 12 meters with a tuner.
- **Power Handling:** 50W SSB, 25W CW and all other modes.
- **Length:** Approximately 66 ft.
- **SWR:** Typically, less than 2.2:1 on covered bands. See figure (2) and (3).
- **Weight:** Approximately 1/2 lbs. (less carry pouch and optional coaxial cable).
- **Color:** Subdued - mostly green, brown, and black.
- **Setup Time:** One operator, approximately 15 minutes.

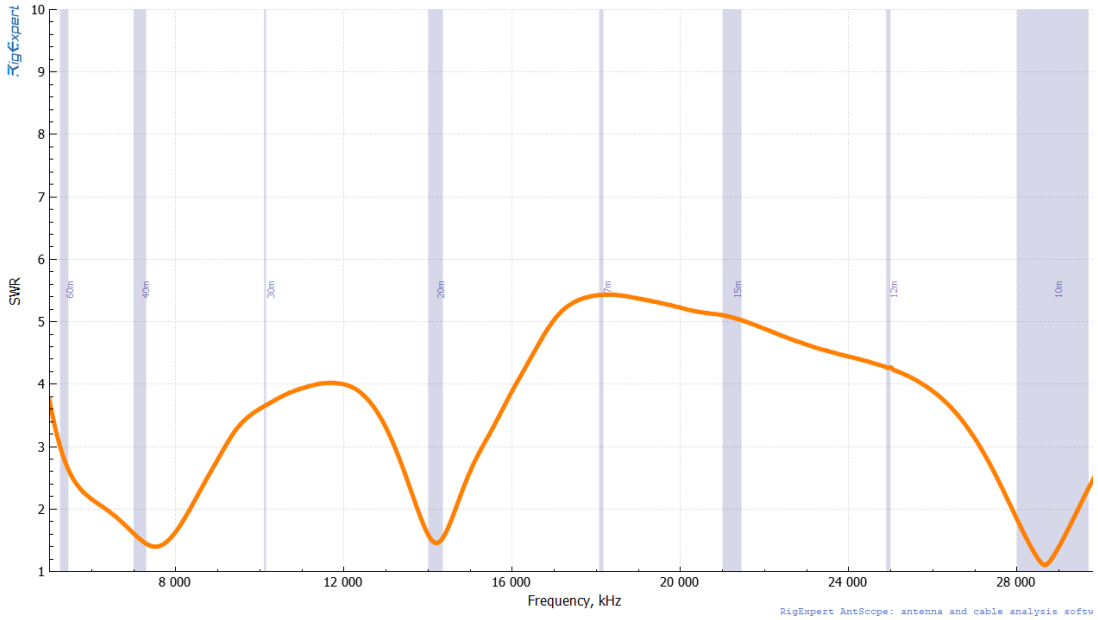


Figure 2. 40 – 10 Meter SWR Curve.

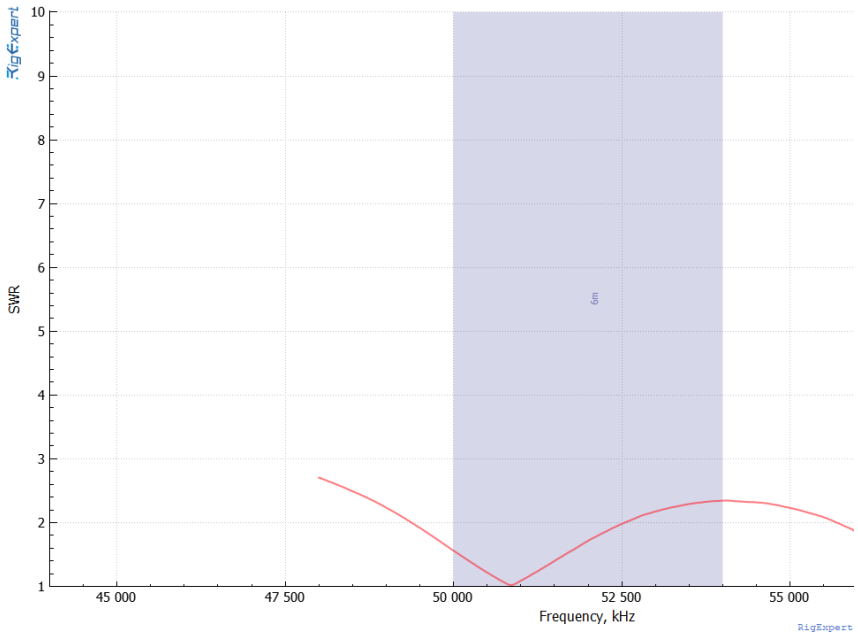


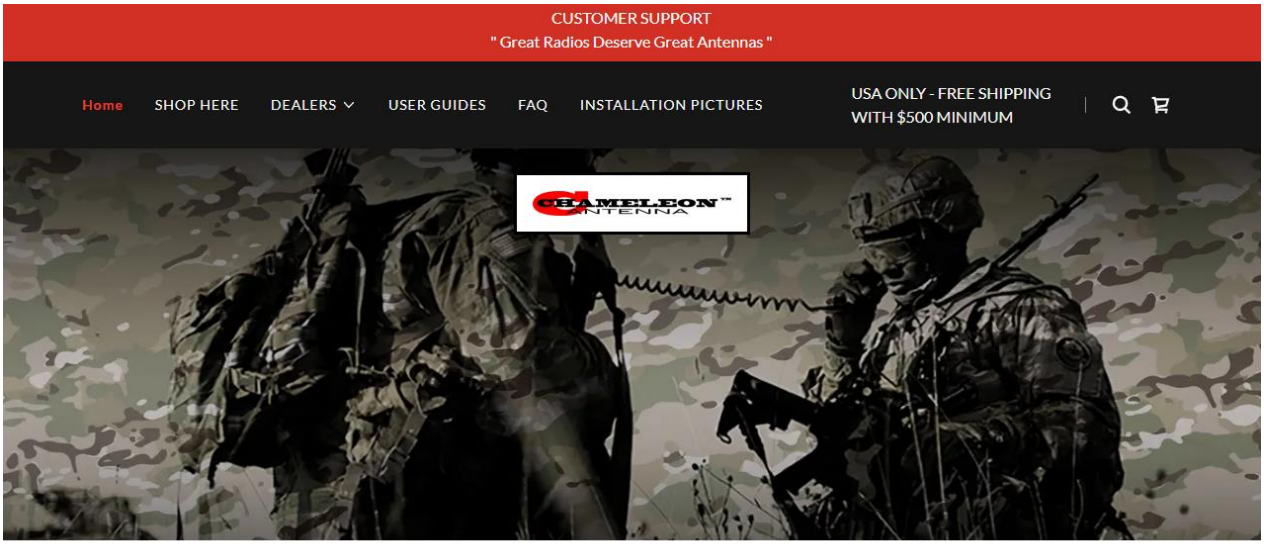
Figure 3. Six Meter SWR Curve.

References

1. Silver, H. Ward (editor), 2013, *2014 ARRL Handbook for Radio Communications*, 91st Edition, American Radio Relay League, Newington, CT.
2. 1987*, Tactical Single-Channel Radio Communications Techniques (FM 24-18)*, Department of the Army, Washington, DC.
3. Turkes, Gurkan, 1990, *Tactical HF Field Expedient Antenna Performance Volume I Thesis*, U.S. Naval Post Graduate School, Monterey, CA.

Chameleon Antenna™ Products

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



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