

# **DISTRIBUTED CAPACITY COAXIAL** **DIPOLE ANTENNA**

This dipole antenna takes on some very interesting characteristics unlike its predecessor the "simple dipole". Unlike the simple dipole, this antenna is very broad banded. Normally, the bandwidth of this coaxial dipole is around 500Khz wide with average installation considerations and a VSWR under 2:1, The higher VSWR occurring, of course at the band edges. The VSWR will be absolutely flat when the antenna is of the proper lengths at design frequency.

By proper choice of design frequency, you may have a VSWR on one band edge equal to that of the opposite band edge. If this is your preference you will want to establish a design frequency somewhere in the top half of the band. As an example, for the 75 - 80 metre band the design frequency should be about 3.920Mhz. At the 4Mhz end of the band the VSWR will be about 1.5:1 with the VSWR at 3.5Mhz at about 1.5:1. This is all without the aid of a "match box". However, antenna parameters may vary slightly from one antenna location to another.

There are at least several reasons this antenna is so broad. One reason being because this dipole is matched to the feed line. Another reason being that it electrically incorporates its own balun. Also, this dipole has a large circular mil area over its entire surface, thus a low Q. Over a five year period of testing, K7UAE, reports an arithmetic mean average of 1.5dB gain over a simple dipole cut to the same frequency and installed at the same height and configuration. From the authors findings this gain figure could be a conservative representation. Also, he reports a -6dB noise figure due to static charge build-up common to the open wire construction of the simple dipole. Since this coaxial dipole is completely covered by a vinyl jacket, it greatly reduces static charge build-up, which discharges creating a popping noise in the receiver. The vinyl jacket covering is usually found on most well designed mobile antennae.

This antenna also greatly reduces harmonics of the operating frequency. Any signal fed to the antenna, which is harmonically related to the antenna's operating range, is reduced by a considerable amount as compared to a simple dipole. This feature, as well as other features of the antenna, amount to a substantial saving in cost for the extras such as an antenna "match box", low pass filter, balun, and etc.

In summary, the advantages of this antenna are: 1) broad bandwidth, 2) almost unaffected by environment, 3) positive gain with reference to a common dipole operating under the same relative conditions, 4) greatly attenuates harmonics, 5) substantial decrease in static charge build-up, 6) essentially non-directional.

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# CONSTRUCTION HINTS

For antenna lengths see table 1 on page 3. For illustration, however, the 80-metre antenna will be used. It is suggested at this time that one may use 52 W coaxial cable for both the construction of the antenna and the feeding of it. The common choice of cable that meet this requirement are RG58A/U or RG8/U. It may be noted that the RG58A/U is a very good choice in that it is the least expensive. As for attenuation in this coax, within the high frequency band, losses are considered negligible. Also, with this antenna one may use RG58A/U at maximum legal power without fear of feed-line breakdown.

At the centre of the antenna, remove one inch maximum of vinyl jacket (1/2 inch each side of centre). Cut the shield in the centre all the way around the coax. Do not cut the insulation (dielectric) or the centre conductor. For two (2) leads with the shield. These leads are the feed point of the antenna. Next, connect the feed line to these leads by soldering the feed line centre conductor to one lead and taping, then the shield to the remaining lead, when this is completed waterproof as best you know how. As for feed line length, refer to page three (3). The same coax type should be used for both the antenna and feeding. Separate feed lines must be used for each antenna.

For 80 metres, measure from this reference point out on each side of centre - 30 ft 6 in and solder the inner conductor to the outer conductor of the coax. This forms the 52 W matching section and the balun. When completed one will want to waterproof these points of the antenna well. Next, at both ends of the antenna the inner conductor may be shorted to the outer conductor. Waterproofing of the ends is not necessary at this time as the ends may need cutting later for tuning purposes.

Next, the antenna is erected. After erecting the antenna, measure the VSWR and trim the antenna to length at the desired resonance. The VSWR will be an absolutely flat 1:1 when the antenna is at the proper length at the desired frequency. Be sure to solder the ends of the antenna (shield to centre

conductor) before measuring the VSWR and also, after completion. Finally, waterproof the ends. This completes the antenna installation.

Follow the same procedure for antennas of other bands. Refer to page three (3) for proper dimensions. It may be added that this antenna is designed for use as a "flat top" or an "inverted vee."

## NOTE:

I used Nylon rope for support between poles and taped the coax every foot to the rope to avoid any tension on the coax.

Table 1

Measurement: ⇒ Band: ↓	Dimension "A"	Dimension "B"
80 M	30ft 6 in	30ft 6in
75 M	30ft 6in	29ft 6in
40 M	16ft 9in	14ft 0in
20 M	8ft 9in	8ft 0in
15 M	5ft 7in	5ft 10 in
10 M	4 ft 2 in	4 ft 5 in

