Building a Specific Frequency Dipole Antenna

By W4DIH
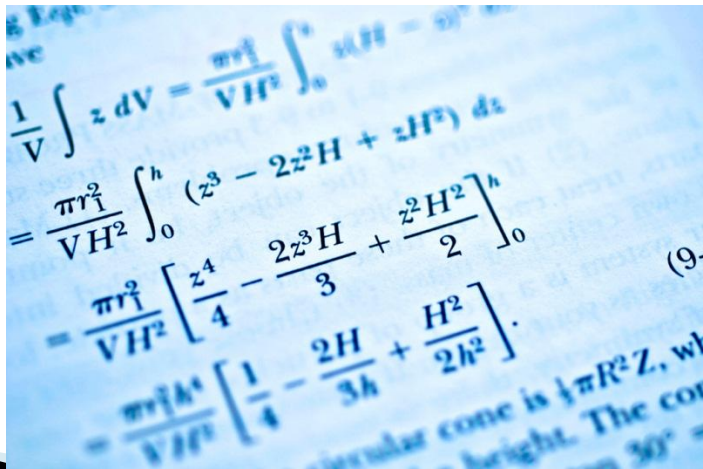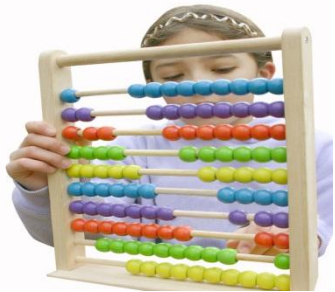
The Project

We need an antenna for 20M PSK31 and 40M CW for Radio on the Square

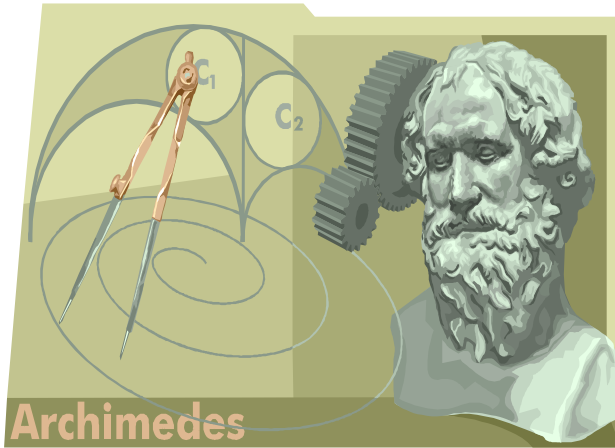Oh! What to do? What to do?

It's just a matter of simple Mathematics

$$\ln 1 = 0$$
$$e^{\ln x} = x = \ln(e^x)$$
$$\log_a xy = \log_a x + \log_a y$$
$$\log_a\left(\frac{x}{y}\right) = \log_a x - \log_a y$$
$$\log_a(x^n) = n\log_a x$$
$$\log_a x = \frac{\log_b x}{\log_b a}$$
$$\log_a b \cdot \log_b a = 1$$

THE SECRET FORMULA

Archimedes

The most fundamental antenna is the *dipole (2 parts)* A straight conductor ½ wave length long (divided by 2) with it's feed point in the middle. A dipole radiates strongest broadside to it's axis and weakest off the ends.

Current in a ½ wave dipole is highest in the middle and zero at it's ends. Voltage along the dipole is highest at it's ends and lowest in the middle. The feed point impedance (ratio of RF voltage to current) of a center fed dipole in free space is approximately 72 ohms but varies with the height above ground.

TOP SECRET   TOP SECRET   TOP SECRET

Length in feet = 468   =   468

_____

Frequency in MHz   =   f

468??????????????

The value 468 was arrived at based on the customary *length to diameter (l/D)* ratio of wire antennas for the HF bands that varies from a few thousands to 20,000 or more. Making antennas out of thicker wire, cages of multiple wires, or tubing and rod all reduce the resonant frequency for a given length even further.

Example 1. What is the length of a dipole for 3.550 MHz?

L=468/3.55 = 131.8 feet

Example 2. What is the length of a dipole for 21.300 MHz?

L= 468/21.3 = 22 feet

ARRL License Manual

BACK TO OUR PROJECT

Enter the formula for the PSK 31 antenna calculation

468 Divided by 14.070 (Freq MHz)

(4% Percent smaller for the Inverted Vee)

468/14.070 = 33.26'
Each side = 16.63'

BACK TO OUR PROJECT

The 40 Meter CW antenna

Enter the formula for the 40 M   CW antenna

Length = 468/ Frequency in MHz
468/7.075 = 66.148'

66.148'/2 = 33.07' each side

Now let's put it all together!

WHAT DO WE NEED ?????

wire

insulators

Center connector

Tools

Wire cutter

Pliers

Cordless Drill

Soldering iron

We also need 4 Volunteers

Let's assemble our parts and get to work!

Get the flat plug and the rounded cap ready to work on.
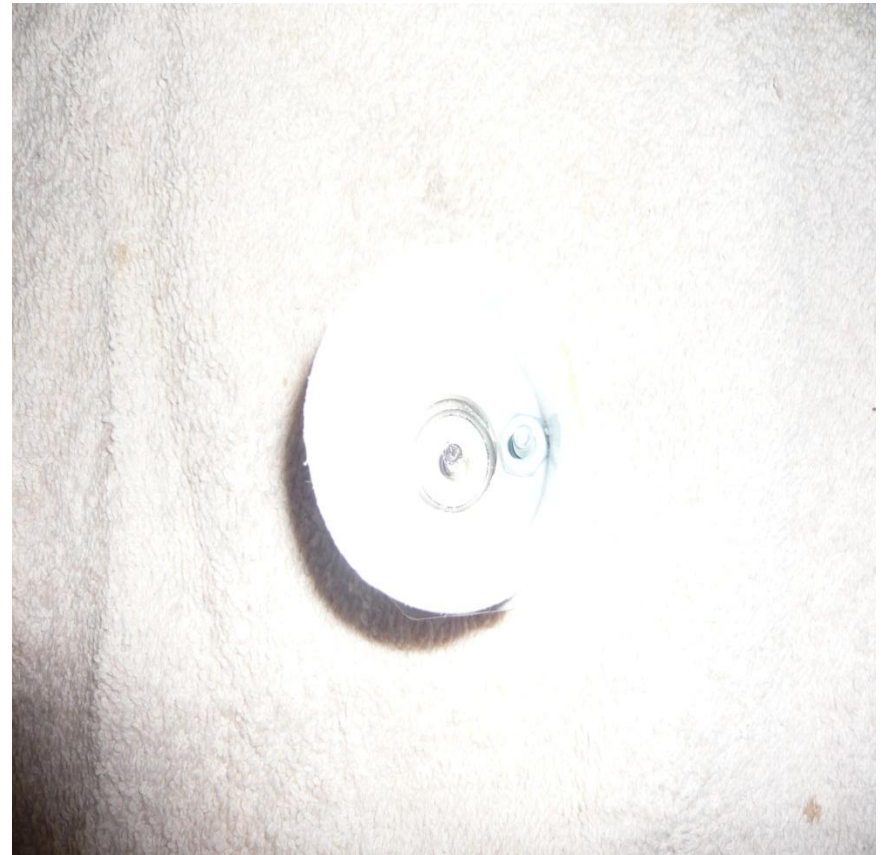
Note that the plug and cap are about the same length, not good. Cut about ¾'" off of the flat plug. This will give more working room.

Drill a hole to fit the SO 239 in the bottom of the flat cap

Insert the connector into the hole ,connection side out, the and mark and drill 2 holes for the support screws and nuts.

Insert screws and tighten the nuts. Add another nut to one screw for the antenna connection. Do not tighten this nut yet.

Get the eyebolts and nuts. Drill 2 holes opposite each other in the rounded cap. Drill another hole just below the eyebolt for the antenna wires to enter.

Insert the eyebolts and tighten the nuts. Note. You could add a third eyebolt to the top of the cap to support the antenna as an inverted V

Take the precut wires and run them through the eyebolts and tie a knot. Leave just enough to feed through the hole and extend the bottom of the cap by an inch. Strip each wire ¼"

Crimp a eye lug on the wire closest to the screw with 2 nuts. Make sure that this is a solid connection. Put the ring on the screw and tighten the nut.
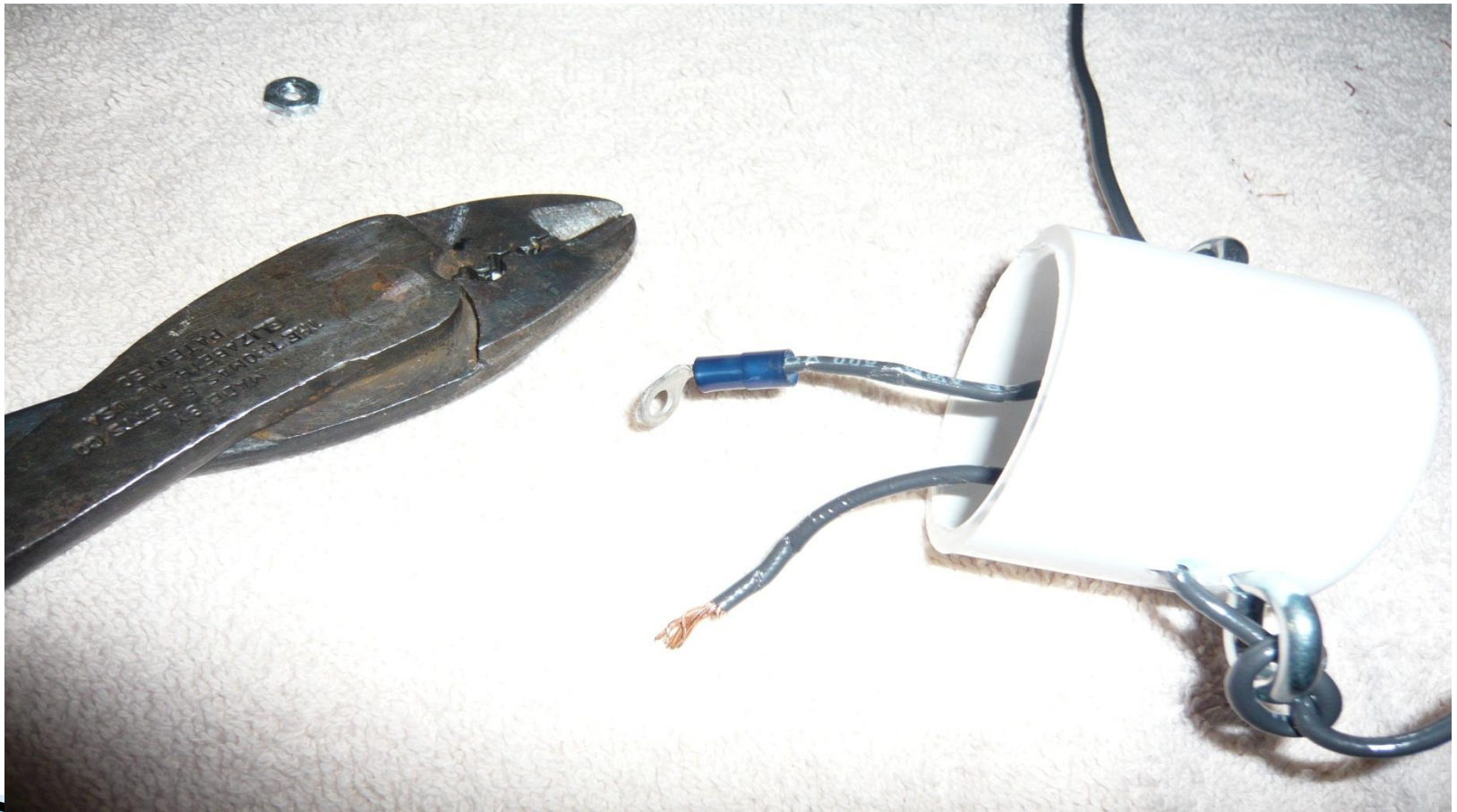
Insert the other antenna lead into the center post of the connector. You may have to trim the wire to fit. Solder this connection. Be careful not to use to much heat.

Strip 4" off the ends of each antenna lead. Do not nick the wire.

Insert the stripped end into the insulator about ½ way. Make a wireman's twist on the wire to form a tight connection. Solder these connections for strength and conductivity.
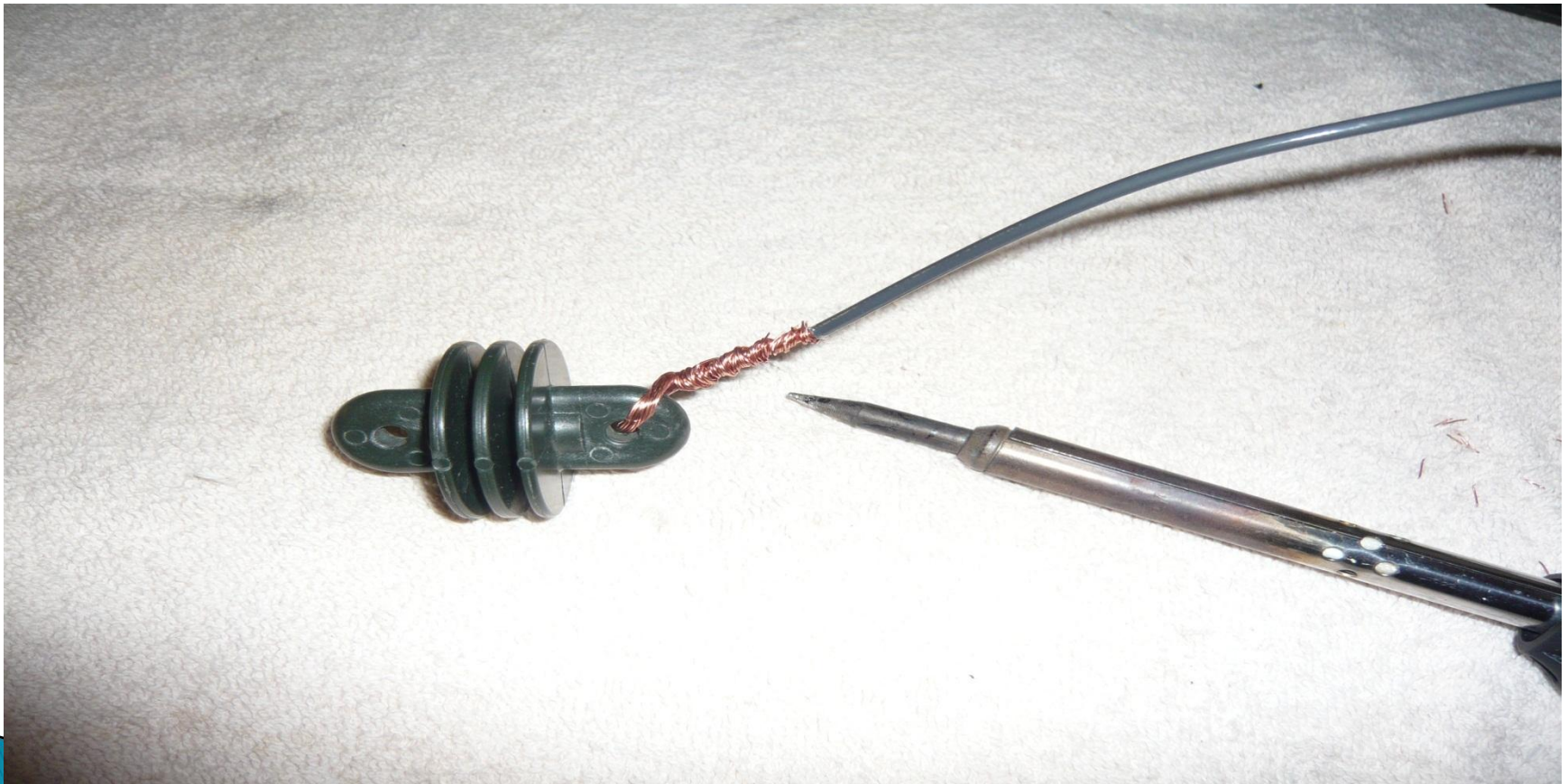
Test your work. Make sure that there are no shorts. Inspect the whole project at this time.

You have reached the point of no return. Make sure that all connections are tight. Make sure that the antenna is electrically sound. Now glue the cap and the plug together.

Now what do we do with the antenna for storage? These cord winders are handy and only cost .98 cents at Home Depot.

How does it work??   Test it out!!!!!

"CQ CQ CQ   North Africa   North Africa"

"That's all Folks"

W4DIH