



## Butternut Ground Radial Kit Instructions

Model BUT-GRK

NOTE: Please read all instructions thoroughly before proceeding to installation and assembly. During assembly and installation take extreme care to avoid contacting power lines with any part of the antenna or other conductors.

### INSTALLATION CONSIDERATIONS

Ideally the antenna should be installed 30 ft (9.1 m) from any structure. In most cases this will not be practical and an alternative method such as the one shown on page 2 may be used.

**WARNING: Do not install the antenna in any place where any part of it can come into contact with power lines in the event of structural failure, in the course of normal flexing after installation or during installation.**

**WARNING: In no case should the antenna be installed in anyplace where structural failure of any part of the antenna or its supporting system can endanger persons or property.**

**CAUTION! A grounded antenna will be at D.C. ground potential! To avoid the danger of shock connect all station equipment to a good earth ground. It is also recommended that all station equipment be disconnected from the power mains before connecting the feed line to the antenna. Please consult the A.R.R.L. Handbook or other reference manuals for additional safety procedures when working with electrical equipment.**

Tube w/insulator (A) should be protected against corrosion if it is to be placed in concrete, damp acidic or alkaline soil. Asphalt roofing compound, polyurethane varnish or other sealant that protects against moisture may be used.

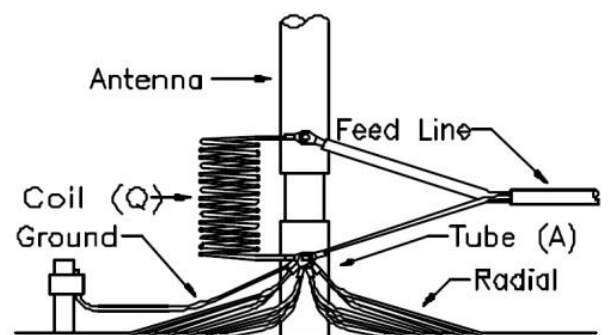
Concrete may be used in areas of high winds for greater strength, in which case the post may be twisted slightly during setting for easy removal later.

### ASSEMBLY

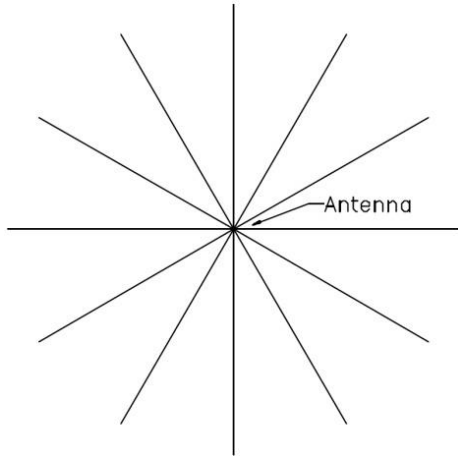
1. Plant tube w/insulator (A) in a hole approximately 21 in (53.3 cm) deep so that the upper end of the fiberglass insulator is approximately 7 in (17.8 cm) above ground level. Pack earth tightly around tube w/insulator (A) so that it remains vertical.

NOTE: Hammering tube w/insulator (A) into the earth may cause the insulator to splinter. If the post must be hammered into the earth, protect the end of the insulator with a block of wood.

2. Assemble and install antenna per instructions.
3. Insert a copper ground rod 6 to 12 in (15.2 to 30.5 cm) from tube w/insulator (A). The ground rod should be at least 48 in (1.2 m) in length.
4. Attach radials onto the screw protruding from tube w/insulator (A) along with coil (Q) base matching, braid side of the feed line and bonding wire from the ground rod as shown in figure 1. Secure with the supplied flat washers and hex nuts.



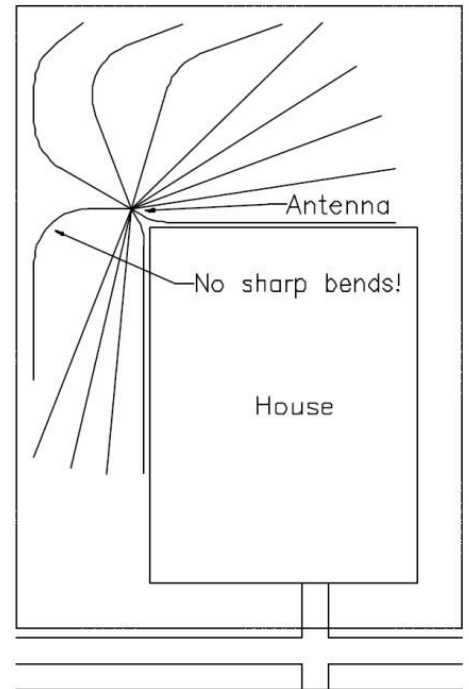
5. Fan out radials as shown. Make sure that the radials are as equally spaced as possible. Ideally, radials should be equally spaced as in Figure 2 but in most cases they will need to be bent around structures and other obstacles as



shown. Make sure that you make your bends no sharper than 90° and as gradual as possible.

6. Slit the earth 1 to 2 in (2.5 to 5.1 cm) with a square shovel or similar tool along the path of a radial.

7. Leaving a little slack at the base of the antenna, carefully press the radial into the slit. Make sure not to cut the radial. Radials may be left on top of the ground however they should be buried for the sake of pedestrians and lawnmowers.



8. Repeat steps 5 and 7 for the remaining eleven radials.

9. Tune antenna per instructions.

## THEORY OF OPERATION

A vertical antenna in its simplest form is electrically equivalent to one-half of a dipole antenna. The earth below the antenna takes the place of the missing half of the dipole. Capacitance between the vertical radiator and the ground causes return currents to flow along the earth's surface back to the transmitter. If they have to come back along the untreated lossy earth they get back to the source greatly attenuated. This return loss is like a resistor in series with the antenna radiation resistance and will therefore affect the feed point impedance. If ground conductivity is excellent, a ground rod may provide a sufficiently good connection for resonant and low SWR operation on the bands for which the antenna is designed. In almost every case the efficiency of a vertical antenna will be greater when radials are used to improve ground conductivity.

Since it's not practical to copper-plate the back yard, the best approach is run out a number of radials. Because most ground losses occurs within a 1/4 wavelength from the antenna, the GRK Ground Radial Kit provides a good ground plane for 160 thru 6 meter operation without using much real estate. If the ground is extremely lossy, as in the desert, additional longer radials may need to be added.

## Parts List

<u>Part No</u>	<u>Description</u>	<u>Qty</u>
VS00405Z	Ground Radial Wire	12
VJ00078Z	#8 x 1 Screw	1
VJ00083Z	#8 Washer	5
VJ00081Z	#8 Hex Nut	2