Homebrew Buddipole Variant

By
Paul – AE5JU

History: The Buddipole is a portable dipole using telescoping whips on the ends of center arms, with loading coils between the arms and whips. Originally a homebrew item made from pvc pipe fittings, and rather flimsy. Later they produced a commercial version.

http://www.qsl.net/w3ff/

http://www.buddipole.com/buddipole.html

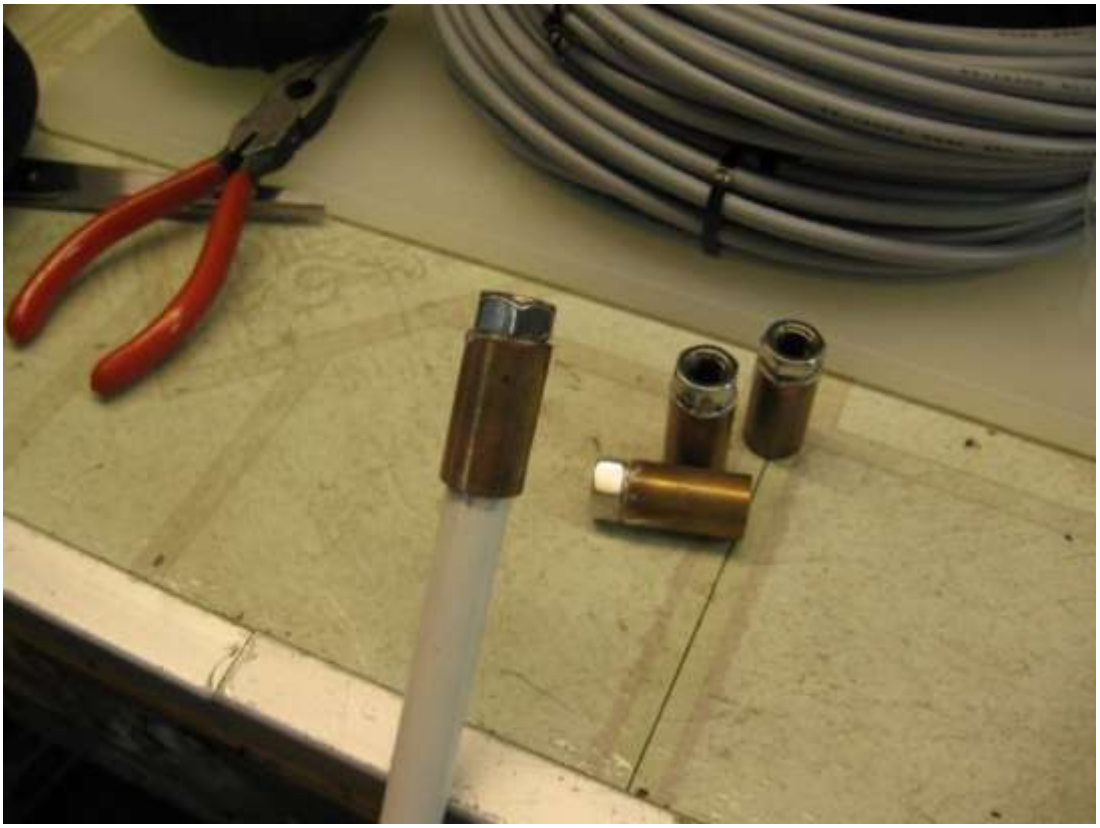
Just what we need for emergency services, portable, the ability to work various HF bands. So, mine's going to be a little stronger than the pvc homebrew Buddipole. I live in a place you can for sure buy hardware!

01 Bench Grinder Work — Those are 3/8-24 hex joiner nuts I got from HamCQ.

http://www.hamcq.com/whips-quick-disconnects-capacity-hats-extensions-antenna-springs/nuts-3/8-24-by-1-inch/prod_129.html

They are really brass with a nickle plating. Also some 1/2" ID bronze sleeve bearings. (1/2" ID x 1-1/8" long) Why? Brass and Bronze are non-inductive, and this will be near the loading coils. I ground down the outside of the nuts to slip fit halfway into the bronze sleeves. The bronze sleeves were obtained from the local hardware store. You'll see why in a minute. I am the Grand Master of the bench grinder, almost. Fellow ham club member Frank, noticing my skint up knuckle said, "Why didn't you just slip the nut over a wood dowel and..." So NOW you tell me, Frank!

02 Soldered — Soldered together with torch, flux and solder, just like soldering copper water pipes. Cleaned up well after, scrubbing off all remnants of the acid flux. There were a few drips of solder inside, so I cleaned up those with a Dremel tool.



03 Ends Fitted — This is what they are for. These things will be epoxied onto the ends of 1/2" diameter fiberglass electric fence rod. I got the fiberglass rods from Kencove Farm Fence Supply. These are VERY cheap, about $2.50 for each 5' x 1/2" rod. You need two 2 1/2' pieces for each Buddipole.

http://www.kencove.com/fence/detail.php?code=F12-5SG

Length of the arms, from center of dipole (even with coax connector) to end of the hex nut, 31".

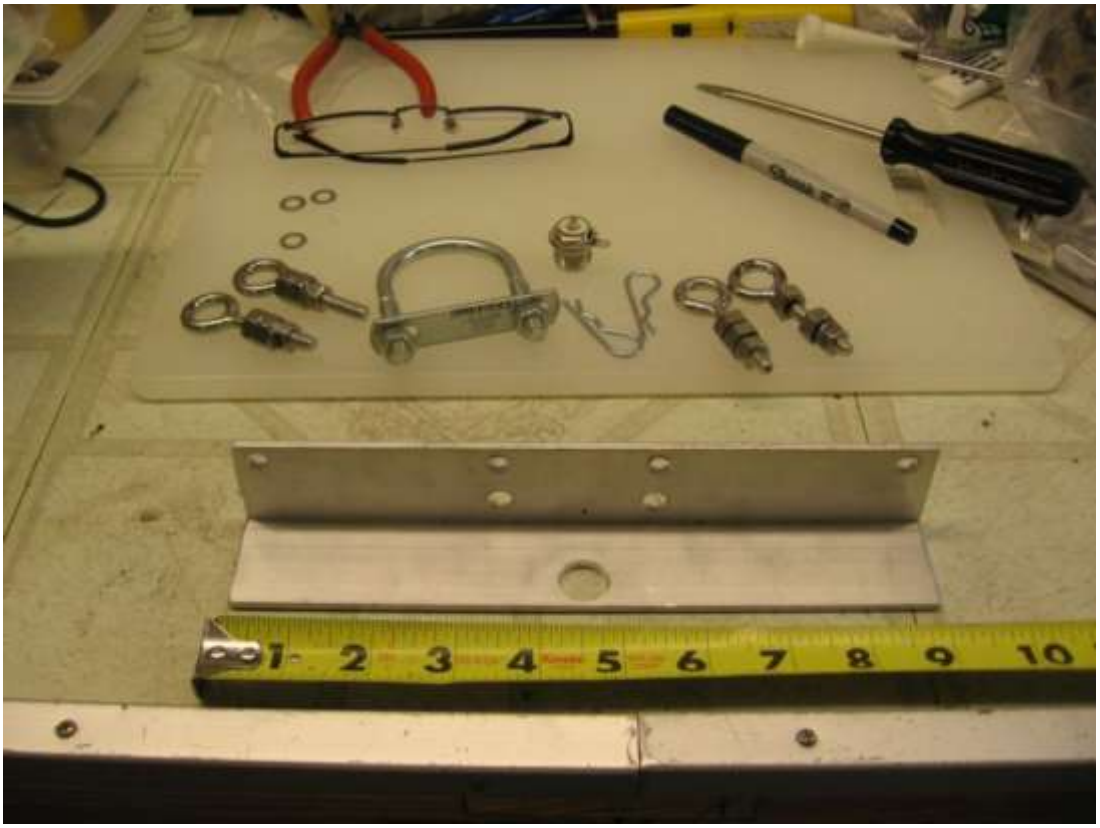
04 Whip Mounted — This is how it will go together. These black whips have a 3/8"-24 thread on the end, just like Hamsticks and other mobile antennas. And as luck would have it, they thread right into those nuts I soldered into the bronze sleeves and epoxied onto the fiberglass rods. The antennas droop. They all do, so get over it. These whips were obtained from www.buddipole.com for $18 each.

http://www.buddipole.com/lotewh.html

These are not the standard Buddipole whips, they are 9 1/2' long.* Along with the center sections, and by varying how much of the whips are pulled out, we should be able to bypass the loading coils and adjust the antenna to resonate on 15, 12, and 10 m.

With coils, this antenna should be able to be tunable to 80m, 40m, and 20m.

* MFJ has some 10' and 12' telescoping whips with the same 3/8"-24 thread.



05 Bracket. — This is a 9" long piece of 1/8" x 1 1/2" angle aluminum. I've drilled some holes. Big hole in center is to install a chassis mount SO-239 socket. Later some jumper wires about 4" long will be soldered to the center and ground tabs with Anderson Power Pole connector on the ends. You may use ordinary spades, or other connectors. I have a big bag of Power Poles here so I'm going to use them. They give reliable connection and are not at all fragile.

Anderson Power Pole connectors can be found here:

http://www.powerwerx.com/

You will also find a nice Power Pole installation tutorial here:

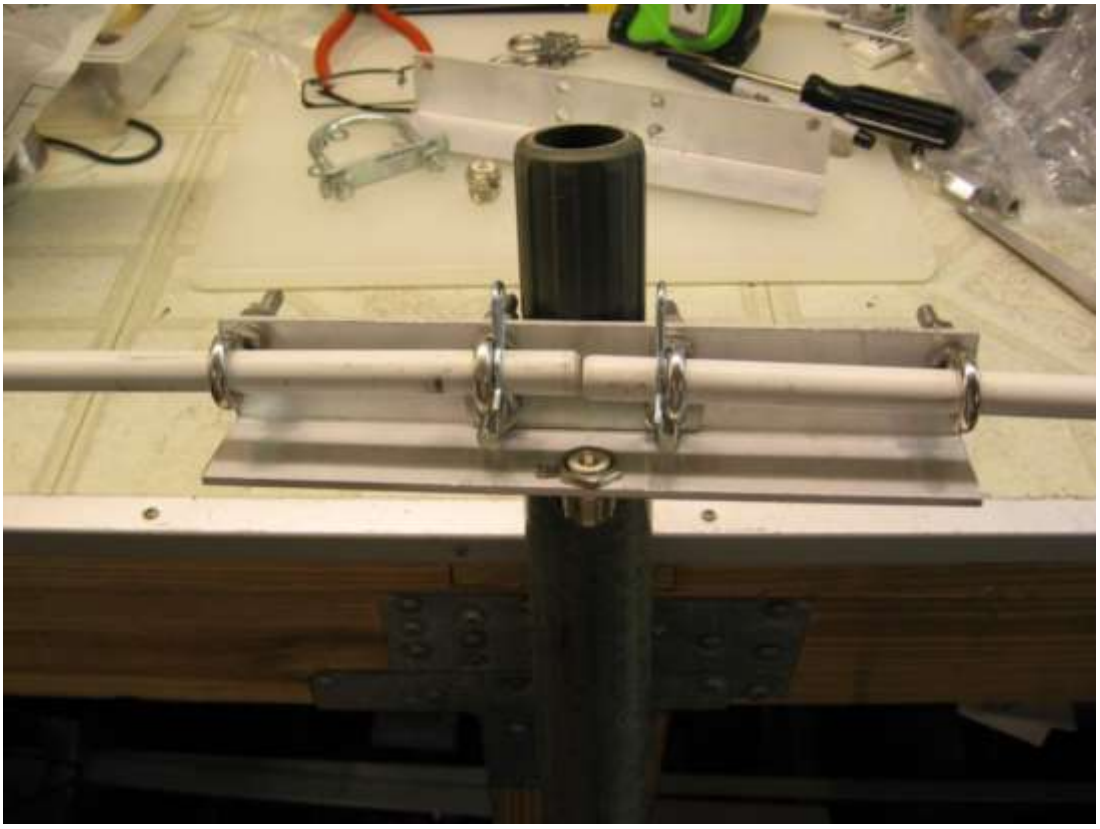
http://www.westmountainradio.com/supportrr_RC.htm

http://www.flyrc.com/articles/using_powerpole_1.shtml

In the background you can see some stainless eye bolts. There are two large nuts slipped over the shank of each eye bolt, and then the properly fitting nut. Those large nuts are used as just spacers. The reason is, there is an unthreaded section of the shank of the eyebolt and you could not get it tight with just the original nut.

The eye bolts go through the four holes across the top of the angle. It just so happens they have a 1/2" diameter hole. This allows those 1/2" fiberglass rods to fit through.

There is a U-bolt which will mount in the lower holes toward the center. This is also stainless steel, and will just fit around the top end of the mil surplus fiberglass poles you can buy on eBay.



06 Bracket assembled — I've cut the 1/2" fiberglass rods in half. They ended up being 3/16" short of 30" each. The ends with the nuts were epoxied on. Tomorrow I'll get some little brass screws, cross drill, and put in the screws to make sure the ends don't come off.

Those fiberglass rods ended up being 30 1/2" long overall, out to the hexnut on the end. We'll have a conductor run along those later to form the center section of the dipole.

You can see I have drilled a small hole in the rods, and they are held in place by slipping "hairpin" hitch pins through those holes.

I have installed the socket. Now it's starting to shape up.

The green fiberglass mast poles are military surplus ones you can find on eBay and at hamfests. They are 48" long. They are not really antenna masts, but are used to hold up camoflage netting. They sell for about $20 for a 12 pc set, with about another $20 or so for shipping. You only need about 4 or 5 of these mast pieces, so, split the set with a friend like I did.

Used masts
http://cgi.ebay.com/ws/eBayISAPI.dll?ViewItem&item=150315895044

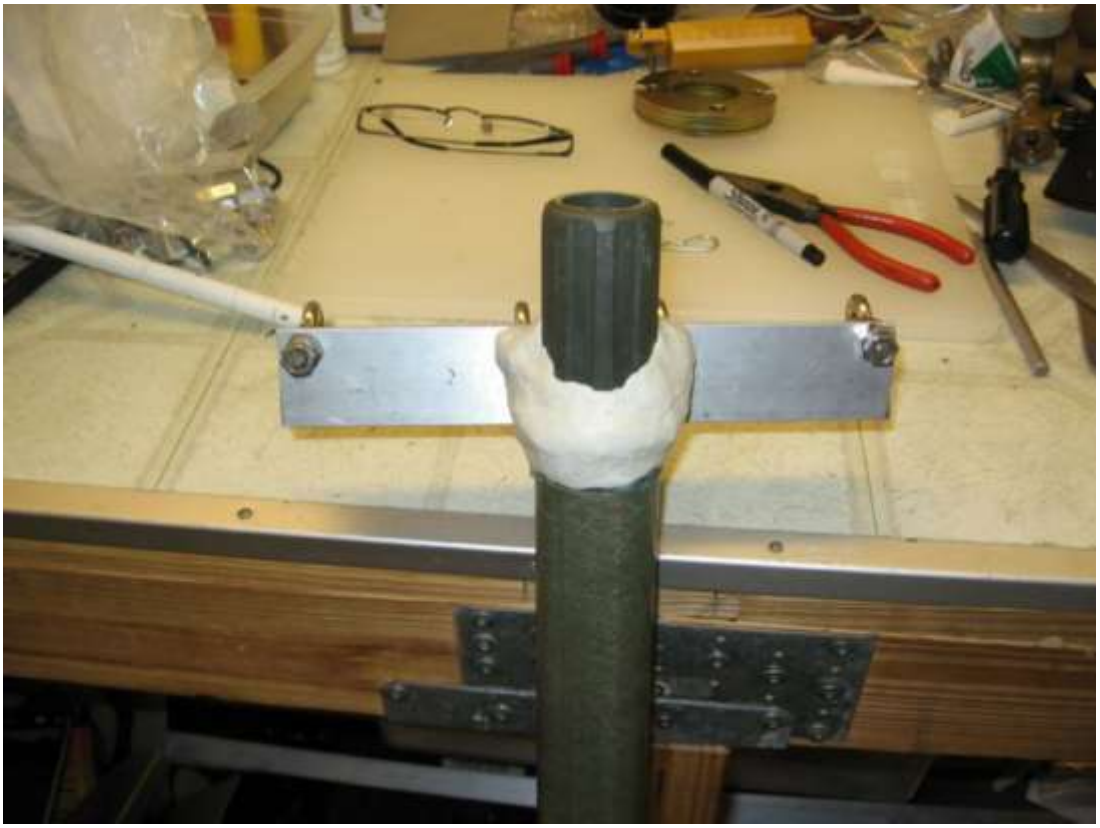
New masts http://cgi.ebay.com/ws/eBayISAPI.dll?ViewItem&item=150316253303

Everything is a little "loosey-goosey" right now, just finger tight. I'll take it all apart in a bit and reassemble with locktite on all of the nuts and bolts, and the nut on the SO-239 socket.

I'll use a Dremel cutoff wheel and cut off the excess threads on the eye bolts. Also, I will make the U-bolt only just tight enough to make the bracket snug. It is tightening around the plastic end of the mast tube. To keep it from shifting around, before I install the U-bolt for the final time I'll put a glob of epoxy putty between the pole and bracket. The U-bolt nuts will get an application of Locktite, also.

The bracket can be left on that top section for transport and storage. The arms come off, the coax comes off, there is no need for the bracket to come off.

First I used a Dremel fiber cut off wheel to remove the excess length of the eyebolts. I made sure there were no sharp bits left. I used plenty of Locktite to make sure everything stays tight.



07 Epoxy Putty.jpg — I put a wad of epoxy putty (similar to Plumber's Epoxy Putty, hardware store or Walmart item) between the bracket and the mast end. I snugged the U-bolt, but not so hard as to crack the end of the mast. You could tighten it all day and never get it tight enough to not wiggle. So, to prevent breakage, I just barely snugged it up, then packed epoxy putty around the back. Now it won't wiggle, it won't come off, and that part can just stay on that section of mast. No need to remove it.

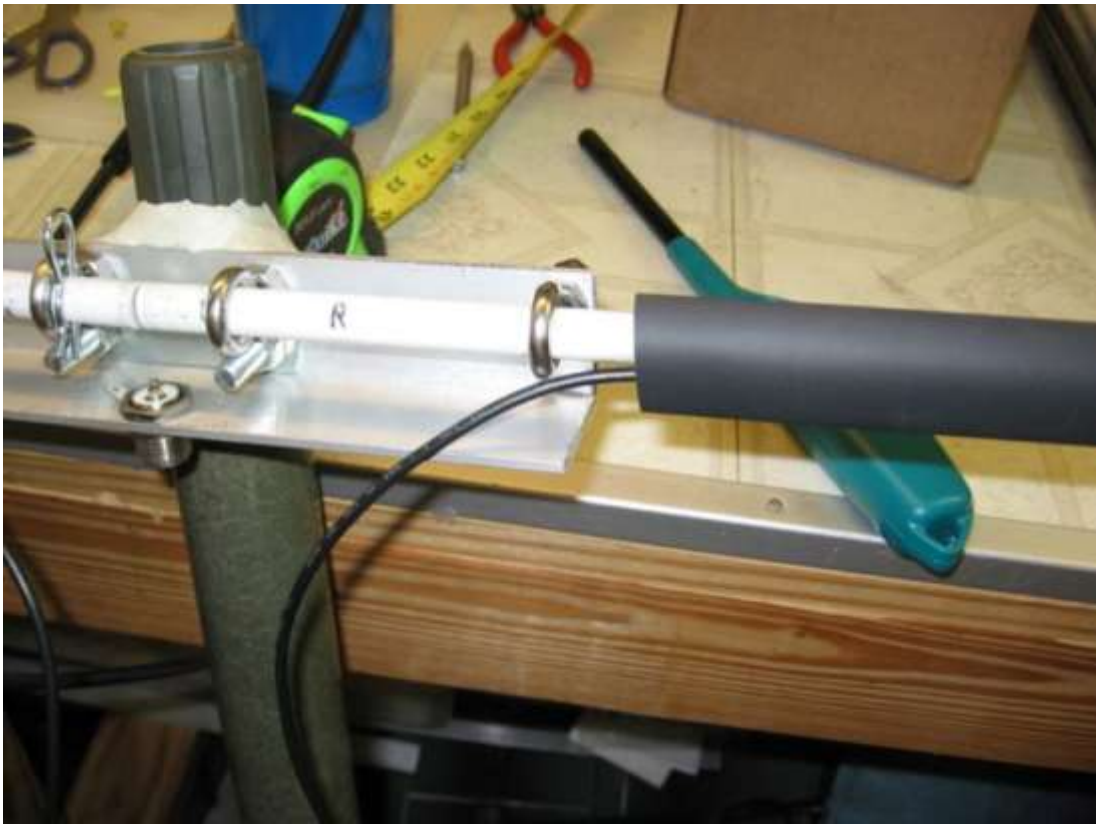
08 Teaser.jpg — This is a mockup, just a teaser to show you where we're going with this. Right now just one section of mast is slipped over the tube of PA Speaker Tripod Stand.

http://www.parts-express.com/pe/showdetl.cfm?Partnumber=245-010

These are somewhat larger, stronger than the ones sold with the commercial Buddipole. The fiberglass arms are installed, and the whips screwed on and extended. I will still have to make the coils, which will go on the ends of the fiberglass arms. Yeah, the whips sag. That can't be helped, and that is going to happen no matter what. Won't hurt a thing. But those fiberglass fence rods sure don't sag! That's some good stuff. Makes me want to look around and see what else I can make from them. There will be loading coils that will slip onto the ends of the fiberglass arms. There will be 14 ga wire that will go along the fiberglass arms to form the middle section of the dipole. Those antenna wires will be held onto the rods with heat shrink tubing. Anderson Power Poles will be used for all those connections.

09 Arm Terminals.jpg — I cross drilled and put in some #6 x 1" brass screws. Brass, all hardware brass because it is non inductive. Why? Because the loading coils for the lower bands will be nearby. I put a little glue on the screw, put it through. A little Locktite on the screw, a brass washer, and a brass nut. Then we have some binding post thumbnuts. Those are left loose. This screw does two things, pins the end nut assembly so it won't fall off, and it provides a way to complete the electrical connection to the telescoping whips in the ends.

10 Wiring Arms.jpg — Here some 14 gauge insulated wire is held in place with some short pieces of 3/4 heat shrink, shrunk in place. This 14 ga wire will be the middle part of the dipole.

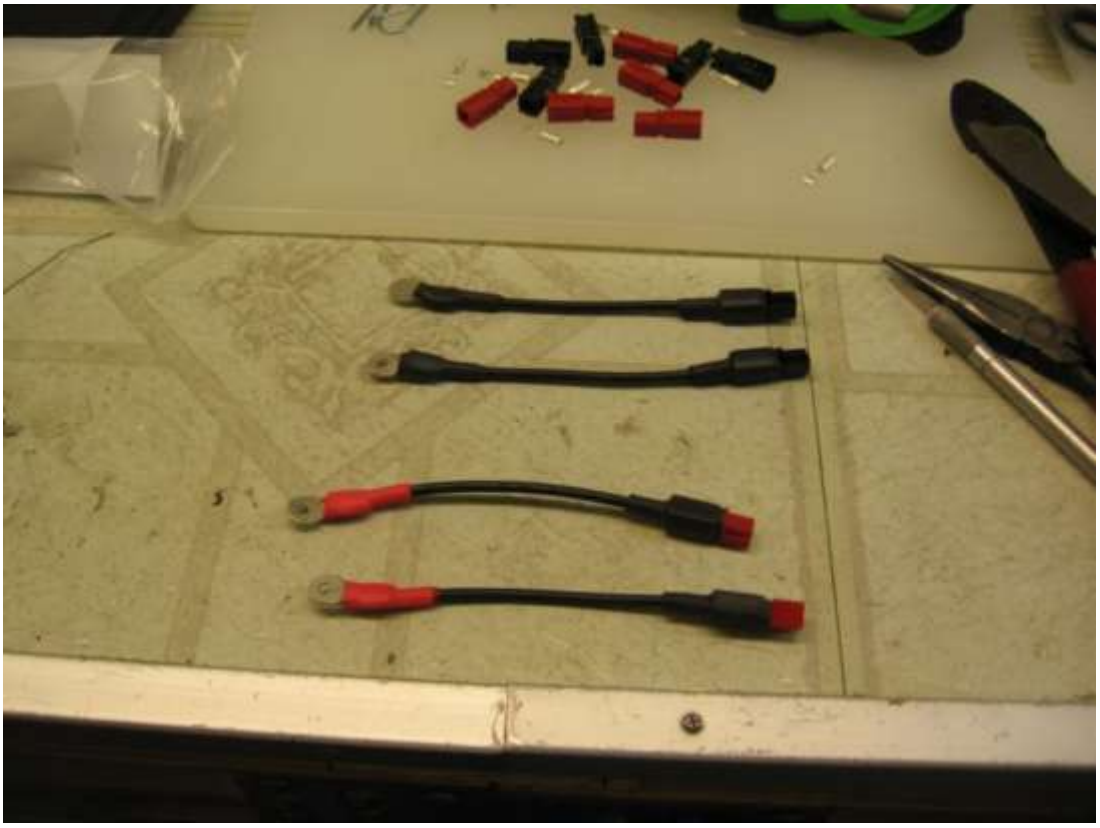


11 Heat Shrink Arms a.jpg — 3/4" heat shink is slipped over the fiberglass arms and wire, to about 1" from the end of the aluminum angle center support.

12 Heat Shrink Arms b.jpg — On the other end, the end of the heat shrink is about 6" from the outer end.

13 Heat Shrink Arms c.jpg —– When I shrunk the tubing I did both ends first to anchor them in place, then worked toward the middle. Don't worry about trapping air bubbles. The air will easily leak out along the wire and rod. You will have to work the wire to be more or less straight, but even if the wire is a little crooked it won't hurt a thing.

Now we hook it all up.



14 Jumpers to Whips a.jpg — These are short, overall length 5". You only need to make up one red and one black jumper. I have two of each here because I am building two Buddipoles. These are made from the same 14 ga insulated wire as the center. Anderson Power Pole on one end and a #6 ring terminal on the other, with one of my favorite materials once again, heat shrink tubing!

15 Jumpers to Whips b.jpb — Power poles have been added to the pieces of wire coming out of the heat shrink tubing on the fiberglass arms. The gap between the end of the heat shrink on the arm and the nut on the end, where the whip will be screwed on, is where loading coils will be placed later on so that this antenna can be made to work on 20, 40, and 80/75 meters. Make the wire coming out of the heat shrink on the arm long enough to connect to the short jumper on the end. This is so that the coils can be bypassed, or not used at all, for use on 6,10, 12, 15, and 17 meters. For the lower bands, requiring the loading coils, those coils will have Power Poles on each end, too. Spade lugs could be used, but I like the Power Poles better.

16 Center wired.jpg — You can see here how I finished the center and connected to the arms with Power Poles. As you can see, we are now outside... somethings gonna happen!

17 Whips screwed on.jpg -- Screwed on and fully extended. The dipole is about 12' on each side.

18 PA Spkr Tripod.jpg — Heavy duty PA speaker tripod from Parts Express

http://www.parts-express.com/pe/showdetl.cfm?Partnumber=245-010.

19 Its UP.jpg -- There it is, up with 4 sections of mast, about 17' up.

23 and 26

I hooked it up to my Yaesu FT-897. It was getting dark and dew beginning to fall, so I didn't do much testing.

I turned the FT-897 down to 5 w power output with the coax connected directly to the output of the radio. With the whips all but the last segments extended, on 15 meters I had a SWR reading of 1.2:1. Hey! Not bad!

I checked SWR on 17 meters with the whips fully extended and got 1.6:1. Check ing 15 meters again, 2.6:1 with the whips fully extended. The tuner quickly had both bands down to 1.1:1. I'm sure it will be tunable on 12 and 10 meters by simply pulling in the whips but I didn't have time to do that before it got dark.

In case you were worried, yes, this will blow over easily. But now I have some guy rings to attach to the mast used with bright orange (to hopefully prevent tripping) parachute cord and 1' long tent stakes.

28 It's up, 40 meter coils in use, and the whip ends adjusted for best SWR.

29 Closeup. The coils are just slipped over the ends, and the jumpers hooked to the coils. Anderson Power Poles used here, too.

30 Ferrite Beads. Four Snap On Ferrite Beads (FSB-1/4) from Palomar-Engineers.com were snapped onto the coax to act as a choke. These beads are for 1/4" cable, such as the RG-8X I used. Again, I have put bands of heat shrink tubing on the choke beads to make sure they stay snapped on.

I later added a 5th bead on the advise of Palomar Engineers. They also offer a ferrite choke balun kit.

31 Red Coil. The coil form is 1-1/2" pvc sink drain pipe. There are 28 turns close wound of 20 ga insulated wire. The is about 1-1/2" of wire from each end of the coil with Anderson Power Poles for connection. The "red side" of this dipole is connected to the center conductor of the coax. All Power Poles used are red, and the coil wire is red. This should give people a hint, red on one side, etc.

32 Black Coil. This coil is also on 1-1/2" pvc sink drain pipe. There are 24 turns close would of 20 ga insulated wire. Yes, good observation, the coils are not identical. This coil is on the "black side" which is connected to the shield side of the coax.

Fine tuning of SWR is done by adjusting the whips. Just as the coils are not symmetrical, neither are the whip lengths. For 7.225 mhz, I came up with these adjustments for SWR = 1.3:1.

Red side whip, 5 1/2 sections, or 103" of whip pulled out.

Black side whip, 5 sections minus 3", or 92" of whip pulled out.

Probably a little better could be done, but I was happy with 1.3:1.

So, why are the coils assymetrical, and the whips pulled out to different lengths?

Good question, and one I asked myself.

When a dipole is up some distance, what, 1/2 wavelength? it is 72 ohms. Closer to the ground, as most people would put them, they are closer to 50 ohms, and a good match to 50 ohm coax.

But lower, such as this antenna will be used, the impedance will drop to around 30 ohms. By placing the feedpoint offcenter the antenna presents a higher impedance, closer to the 50 ohms of the coax. SWR can be lower in such a case.

Now, I thought, you've got to be kidding. At first I had both coils symmetrical, the whips pulled out equally, and sure enough, I had problems getting SWR below 3:1. I'd push both in or out a little, and get down to 3:1, then a little more, and it was back up 5:1 or higher. Then I just went with the flow, tried it like this, and sure enough, I was soon getting SWR's down, 1.9, 1.6, 1.4:1, and lower.

Make sure the knurled nuts (jumper binding posts from end of fiberglass to whips) are tight.

Coils for 20 meters were fabricated, using the same 1 1/2" pvc sind drain pipe. Red coil is 8 turns, 20 ga insulated wire close wrapped. Black coil is 6 turns.

For 20 meters, whips were, red side, 5 1/2 segments (total whip length 104"). Black side, 5 segments + 3" (total whip length 98"). This resulted in 1.2:1 SWR with tuner bypassed, at 14.240 mhz.

I tuned around and was hearing an old acquaintance from my SWL days, Angelo in Michigan, almost 1000 miles away, on 14.245 mhz. I waited for my turn, CQ'd him, and he came right back. We had a nice 25 min QSO. Signal report 59+15 both ways.

The next day I set up in the Park for an informal mini-field day.

Now I ask you, is that not a great picture? Bandstand, American flag, fountain on the left, playground in the background. Nice big shady oaks. Just a very relaxing place.

The Husky Power Center battery held up well for about two hours. From the Louisiana Gulf Coast I made a number of good QSO's, Iowa, Wisconson, Pennsylvania, Connecticut, Maryland, New York (a nice 25 minute chat about stereo gear, and he used to work at a TV station near me). Very good signal reports, too, from 56 to 59+20. This was all up on 20 meters.

By the time I shut it down, when I would key the mic the voltage would drop to 11.3 v, with 12.4 v on receive. Still, the radio did not shut down due to the low voltage. That was good. I don't know just how low voltage it will tolerate.

The Yaesu FT-897, LDG AT-897 tuner and antenna gave great performance.

The whips have 6 sections, and the left side (6 turn black coil) was pulled out to 5 sections plus 3" (total 98" whip length). The right side, (8 turn red coil) was pulled out 5 1/2 sections (total 104" whip length). The antenna, with the 20 meters coils, on 14.240 mhz gave an SWR reading of 1.2:1 with tuner bypassed.

Police cruised by and did not even slow down to look.

Talking on the radio in the park is fun.

Parts List

Fiberglass masts, carry bag, AND guy rings.

Used http://cgi.ebay.com/ws/eBayISAPI.dll?ViewItem&item=150315895044

New http://cgi.ebay.com/ws/eBayISAPI.dll?ViewItem&item=150316253303

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Tripod Stand

http://www.parts-express.com/pe/showdetl.cfm?Partnumber=245-010

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1/2" x 5' fiberglass rods, Item # F12-5SG. One required for one antenna, will be cut in half.

http://www.kencove.com/fence/detail.php?code=F12-5SG

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Hexnuts for ends of arms to mount whips

http://www.hamcq.com/whips-quick-disconnects-capacity-hats-extensions-antenna-springs/nuts-3/8-24-by-1-inch/prod_129.html

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Bronze bushings from the first photo are 1/2" ID x 1-1/8" Long. Hardware store item.

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9-1/2' long telescoping whips from Buddipole

http://www.buddipole.com/lotewh.html

MFJ also makes some 10' whips that will work as well.

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Anderson Power Pole connectors

http://www.powerwerx.com/

How to install Powerpoles:

http://www.westmountainradio.com/supportrr_RC.htm

http://www.flyrc.com/articles/using_powerpole_1.shtml

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Split Beads for 1/4" coax (get the size you need for your coax) FSB-1/4 fits RG-8X.

Use 5 beads or buy Palomar Engineer's ferrite balun kit.

http://www.palomar-engineers.com/Ferrite_Beads/ferrite_beads.html

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SO-239 "chassis mount" socket

Heat shrink tubing - 3/4", 1/2", 3/8"

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Tent stakes, orange paracord, and other items can be found online.