Stowable VHF/UHF Ground Plane Antennas for Emergency Communications

by Mark R. Hayden N7YLA with collaboration by Gregory K. Lee HS0ZHM

November 28, 2011

Introduction

The Glendora Emergency Response Communications (GERC) has a demonstrated need for portable and easily deployable VHF and UHF antennas for use in emergencies with low power HT transceivers (5 watts) and mobile radios (10 watts). The antennas should be easy to assemble, pre-tuned to Emcomm frequencies, and available to all GERC members at a reasonable price.

Description of Project

The GERC Emergency communications antenna kit is based on the ***Super Simple Ground Plane*** **(SSGP)** plans as outlined in the November 2011 QST magazine. The kit includes pre-tuned radials for 146.715 MHz and 445.940 MHz, primary GERC Emcomm VHF and UHF Net frequencies, but operators have the option to purchase materials to prepare radials for other frequencies. Predrilled pvc mounting caps and adapters are included to fit a 1 inch ID pvc pipe mast. Coax or pvc pipe masts are not included. 1/8 inch brazing rods are used for the radials. The kit is packaged in a convenient cardboard tube.

Availability: February 2012

Cost : **~ $10.00**

Construction

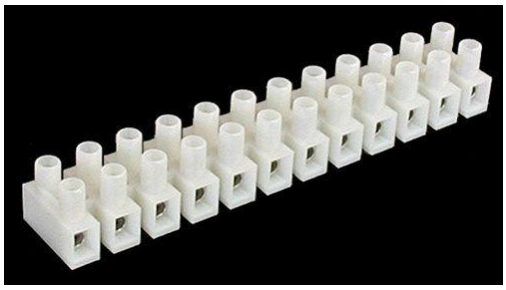
The November 2011 QST Magazine Hints and Kinks article on pages 66-67 features a Super Simple Ground Plane Antenna that can meet these requirements. The heart of this project is the use of the metal sleeves taken from a European style terminal block. These terminal blocks are readily available in different gauges to accommodate a wide range of radial diameters. It should be noted that this antenna is designed for portability and easy assembly and disassembly. The use of silicone sealant is recommended to weatherize this antenna if needed.

PARTS LIST FOR GERC EMCOMM GROUND PLANE ANTENNA

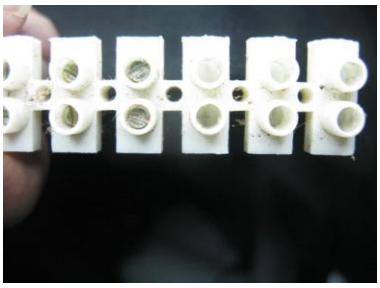
Quantity	Cat #	Description/ Vendor	Unit	Ext
1	SO-239	SO-239 UHF connector (chassis mount) All Electronics	$1.00	$1.00
5	TB-35	Insert from 12 position Terminal block All Electronics	$.25	$1.25
5	.79	1/8 in x 36 in R-45 brazing rod for VHF & UHF radials A and B-E Air Gas Co., Duarte	$.79	$3.95
1	049081137205	1 inch pvc pipe cap Schedule 40 Home Depot	$.73	$.73
1	049081131784	1 inch pvc M adapter Schedule 40 Home Depot	$.63	$.63
1	99962A	3 x 24 inch cardboard mailing tube Kelly Paper	$1.09	$1.09
1	21257	5/8 inch O-ring Dollar Store	$.02	$.02
2	99967A	3 inch end plugs	$.28	$.56
			subtotal	$9.23
			tax	$.79
			total	**$10.02**

Construction Details

How to disassemble the terminal block sleeves

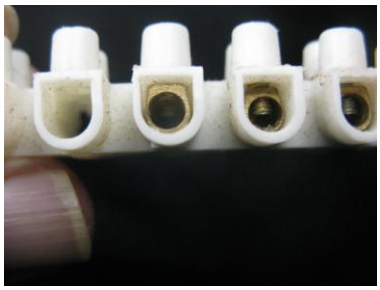


(photo by All Electronics – fair use clause)



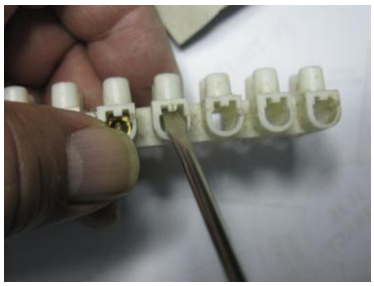
(photo courtesy G. Lee)

TB-35 12 position European style terminal block



(photo courtesy G. Lee)

Remove set screws



(photo courtesy G. Lee)

Push out sleeves

(photo courtesy G. Lee)

Remove sleeves

(photo courtesy G. Lee)

Attach sleeves to SO-239

(photo by author)

(photo by author)

SO-239 radial attachment

The Elements

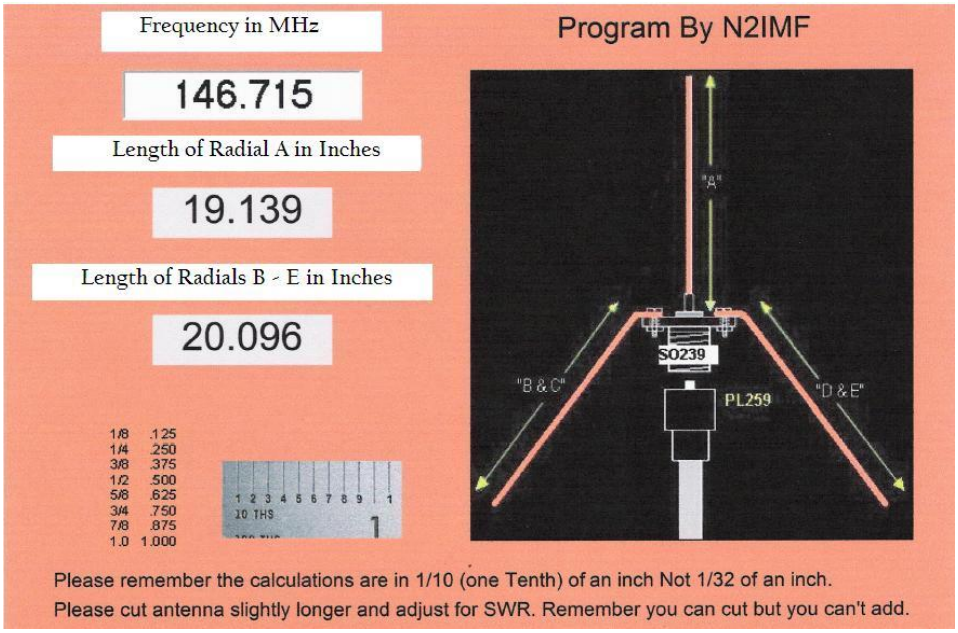
Radials are made from 1/8 inch diameter brazing rod

How to cut your own radials

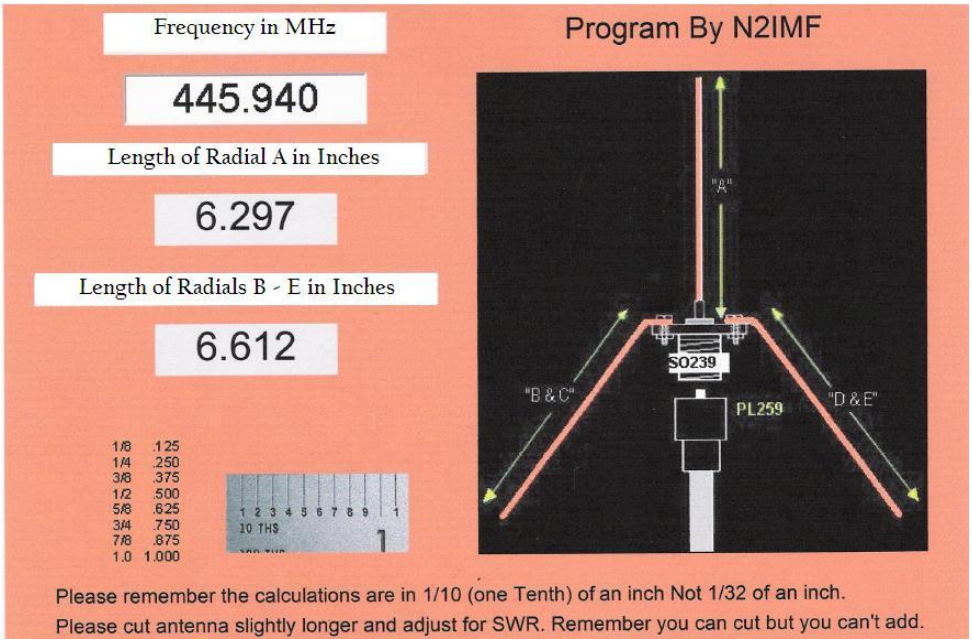
Radials for this kit are made from 1/8 inch brazing rod which is supplied in 3 foot lengths by most metal supply dealers. The exact length of the radials can be calculated using a simple program by N2IMF which is available at http://www.hamuniverse.com/2metergp.html. It is advisable to first cut the radials an inch longer than prescribed by the calculator. Next connect the antenna to an S-meter which is in turn connected to a radio transmitting on

the desired frequency while carefully trimming the radials for the best match. Or use an antenna analyzer without a radio. Remember you can cut but you can't add!

Antenna Calculations for GERC Emcomm VHF and UHF antennas



Element dimensions for the GERC Primary VHF Net 146.715 MHz



Element dimensions for Los Angeles Storehouse ERC UHF Net 445.940 MHz

Preparation of the Radiator and the Radials

The elements are cut from 1/8 in R-45 copper coated steel gas welding rods. One inch is added to the calculated measurement, to allow for trimming.

The radials are bent to 45 degrees with a special rod bending tool

Assembly of pvc end cap and adapter mount

A 1 inch pvc pipe cap and M adapter is used to mount the antenna on a pvc pipe.

A 5/8 inch hole is drilled in the cap for the SO-239.

SO-239, O-ring and PL-259

Tighten PL 259 with a needle nose pliers

Attach M adapter

Assembled antenna mount

Assembled UHF antenna

TUNING STEPS

(1)assemble antenna and connect coax, (2) raise on a telescoping mast to 21 feet , (3) test for SWR using 5 watts, (4) lower antenna, (5) disassemble antenna, (6) trim radiator and radials 1/8 inch. Repeat steps 1 - 6 until the desired SWR is attained.

Assembled VHF antenna

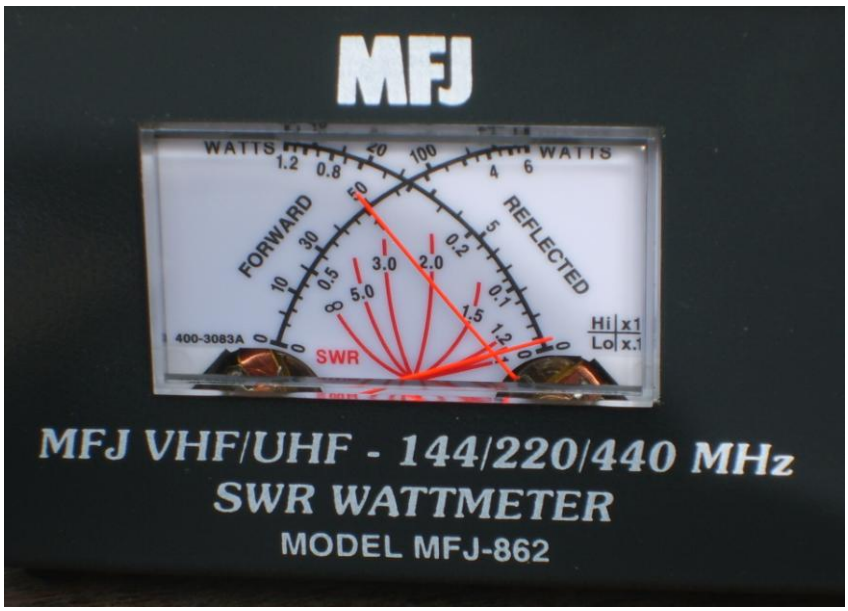
WARNING: These antennas are designed for Low (5 watts) and Mid (10 watts) Power .

DO NOT TRANSMIT ON HIGH POWER

Results of Tuning the Antennas

The antennas were tuned using an MFJ-862 SWR meter and a Kenwood TM-V7 dual band transceiver transmitting on **LOW** power (5 or 10 watts)

RG-8x coax jumper on the left was connected to transmitter, and 27 feet of RG-8x coax on the right was connected to the antenna



After repeatedly trimming of elements the SWR was less than 1.2 to 1 for both UHF and VHF antennas.

Packaging

3 inch diameter by 24 inch mailing tube with end plugs allows space for storing the antenna kit plus coax and extra radials