

Easy to build Buddipole

With the current events of terrorism and tropical weather that plague the US., I've decided that being an ARES/RACES member, I should be portable for HF as well as VHF. I purchased the Yaesu FT-857D which pretty much exhausted my Ham Radio funds. So what should I do about a portable antenna? With a lot of research on Ham Sticks, Slinky Di-pole, Verticals, Etc, I decided on the Buddipole. The Buddipole, designed by Budd W3FF is an extremely compact and portable antenna system. Deployed, it spans 16 feet across and is nice & light. The Buddipole has about a 1.5 DB gain on 40 and 20 meters where ham sticks can't compete. In fact, it has also won a few portable hiking ham awards.

Budd's Commercial Buddipole (See: <http://www.buddipole.com>) Starts at about \$200 which I don't have. Fortunately Budd provides the instructions to build the Buddipole yourself (see: <http://www.qsl.net/w3ff>). But Budd's Homebrew design lacks 40 meters, and you have to physically take it apart and change out the coils to change bands. So I took his homebrew concept and used it to make a Buddipole more like his commercial design with tapped coils and it includes 40 meters.

To build this version, you will need the following:

Order online from Buddipole:

Two 66 inch Stainless Steel Telescopic Whips (these are the best on the market plus for using his design, its nice to put a little money in Budd's pocket! ☺).

Go to <http://www.buddipole.com/stainsteelte.html> to purchase.

From Home Depot:

Two 22 inch lengths of ½ inch PVC pipe

One 6 inch length of 1 ¼ PVC pipe

One 6 ½ inch length of 1 ¼ PVC pipe

One ¾ x ¾ x ½ inch PVC Tee (slip-slip-thread)

Two ¾ to ½ inch PVC adapters

Two 1 ¼ to 1 ¼ PVC Unions

Two ½ to 1 ¼ inch PVC adaptors

Two 1 ¼ PVC end caps

From Radioshack:

One spool of 75 foot, #20 insulated speaker wire.

(That is more than enough to make several antennas.)

RS Part # 278-1388

Two packages of electrical connectors. (use the blue ones, and take the wire, strip it, and fold it over before inserting in into the connector. That makes a better connection.)

RS Part # 640-3313

Two 3/8" x 24 thread to SO-239 antenna adaptors
RS Part# 21-961

One package of 1 3/8 inch Alligator Clips
RS Part# 270-374C

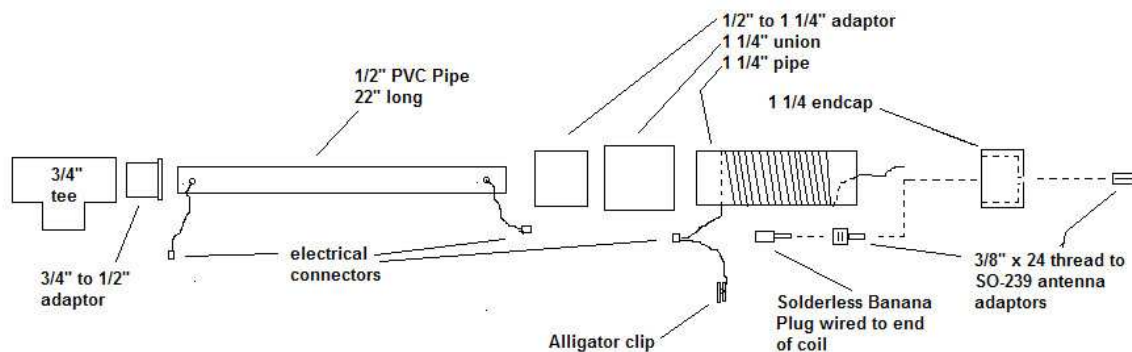
One set of Solderless Banana Plugs
RS Part# 274-721

One 12-Ft. 3/4" Color Electrical Tape (5-Pack, you will only need two of the 5 colors)
RS Part# 64-2380

Tools Needed:

You will need a hacksaw, a pair of needle-nosed pliers, a soldering iron, solder, a drill with a 7/16" and a 1/8" bit, (perhaps, also, a 3/16" bit, if you want a little extra room when drilling the holes in the PVC), a crimping tool, two thumb tacks, and a tool for removing insulation from wire. You will need a measuring tape. Keep a pad and pencil handy to record measurements. A Marks-alot felt pen will be needed in the final tuning phase. You should buy or borrow an antenna analyzer if you don't own one.

Here's how to build the antenna:



Take one of the two 22" long pieces of 1/2" PVC.

Drill a 1/8" hole about 3/4 of an inch in from each end of the PVC pieces. Don't drill the whole way through. Angle the drill slightly toward the long end, so that you can slide a wire into the piece of pipe. Drill the holes on the same side of the pipe. Leave the speaker wire in its pair form before you cut it. Cut 28" of wire from the spool, and split it into two 28" pieces. Put one end of one of the wires into the hole you just drilled in the PVC.

Gently push the wire until you see it come out the other side of the pipe. Take a pair of needle-nosed pliers and work the protruding end into the hole at the end of the PVC. You will have about 3" of wire on each side of the pipe when you are finished. Do the same for the second 22" PVC pipe piece. Crimp one of the end electrical connectors, a female connector, on one side of each piece of the section you just finished.

Put a male electrical connector on the other side on each section. Add a ¾ to ½ inch PVC adapters to each end You are finished with the 'arms' of the dipole.

Cut 17' 10" of wire from the spool, and split it into two 17'10" pieces. Take the 1 ¼" PVC pipe that is 6 ½ inches long . (for this illustration we will mark this with RED tape as it will be connected to the center conductor of the feed) Drill a 1/8" hole all the way through the section, about ¾ of an inch in from one end. Then drill a hole threw only one side. Take a piece of wire 17' 10" long and poke about three inches through the holes you drilled completely threw the pipe. Start wrapping the wire around and around the PVC section until you have 39 turns on the coil. Push the tag end through the hole you drilled on only one side, and anchor it inside the pipe with plastic tape. This side will face the telescoping stainless steel antenna rod. Cut the tag end so that you have about 3"of wire coming out of the hole in the pipe. Put a banana connector on the protruding wire that is inside the pipe. Cut a 6" piece of speaker wire and solder on an alligator clip to one side, strip and twist the other end with the other side of the coil that will face the center tee and crimp a male electrical connector on the two twisted wires.

Repeat the paragraph with the 1 ¼" PVC pipe that is 6 inches long using only 16' 6" of the wire, and 36 turns (mark this one with BLACK tape).

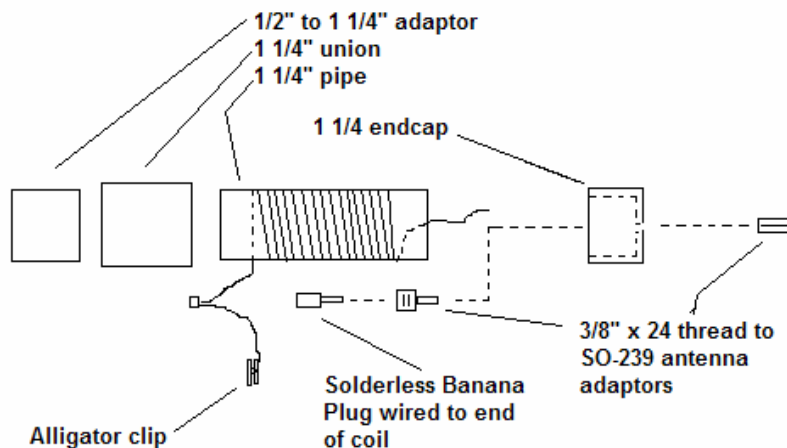
Here is the specifications for the coils:

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L. Length of coil, mm .	83.8	R. Ratio wire Dia/Pitch	0.461
D. Diameter of coil, mm	42.0	F. Test Frequency, MHz	7.000
N. Number of turns	39	V. Applied RMS volts ..	160
Coil VLF Inductance	27.038	microhenrys	
Coil impedance magnitude	1271.3	ohms, includes self-capacitance	
Impedance phase angle	89.86	degrees	
Effective series resistance	2.779	ohms, all losses combined	
Q in a parallel tuned circuit	428	approx, at test frequency	
Q in a series tuned circuit	400		
Self-resonant frequency	27.542	megahertz when coil is isolated	
Self-capacitance	1.23	pF when coil is isolated	
Additional tuning capacitance	17.88	pF resonates coil to test freq.	
Resonant impedance of tuned cct	508.85	K-ohms, at test frequency	
Wire diameter	1.02	mm = 0.040 inches	
Winding pitch	2.21	mm = 0.087 inches	
Length of wire	5.27	metres = 17.3 feet	
Power dissipated in coil	0.05	watts, at test freq and volts	
Vary Ratio with keys 1,2 Length: 3,4 Diameter: 5,6 Turns: 7,8 Freq: 9,0			
Hit keys L,D,N,R,F,V to change data. B(egin again) or Q(uit) ...			

C:\HAMRAD-1\80MLOA-1\DESIGN-1.EXE			
L. Length of coil, mm .	77.4	R. Ratio wire Dia/Pitch	0.462
D. Diameter of coil, mm	42.0	F. Test Frequency, MHz	7.000
N. Number of turns	36	V. Applied RMS volts ..	160
Coil VLF Inductance 24.530 microhenrys			
Coil impedance magnitude 1145.5 ohms, includes self-capacitance			
Impedance phase angle 89.86 degrees			
Effective series resistance 2.544 ohms, all losses combined			
Q in a parallel tuned circuit 424 approx, at test frequency			
Q in a series tuned circuit 399			
Self-resonant frequency 29.034 megahertz when coil is isolated			
Self-capacitance 1.23 pF when coil is isolated			
Additional tuning capacitance 19.85 pF resonates coil to test freq.			
Resonant impedance of tuned cct 457.49 K-ohms, at test frequency			
Wire diameter 1.02 mm = 0.040 inches			
Winding pitch 2.21 mm = 0.087 inches			
Length of wire 4.87 metres = 16.0 feet			
Power dissipated in coil 0.06 watts, at test freq and volts			
Vary Ratio with keys 1,2 Length: 3,4 Diameter: 5,6 Turns: 7,8 Freq: 9,0			
Hit keys L,D,N,R,F,V to change data. B(egin again) or Q(uit) ...			

You will notice that I am using 20 gauge and not 18 (0.040). The gauge did not seem to affect all too much, however the thick insulation almost gave the perfect winding pitch (gap between the windings).

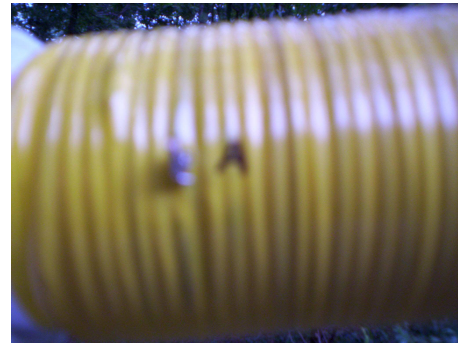
Take both of the 1 ¼ end caps. Drill a 7/16" hole the center on each and install the two 3/8" x 24 thread to SO-239 antenna adaptors with the SO-239 on the inside of the cap. Assemble the coils as shown below:



Assemble your buddy pole and add your feed line. Remember to coil up about 6 to 12 turns of coax at the feed point as a balun. You are ready to start testing and adding the band taps to the coils. With the alligator clips dangling, using an antenna analyzer move the telescope sections in & out for fine adjustments. Write down the settings. Later when you begin broadcasting, you should get great SWR's without the need for an antenna tuner.

Now let's set up 20, 17 & 15 Meters. Using the two thumb tacks, pierce into the insulation of the 10th turn back from the telescopic antenna on the RED coil. Do the same to the 14th turn on the BLACK coil. Attach the alligator clip tapping wires. Now using an antenna analyzer and move the antenna telescope sections in & out for fine adjustments and try piercing adjacent turns with the thumb tacks as well. Look to hit the center of the band and make sure to write down your settings. Use the chart below that I set up for my own Buddipole as a reference to start off with (Note: Yellow is my RED and blue is my Black side).

	YELLOW			BLUE		
	COILS	Whip sections	Tap	COILS	Whip sections	Tap
40	YES	5.5	No	YES	5.1	No
20	YES	5	A (10)	YES	6	B (14)
17	YES	5	A	YES	6	C (6)
15	YES	3	A	YES	4	C



Repeat the steps for 17 & 15 meters using my chart (above). Once you have located your taps, mark them. Now strip back the insulation at each mark and solder a tab (piece of wadded up wire) at each.

There are other bands you can tap, however at the time of this writing, I haven't tapped the coil for these. Below is a tap chart from the Commercial Buddipole.

BASIC DIPOLE TUNING						
	RED SIDE - side with red lead			BLACK SIDE		
BANDS	COILS	Total whip sections out	TAP	COILS	Total whip sections out	TAP
40 METERS	YES	5.5	NO	YES	5	NO
30 METERS	YES	6	23	YES	6	19
20 METERS	YES	6	GREEN 10	YES	6	BLUE 14
17 METERS	YES	4.5	GREEN 10	YES	6	BLACK 6
15 METERS	YES	6	RED 4	YES	6	BLACK 6
12 METERS	YES	6	2	YES	6	4
10 METERS	YES	5	2	YES	6	2
6 METERS	WHIPS ONLY (NO COILS, NO ARMS) - 4.5 SECTIONS OUT EACH SIDE					
2 METERS	WHIPS ONLY (NO COILS, NO ARMS) 1 SECTION + 2"(TOTAL15") EACH SIDE					

This design will not work for 6 or 2 meters. There is no way to use the "whips only". You're all set. A special Thanks to Budd, W3FF for his original design.

Have Fun & 73's de Mike, W2SWR.