

## “BULLET” 500 Watt PEP End Fed Antenna



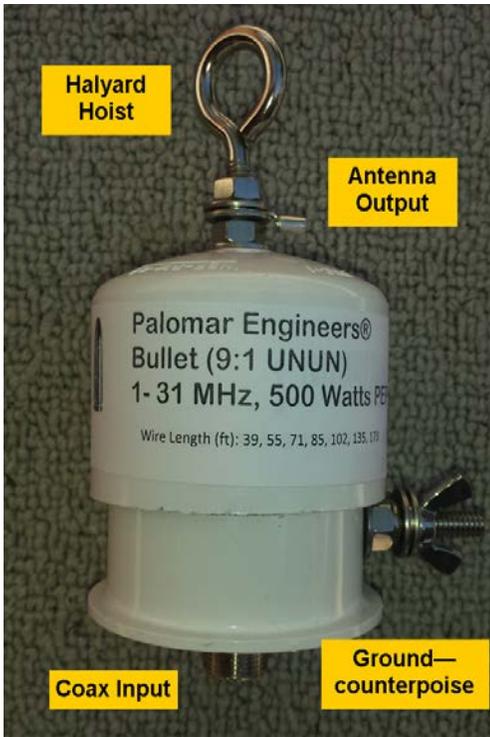
One of the most popular antennas today is the end fed due to its ease of installation, portability and stealth in various installations. It can be a condo dweller's only access to the world of ham radio or the best alternative for a backpacking SOTA (Summits on the Air) mountaintop expedition.

The antenna is simple to deploy, folds up easily for transport, and weighs under a pound, yet, with the 71 foot included wire, can work the 80-10 meter bands easily with the built in antenna tuner of most current day transceivers.

The key to the antenna's success is the matching network interface between the long wire antenna and the coax feed line to the transceiver. Palomar Engineers employs a dual core matching system that offers wide bandwidth (1.8-61 MHz), 500 watt PEP rating, and a connection for a counterpoise or ground

if desired, and a SO-239 female coax connector for easy attachment of coax cable (50 or 75 ohm is ok).

The antenna can be used as a sloper, “L” with a vertical section and a longer horizontal section, or as a random horizontal antenna between two trees or supports.



## BULLET-9, 9LF Matching Unit

Our antenna matching network is called the “Bullet” because of its shape and its effectiveness at taking down or contacting distant (DX) stations all over the world under the right conditions.

We sell the Bullet matching unit separately so you can add your own wire type and length (see table of suggested lengths below) or you can purchase a complete antenna system including wire, end insulator and support cord. Available as the Bullet-9 (1.8-31 MHz) or 9LF (.02-30 MHz) for VLF use down to 20 KHz.

For best results we recommend that the coax feed line be at least 1/4 wavelength on the lowest operating frequency since the coax braid is used as a counterpoise if you don't use the external counterpoise terminal on the matching unit. We also recommend a feed line choke at the end of the coax feed line near the radio to prevent RFI common mode current from interfering with the radio. The [BA-58](#) (slip on) or [Kit 105](#) (snap on) sleeve chokes or simply a EFFLC toroid ring with 8-10 turns of the coax line will work very well on RG-8X (1/4" cable) typically used for low power operations.

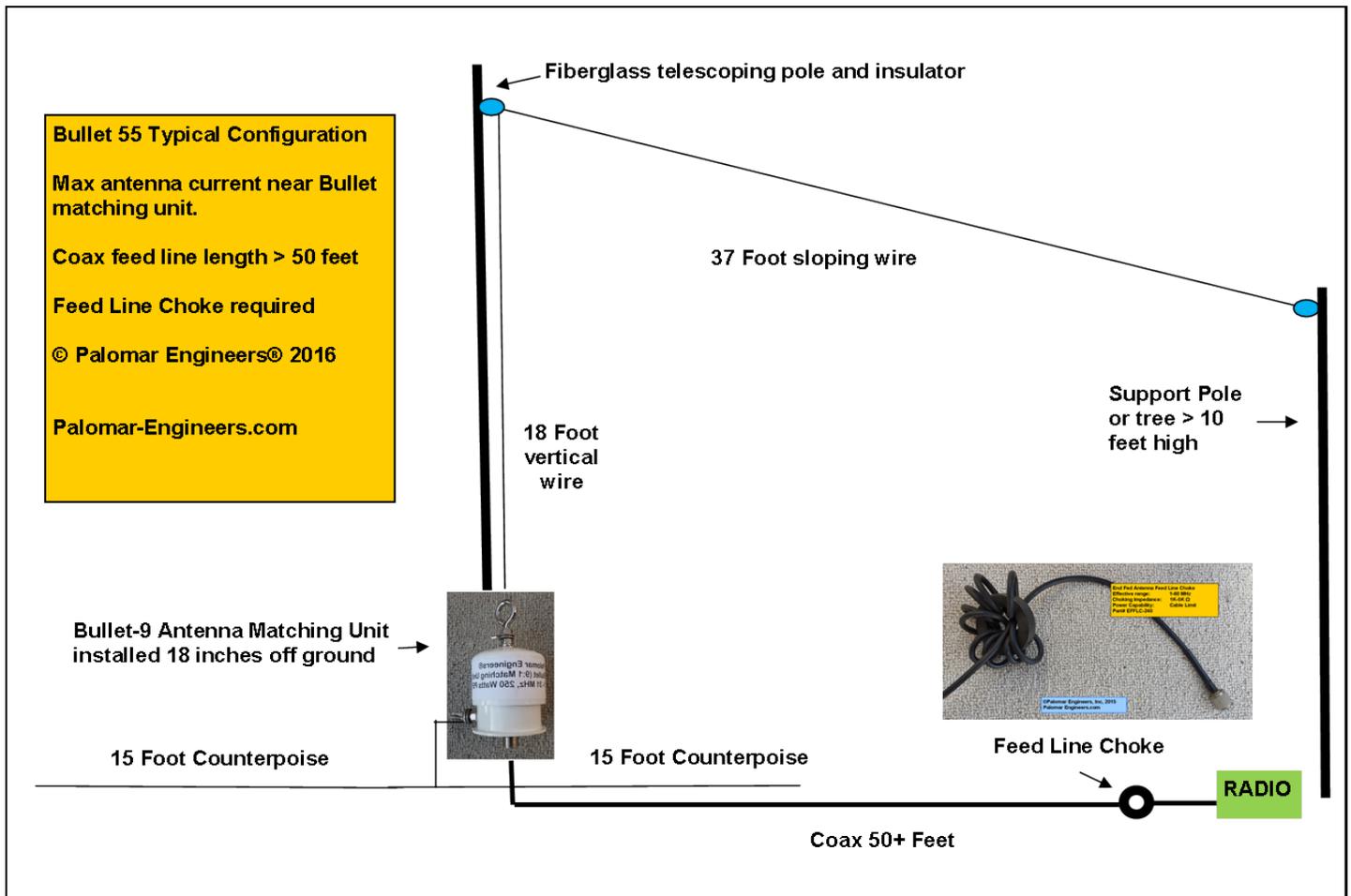
### Suggested wire lengths for 1-31 MHz operation (measured from Bullet wire terminal):

| Bands Covered (meters)             | Wire Length (feet)                 | Minimum Coax Length (feet) |
|------------------------------------|------------------------------------|----------------------------|
| <b>40-30-20-15</b>                 | <b>35-43, 49-63, 70-85</b>         | <b>35</b>                  |
| <b>40-30-20-17</b>                 | <b>35-45, 54-64, 67-77</b>         | <b>35</b>                  |
| <b>40-30-20-17-15-12-10</b>        | <b>38-44, 55, 60, 68-73</b>        | <b>50</b>                  |
| <b>80-40-30-20-17-15-12-10</b>     | <b>68-73, 85, 92, 102, 120-125</b> | <b>65</b>                  |
| <b>160-80-40-30-20-17-15-12-10</b> | <b>135, 141, 173, 203</b>          | <b>130</b>                 |

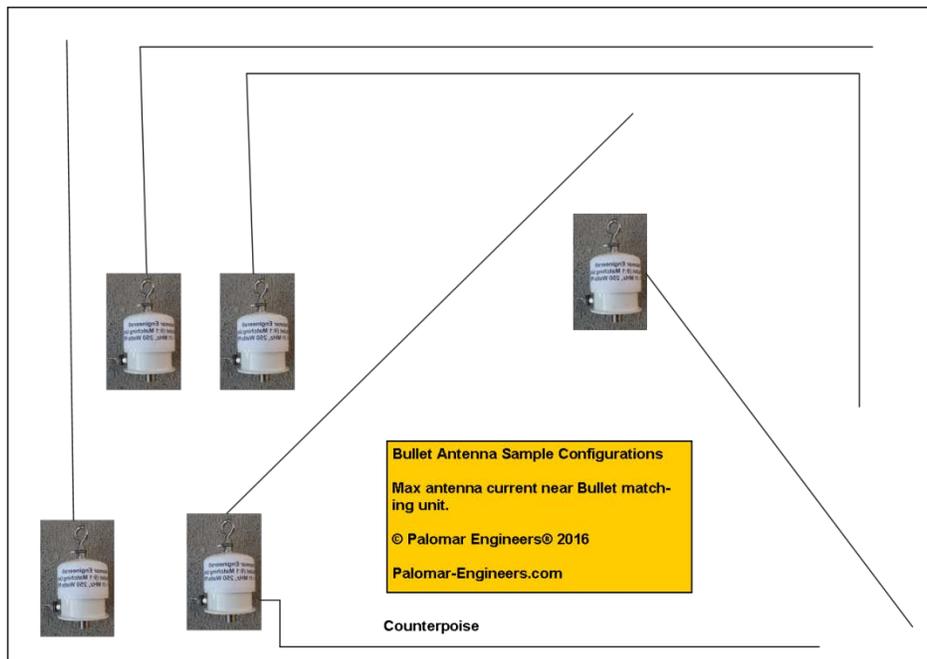
If you run more than 500 watts PEP and need a high power 9:1 unun for your end fed antenna, check out the 1K-7.5KW PEP ununs on the [9:1 impedance transformer](#) page in our website at [Palomar-Engineers.com](#)

### Installation

For best results raise the Bullet matching unit as high as possible (use a tree or vertical support) and then extend the antenna wire horizontally or as an “L” (horizontal with vertical end drop). The antenna may also be deployed as a sloper with the Bullet matching unit at the top (best) with the wire sloping toward the ground (with the end high enough to avoid contact by humans or animals), or at the bottom of the sloper with the antenna wire rising to a higher point (see typical configurations on next page).



**Additional Typical Antenna Configurations:**



**Antenna Length Modifications:** For best results, chose a length from the table above as these lengths will form a non-resonant antenna for the amateur bands indicated. The antenna length should NOT be  $\frac{1}{4}$ ,  $\frac{1}{2}$  wavelength on any frequency that you transmit as the impedance will be very high (or low) and will not transfer through the matching unit at a favorable impedance to your antenna tuner. The theory of the antenna length is to make the antenna non-resonant on any amateur band so that the impedance at the antenna side of the matching unit is in the range of 200-600 ohms and when divided by 9 will be in the range of your transceiver antenna tuner.

Any length of 50/75 ohm feed line ok (over 35 feet minimum) but longer feed lines over 50 feet may show reduced SWR on some bands due to soil conductivity, nearby objects, etc. Due to local ground conditions, antenna height and feed line length, SWR may vary and an antenna tuner may be required or some bands to bring SWR at end of feed line to acceptable levels. Use of one or more  $\frac{1}{4}$  wavelength counterpoise(s) connected to the ground post of the matching unit may also improve antenna efficiency and reduce SWR on certain bands. The first counterpoise should be installed under the horizontal portion of the antenna for best results

Use a good quality 50/72 ohm cable adequate for the power level of your station. The Bullet-80 matching unit is rated for 500 watts PEP for SSB and 150 watts continuous carrier for AM, FM, digital modes, or 375 watts CW. If the matching unit becomes warm to the touch after transmitting at high power, reduce the power output or the internal matching unit may become damaged.

NOTE: The matching unit output is DC grounded to bleed off static electricity, however it is not RF grounded as the RF signal (at the coax connector) will see approximately  $\frac{1}{9}$  of the RF impedance on the antenna terminal of the matching unit (if the antenna impedance is between 200-600 ohms).

## CAUTION

**USE CAUTION WHEN INSTALLING ANTENNA AND KEEP AWAY FROM ANY POWER LINE WIRES!**

### Simple Ring Ferrite Feed Line Choke – Part # EFFLC

