CEECOM BIG WHEEL ANTENNA

BIG WHEEL HORIZONTAL ANTENNA

CEECOM Amateur Radio Antennas

www.ceecom.co.uk

Available for 2m, 4m & 6m Bands.

The Ceecom big wheel antenna is an excellent choice for ham radio operators looking for reliable, omnidirectional coverage on VHF and UHF bands.

Its circular design, resembling a “Big Wheel" provides excellent 360-degree horizontal radiation, making it ideal for contacting stations in all directions without needing to rotate the antenna. This makes it perfect for portable setups or fixed stations where simplicity and wide coverage are important.

Our Big Wheel antennas are easy to assemble, lightweight, and typically mount on poles or masts, offering great performance for both local and DX communication, especially for those involved in SSB and FM Modes.

ELECTRICAL / MECHANICAL SPEC

DIMENSIONS:
2M - 145MHz – 107cm diam.
4M - 70MHz – 207cm diam.
6M - 50MHz - Coming soon

WEIGHT:
2M - 145MHz – 1.8KG
4M - 70MHz - 2.8KG
6M - 50MHz - Coming soon

POLARISATION: Horizontal

FEED POINT: 4M & 6M - SO239, 2M - N-Type

POWER HANDLING:
SO239 500W, N-Type 1000W

GAIN: See tables below

BEAMWIDTH: See table below

BANDWIDTH <1.5 SWR:
2M - 145MHz – Approx 2 MHz
4M - 70MHz – Approx 1.5 MHz
6M - 50MHz – Coming soon

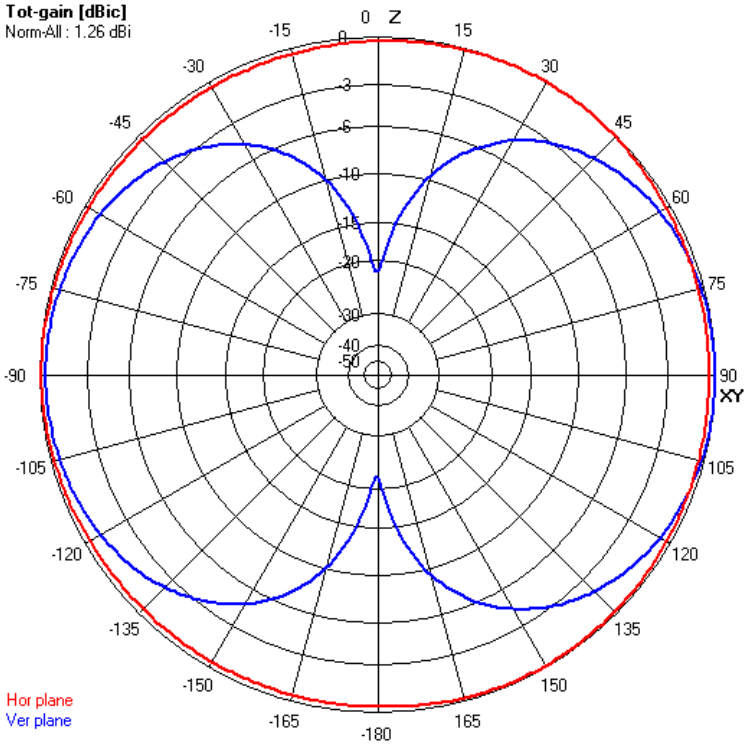
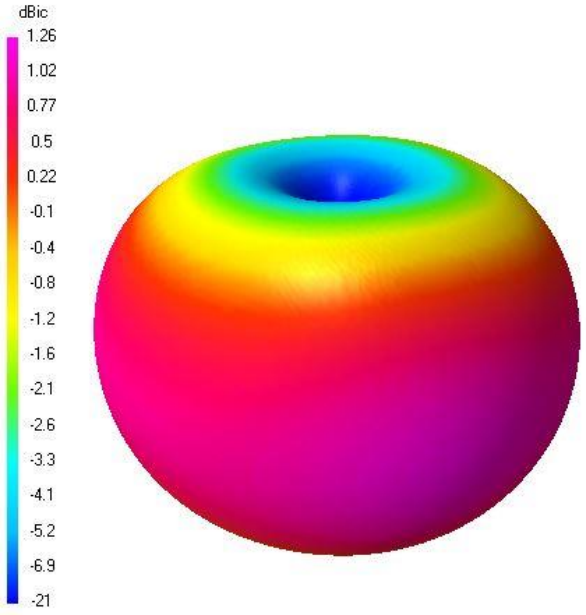


Fig 1. (70 MHz) Free space plot - Antenna in horizontal position in Free space

NEC Modelling Suggested Gain and Angles

- Gain: 1.26dBi
- Radiation Angle 92°
- Beamwidth 106°



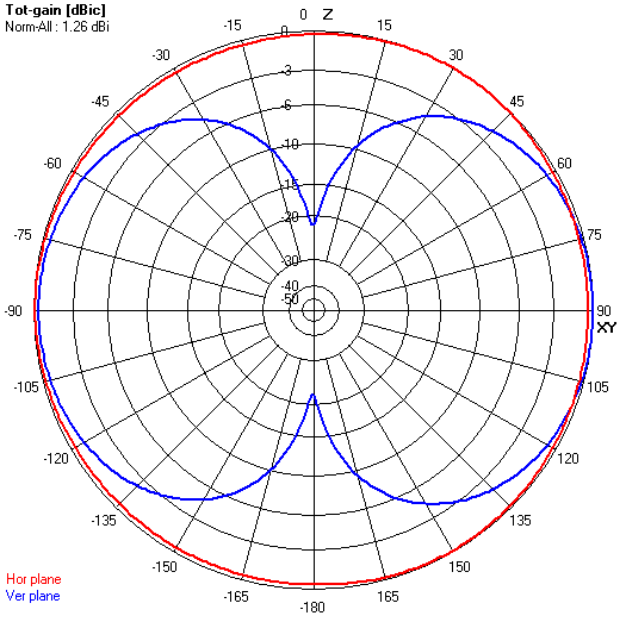
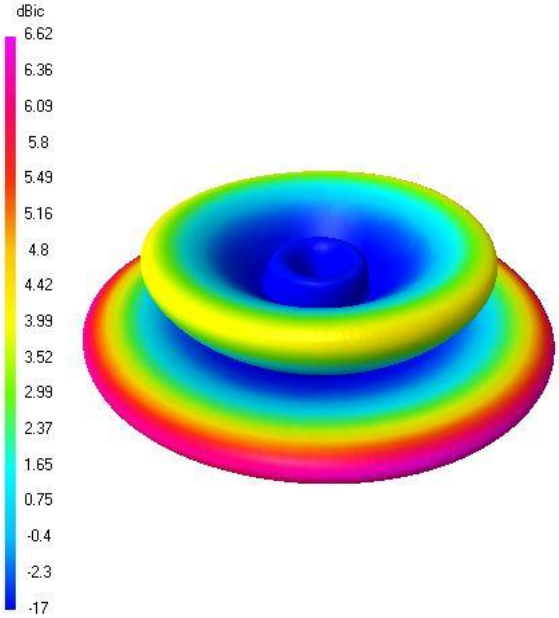


Fig 2. (70 MHz) 5m above ground - Antenna mounted on a 2" pole, 5m above ground.

NEC Modelling Suggested Gain and Angles

- Gain: 6.62dBi
- Bottom Lobe Radiation Angle 72°
- Bottom Lobe Beamwidth 12°



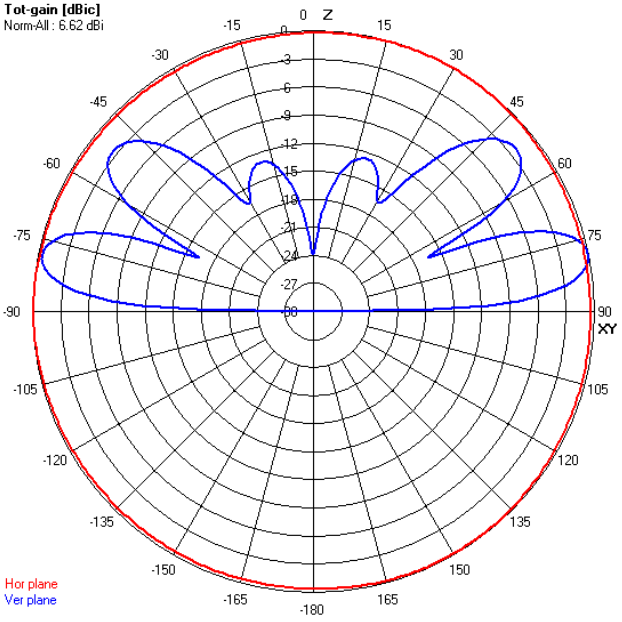
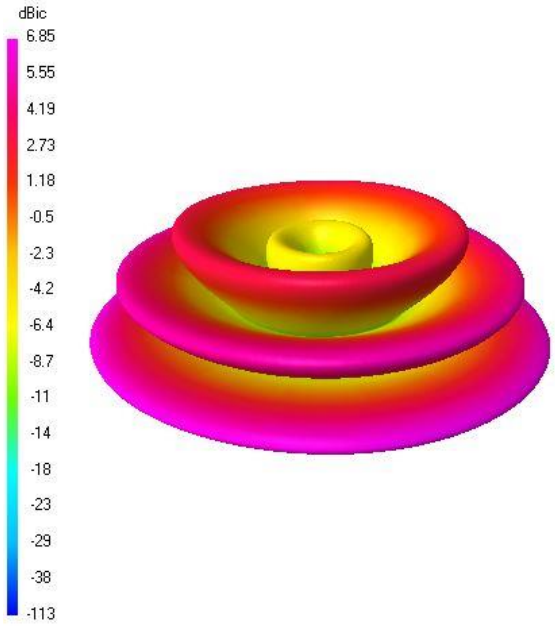


Fig 3. (70 MHz) 7.5m above ground - Antenna mounted on a 2" pole, 7.5m above ground.

NEC Modelling Suggested Gain and Angles

- Gain: 6.85dBi
- Bottom Lobe Radiation Angle 82°
- Bottom Lobe Beamwidth 8°



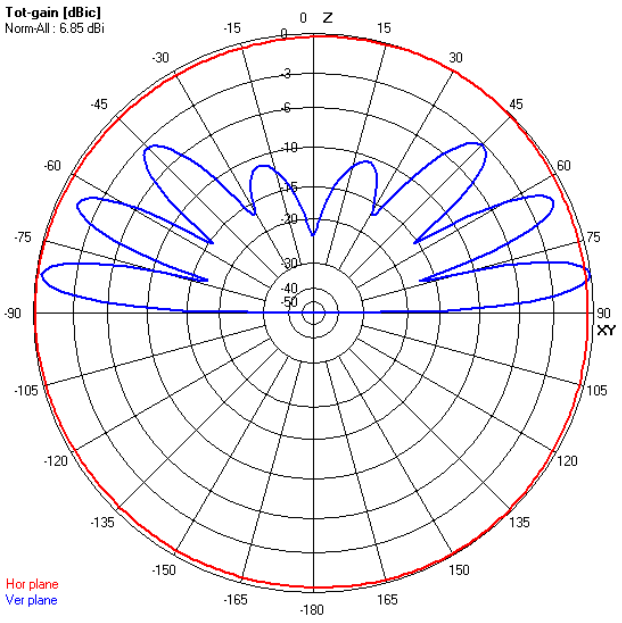
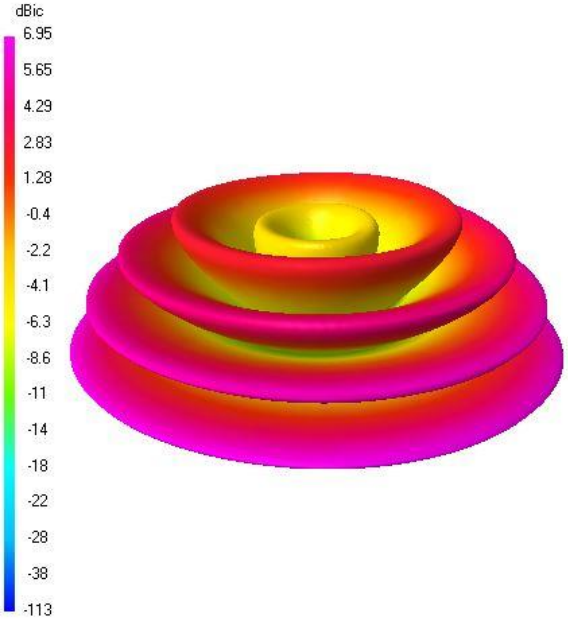
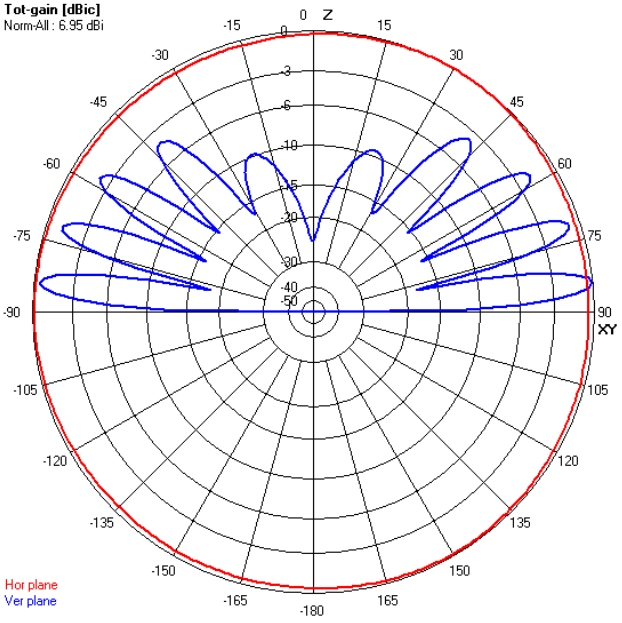


Fig 4. (70 MHz) 10m above ground - Antenna mounted on a 2" pole, 10m above ground.

NEC Modelling Suggested Gain and Angles

- Gain: 6.95dBi
- Bottom lobe Radiation Angle 84°
- Bottom Lobe Beamwidth 6°





CEECOM BIG WHEEL ANTENNA

Lets talk GAIN

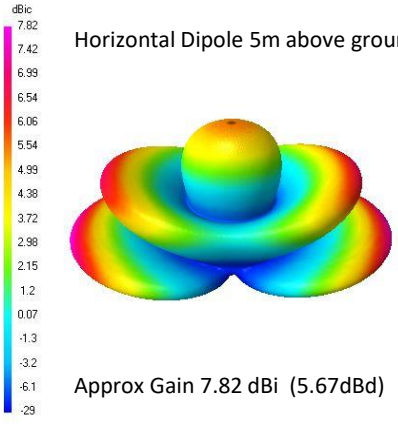
Many manufacturers advertise antenna gain differently, making it challenging to accurately assess an antenna's true performance. The gain figures provided by Ceecom are based on free-space calculations, ensuring straightforward comparisons with other antennas. In contrast, some manufacturers present gain figures based on measurements taken above ground at various heights or under conditions that may artificially inflate the numbers. Furthermore, gain values may be expressed in terms of dBi, dBd, or simply dB, which can add to the confusion.

To provide clarity, we have compiled a comparison table for this antenna under different scenarios. In the commercial radio industry, free-space gain is typically quoted for ease of comparison between antennas.

Big Wheel Antenna Gain	Gain dBd	Gain dBi
Free space	-0.89	1.26
5m Above Ground	4.47	6.62
7.5m Above Ground	4.7	6.85
10m Above Ground	4.8	6.95

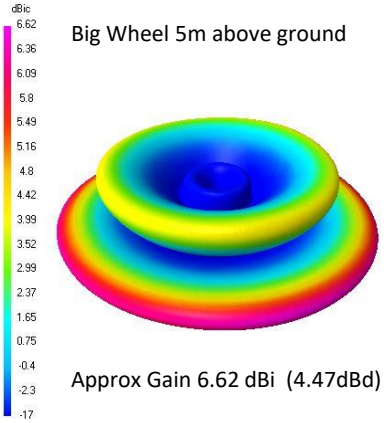
There has been much discussion online regarding the Big Wheel antenna's 3 dBd gain claim, but it is rarely specified whether this gain is measured in free space or above ground. For those unfamiliar with gain measurements, dBd refers to gain compared to a basic dipole, whereas dBi is referenced against an isotropic radiator. We believe it is impossible for the Big Wheel antenna to achieve 3 dBd of gain over a dipole.

A basic horizontal dipole radiates in two main directions (see image below). To achieve omnidirectional radiation, RF energy would need to be taken from one direction and redistributed in others. If we redirect power from either side of the dipole's radiated energy, we inevitably create negative gain. For this reason, we find it implausible that a Big Wheel antenna could exhibit 3 dBd of gain over a dipole in free space. However, we considered whether this gain might be possible when measured above ground, given that the Big Wheel effectively acts as three half-wave radiators, with ground reflections possibly enhancing the gain. This differs from a horizontal dipole, which only has one half-wave radiator reflecting off the ground. To explore this further, we conducted comparative NEC modelling at 5m above ground, as shown in the following images:



Horizontal Dipole 5m above ground

Approx Gain 7.82 dBi (5.67dBd)



Big Wheel 5m above ground

Approx Gain 6.62 dBi (4.47dBd)

As evident from the models, the Big Wheel antenna still demonstrates negative gain compared to a dipole. However, as the 3D radiation pattern illustrates, the horizontal dipole radiates in only two directions (e.g., east and west), leaving no coverage in the north and south. In contrast, the Big Wheel antenna spreads its RF energy uniformly in all directions, making it one of the best horizontal omnidirectional antennas available.

CEECOM BIG WHEEL ANTENNA

Setup Instructions

Identify the following components:

1 x Bottom Centre Hub Plate (Ref **A**)
(This part contains the RF connector)

1 x Top Centre Hub Plate (Ref **B**)

Bag of M6 Nuts + M6 Shakeproof Washers + M6 Bolts

Please note that only one bolt is required for the 4m and 6m versions, while two bolts are needed for the 2m version. As a result, you may have an extra bolt along with a couple of spare washers.

3 x Stub Arms (Ref D)

2M version shown for reference

3 x Halfwave Curved Elements (Ref **E**)

6 x Hose Clamps (Jubilee Clips) (Ref **F**)

1 x Tubular Spacer

2 x Mast 'U' Clamps

You will require the following tools (not supplied):

- Gloves. Wear protective gloves as some sharp edges may exist.
- 10mm Spanner (or adjustable) or hex fitting.
- Medium size flat head or Philips Screwdriver (dependant on hose clips are supplied)
- Tape measure
- Common sense, a bucket of enthusiasm, and maybe a signed waiver from your spouse… Building a Big Wheel antenna is guaranteed to test your patience and your relationship…

Now let the stress begin:

Setup Instructions

Antenna Assembly Instructions

Step 1: Lay out the three stub arms (Ref D) in any configuration. The orientation, whether up or down, does not matter at this stage.

2M version shown for reference

Step 2: Slide a hose clamp (Ref F) over the end of each stub tube, ensuring that the main body of the clamp faces outward, not inside the tubes. Leave loose at this stage.

Step 3: Loosely insert the three half-wave curved elements (Ref E) into the ends of the stubs (Ref D). Do not tighten the hose clamps yet.

Setup Instructions

Step 4: Position the top centre hub plate over the bolts of each stub so the bolts pass through the holes and that the plastic locator pins sit inside the holes. You may need to use **gentle persuasion** to align the plate properly. Once the plate is in position, secure each bolt with an M6 shakeproof washer, followed by an M6 nut. Do not tighten the bolts at this stage.

Step 5: Flip the entire antenna assembly so that the top centre plate rests on the floor. Position the bottom centre hub plate over the bolts, ensuring that the matching stubs align both at the top and bottom (the slotted protruding part).

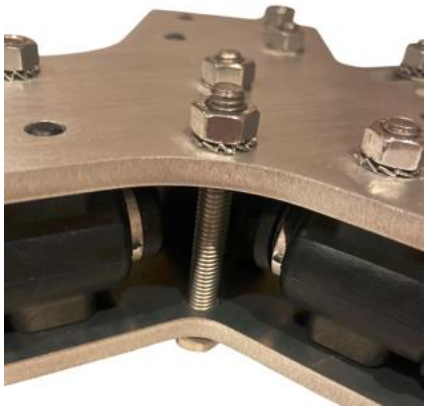
Insert an M6 shakeproof washer over each bolt, followed by an M6 nut. Tighten these bolts, ensuring the centre bolt from the RF connector passes through the hole on the opposite side.

Setup Instructions

Step 6: Flip the antenna again and fully tighten all the M6 bolts. Add a shakeproof washer to the center bolts, followed by an M6 nut, and tighten securely. At this point, all nuts should be fully tightened.

Step 7: Locate the tubular spacer and insert it between the two slot cuts protruding from the plates. This is the tuning stub, also referred to as the hairpin match. Insert an M6 bolt, followed by a flat washer (Ref I), through the hairpin match and the tubular spacer. Secure with another flat washer, a shakeproof washer, and an M6 nut. Only loosely tighten, as this will require adjustment for tuning later.

Step 8 (2m version only): Insert the remaining M6 bolts, followed by a shakeproof washer, through the plate holes. Secure them with another shakeproof washer and an M6 nut on the opposite side. Fully tighten these bolts, as they function as a hairpin for impedance matching.

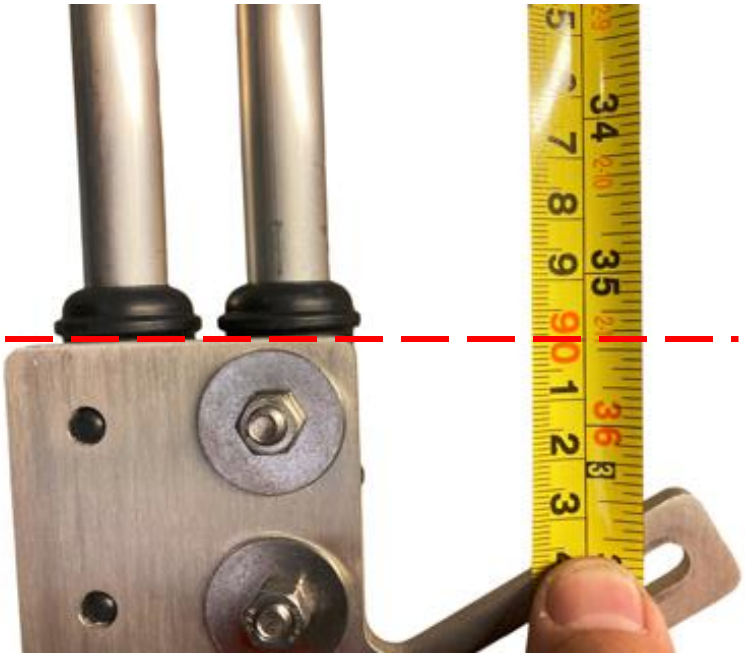


Setup Instructions

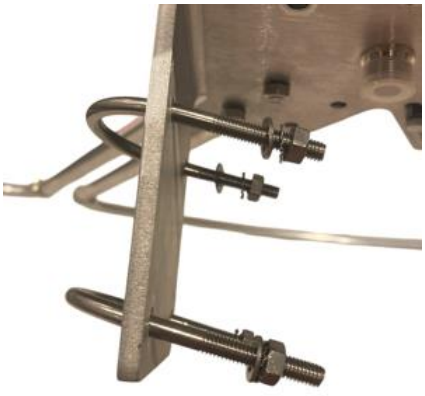
Step 9:

•**For the 2m version**, Ensure curved half-wave elements are pushed fully into the stubs without applying force. Tighten the hose clamps so that their bodies are facing outward.

•**For the 4mv version (6m coming soon)**, Position the curved halfwave elements into stubs as shown in the photo, with an approximate measurement of 90 cm with the tape measure hooked over the element to the align with the edge of the plate shown in photos. Tighten the hose clamps with the bodies facing outward.



Step 10: Position the 'U' clamps in place and secure them with shakeproof washers and M6 nuts. These can be fully tightened when mounting the antenna to the mast pole.



Please note: If this is mounted at the top of your mast pole with no other antennas above it, you can position the U-bolts on the inside of the bracket, which will help centre the pole more effectively

Setup Instructions

Step 11: Tuning Process

• **For the 2m version**
Extend the tuning stub out as far as possible. The antenna should be resonant around 144.3 MHz. To raise the frequency, move the stub inward towards the connector.

• **For the 4m version (6m coming soon)**
Position the matching bolt approximately 5mm from the inside. Take an SWR reading, then gradually move the bolt outward, taking further readings to fine-tune the antenna. This can be done at ground level for initial adjustments, but it is recommended to raise the antenna to check SWR at height. Ground-level tuning can introduce capacitance and detuning due to proximity to the ground, which is why patience is tested in this process ☺

Step 12: Finally, take a break and enjoy some refreshment. You might also want to explain to your spouse that the large "washing line" is, in fact, your new antenna. Then, enjoy some omni-directional SSB action!

CAUTION:
DO NOT MOUNT THE ANTENNA NEAR OVERHEAD POWER LINES!

And that's it… Enjoy chasing that DX ! Over and Out… 73 !