

DIY Build Instructions

End Fed Half Wave 10-15-20-40-meter Antenna

Coastal and SLV ARES Amateur Radio Emergency Service

End Fed Half Wave 10-15-20-40-meter Band Antenna Project Build

Brief Background of the End Fed Half Wavelength Antenna

The End Fed Half Wave (EFHW) antenna is half a wavelength long on the lowest band of operation. An EFHW antenna is a variation of the much more common half wavelength dipole antenna. When an antenna is one half wavelength long has RF energy applied to it at its resonant frequency a standing wave develops on it. This standing wave consists of both current and voltage that are 90 degrees out of phase. The result is a distribution of current that is at maximum at the center and a distribution of voltage that is at a maximum at the ends as illustrated in Figure 1.

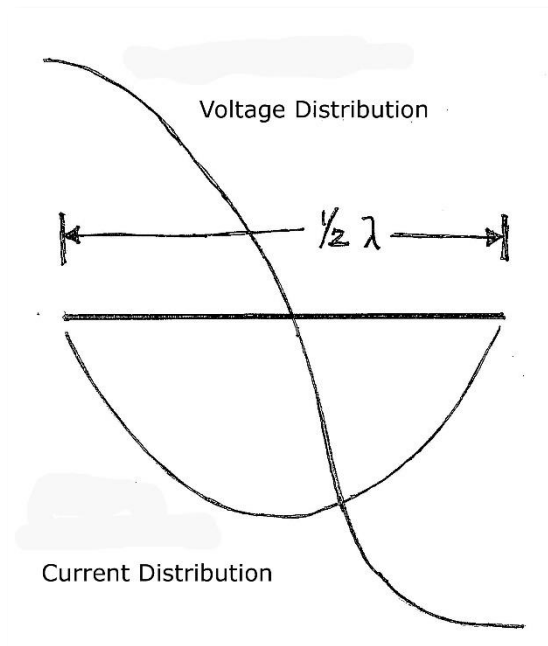


Figure 1

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Understanding HF frequency propagation

Understanding HF Propagation: Rohde Schwarz

The video authored by Rohde Schwarz: Understanding HF propagation is an introduction to the fundamental concepts of HF propagation, with special emphasis placed on skywave propagation and the role of the ionosphere.

Link: https://www.youtube.com/watch?v=7Y_RTdPs3NI

White Paper Straightening Out the Inverted-L; Author L. B. Cebik, W4RN

This white paper (somewhat technical) reviews various wire antenna configurations Base Fed L, Center Fed L, Center Fed Sloping Doublet, Base Fed Sloping Wire, and various Inverted L configurations. Including a good discussion of antenna types, and radiation patterns.

Link: <http://on5au.be/Cebik-2/StraighteningOutTheInverted-L.pdf>

DIY End Fed Half Wave Antenna Kit for 10-15-20-40-Meters

ARRL and HF Kits offer a 4-band antenna kit: End Fed Half Wavelength Antenna

The advantage of an EFHW is the ease of construction, it's versatility in a variety of installation configurations, no tuner is needed, and this one works on 4 bands: 10, 15, 20, and 40 meters. Unlike the dipole antenna, which is comprised of two quarter-wavelength wires and fed at its center, the EFHW is a half-wavelength antenna with the coaxial cable for your transceiver attached at one end. It has become popular with portable operators because it's very simple in its construction and deployment. This antenna, which works on 10, 15, 20, and 40 meters, has a very high impedance of around 2,500 Ohms. The kit includes the parts needed to construct a 49:1 impedance matching network, which will transform the impedance to 50 Ohms, which will suit most transceivers.

End Fed Half Wave Antenna Kit for 10-15-20-40-Meters

This kit can be purchased from AARRL for \$69.95

Link: <http://www.arrl.org/shop/End-Fed-Half-Wave-Antenna-Kit-for-10-15-20-40-Meters/>

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AARL Antenna Kit for 10-15-20-40-Meters Specifications

Bands: 10/15/20/40

Power rating: 250 W PEP

Impedance network type: 49:1 with included ferrite toroid

Wire antenna length includes 66 feet (approx. length) of strong, flexible, and low weight wire

Photograph of the Antenna Kit for 10-15-20-40-Meters, illustrated in Figure 2



Figure 2

Parts included in kit [End-Fed-Half-Wave-Antenna-Kit-for-10-15-20-40-Meters](#)

- Impedance network
- P65 enclosure 100 x 100 x 55 mm with weather sealant and screws 4x
- Toroid Amidon FT240-43
- Toroid mounting plate
- Stainless steel M3 6mm screws 4x
- Stainless steel M3 split lock washer 4x
- Winding wire 1.0 mm
- Cable ties 8x
- 100 pF capacitor 2kV
- SO-239 chassis mount connector
- Stainless steel M3 bolt 12mm 4x
- Stainless steel M3 nut 4x
- Stainless steel M3 washer 4x
- Stainless steel M3 tooth washer 4x
- M3 cable lug
- M5 cable lugs 2x
- Stainless steel (A4) M6 strain relief
- Stainless steel M6 nut
- Stainless steel M6 washer
- Stainless steel M6 lock washer

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- 66 feet (approx. length) of strong, flexible, and low weight wire
- 2x Stainless steel cable clamp
- 1x end insulator
- 1x cable lug 5mm
- 1x Heat shrink sleeve for cable lug
- Stainless steel M5 bolt 25mm 2x
- Stainless steel M5 wing nut 2x
- Stainless steel M5 nut 4x
- Stainless steel M5 washer 4x
- Stainless steel M5 tooth lock washer 4x
- Stainless steel M5 split lock washer 4x
- Antenna

Tools and Consumables

Tools	
Tool Description	Quantity
Drill (hand or electric)	1 each
Drill bits (1/8 to 3/4 in step bit, 1/4 inch bit, 13/64-inch bit, 9/64-inch bit)	
Wire Cutter	1 each
X-Acto knife (or similar bladed tool)	1 each
Screwdriver Philips	
Side cutting pliers	1 each
Needle nose pliers	1 each
Soldering Kit	1 each
Heat shrink gun (hair dryer is a good option)	1 each

Consumables	
Consumables Description	Quantity
Solder (Rosin Core)	AR
Electrical Tape	AR

HF Kits sells the same antenna Kit directly from their website

10/20/40 meter band end fed antenna kit, including 100 Watt 1:49 UNUN impedance transformer, wire of your choice, DIY kit € 30,50 – € 39,50 Incl. VAT

Link: <https://www.hfkits.com/product/10-20-40-endfed-antenna-kit/>

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DIY Assembly Instructions / Videos End Fed Half Wave 10-15-20-40-meter Antenna

Listed below are DIY valuable resources for this specific DIY build.

[Assembly Instructions / Videos End Fed Half Wave 10-15-20-40-meter Antenna](#)

[ARRL Build an End-Fed Half-Wave Antenna from a Kit](#)

Link: <http://www.arrl.org/end-fed-half-wave-antenna-kit>

[HF Kits Manual impedance transformer for 250 watts End Fed Antenna's](#)

Link: <https://www.hfkits.com/build-instruction-impedance-transformer-250w-for-end-fed-antennas/>

[ARRL End Fed Antenna Build - Ham Radio: video by The SmokingApe](#)

In this video, we build the ARRL / HF-Kits End Fed Half Wave (EFHW) Antenna.

Link: <https://www.youtube.com/watch?v=KuEAYkp-mlk>

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Notes from a DIY End Fed Half Wave 10-15-20-40-meter Antenna Project

Location: There are several antenna configurations this antenna can be configured in some of which may be dictate the location of the antenna and any surrounding features such as house, fence, or trees. A location site map may be useful in your decision process. A convenient resource is using Google maps to obtain an overhead view of your location and surrounding environment. The example illustrated in Figure 3 is the Santa Cruz County Emergency Services facility at 5200 Soquel Ave, Santa Cruz CA. 95062.

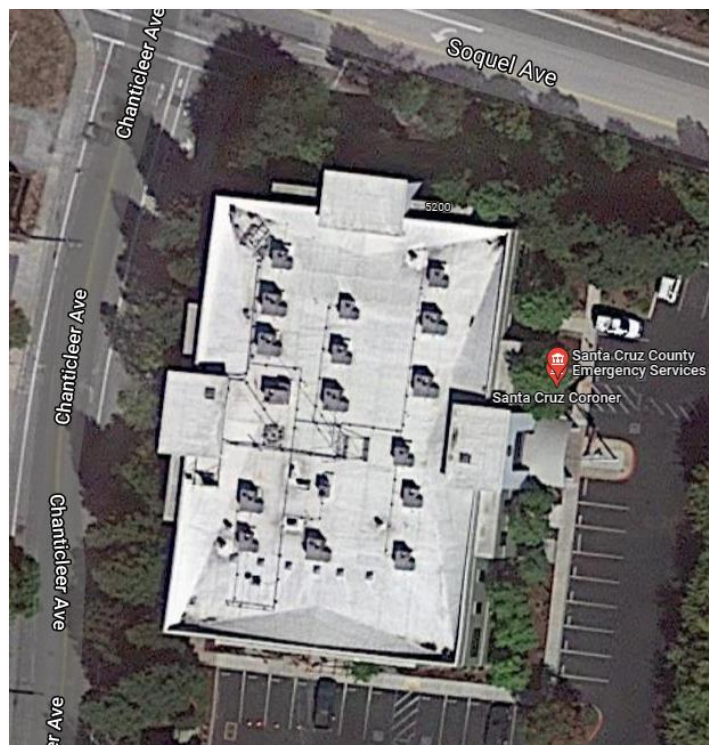
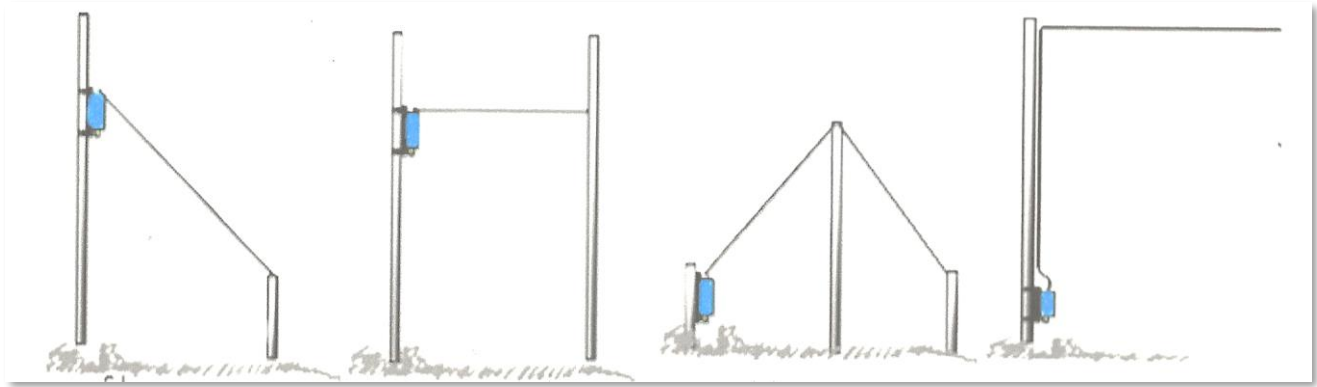


Figure 3

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Typical End Fed Half Wave antenna configurations: Illustrated in Figure 4 are four typical examples which are named to commonly indicate the antenna configuration.



Sloper
UNUN mounted above
antenna termination
location

Horizontal
UNUN mounted
horizontal to the
antenna termination
point

Inverted "V"
UNUN mounted to
one end of the
antenna termination
with the mast in the
center of the antenna

Inverted "L"
UNUN mounted below
with antenna routed
vertically to a point
where the antenna is
terminated at a
location (tree, fence,
pole)

Figure 4

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Other options: Another popular configuration is a Stealth configuration which uses the existing features of an existing structure to mount the antenna. The example in Figure 5 illustrates the yellow antenna wire routed along the house roof line. In comparison the red antenna wire would be an inverted "L" configuration.

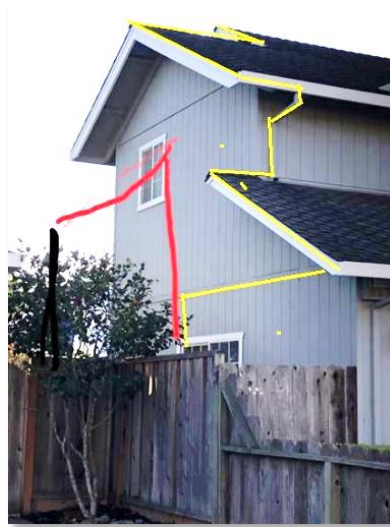
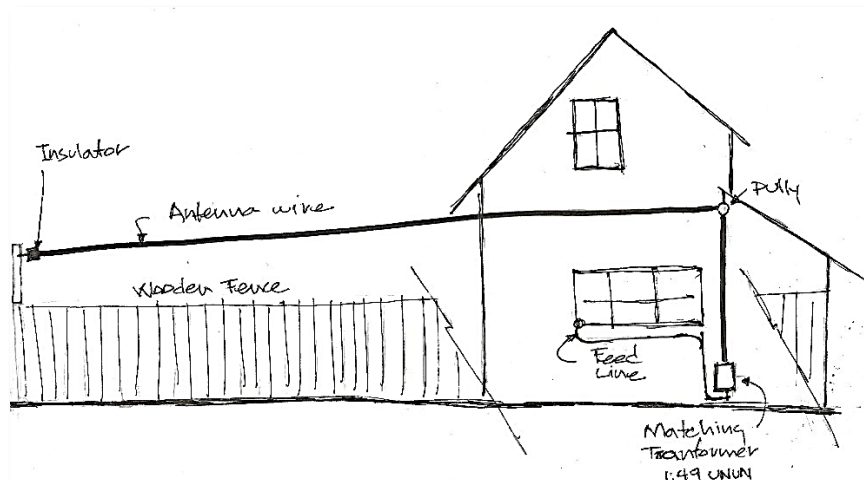


Figure 5

The installation sketch, Figure 6, is that of an Inverted "L" with the 49:1 UNUN mounted the external wall of the house. The antenna wire routed from the matching transformer to a transition point (the antenna "L"). In this example a pulley and para cord assembly is support the antenna wire change in direction to the long side of the antenna "L". The antenna wire is terminated at the isolation insolation, in this example the end of an existing fence. The feed line is routed along the building to an entry point using an existing window. A ground can be connected to the matching transformer at this location.



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Figure 6

The pully / para cord assembly is illustrated in Figure 7. The antenna wire is routed through a loop in the para cord. The para cord is drawn through the pully until the loop reaches the pully block tensioning the antenna wire. The antenna wire can be raised and lowered if needed for maintenance or repair without climbing on a ladder. The para cord also supports the weight and tension of the antenna wire after termination.

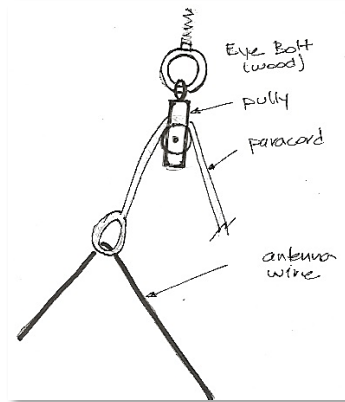


Figure 7