

Cheap and Simple 10 – Meter Junk Box Vertical



During the CQWW SSB contest I realized that my 10-meter (10m) dipole wasn't cutting it. I could hear a few stations but was unable to work them. That's always frustrating. Once the band "died" after dark I decided that I needed something that was vertically polarized, simple make, and just as simple to deploy since I planned to get back on 10m at daybreak the next morning.

The basic ¼ wave vertical ground plane antenna immediately came to mind so I began looking around in the shop and barn for some parts and pieces that I would need.

I started making the antenna around 9pm and began tuning it up by 10:30pm. Definitely quick and simple to build. From 28.300 to 28.450 the SWR was really nice, but once I began creeping above 28.450, I needed to touch it up a bit with my radio's ATU. Good enough for me, so I went to bed.

The following morning I got into the "Shop Shack" at 6:00am and 10m was already alive with testers calling CQ with quite a few of the DX stations working pileups. I attempted to break a few pileups with the dipole with no success and then switched to the vertical. HUGE difference in reception was first noted and when I tossed out my call to an Argentinian station he worked me 59 first call. From there, the rest of the day was full of DX!

2025-10-26	01:16	VK2YI	10m	28.448	SSB	QF561b		Australia
2025-10-26	18:49	ZF2AA	10m	28.309	SSB	FK09cr		Cayman Isl...
2025-10-26	18:53	PV2G	10m	28.317	SSB	GH49eq		Brazil
2025-10-26	18:57	ZW5B	10m	28.323	SSB	GG54kl		Brazil
2025-10-26	19:00	PJ6Y	10m	28.333	SSB	FK87kn		Saba, St Eu...
2025-10-26	19:08	V26B	10m	28.360	SSB	FK97cc		Antigua and...
2025-10-26	19:18	TI8X	10m	28.383	SSB	EK70wf		Costa Rica
2025-10-26	19:26	VP2MPN	10m	28.400	SSB	FK86vq		Montserrat
2025-10-26	19:28	VA7DX	10m	28.403	SSB	CN89kg		Canada
2025-10-26	19:37	HC5AI	10m	28.412	SSB	FI07mc		Ecuador
2025-10-26	19:40	AB3CX	10m	28.429	SSB	FN22mq		United States
2025-10-26	19:46	EF8R	10m	28.448	SSB	IL28gc		Canary Isla...
2025-10-26	19:55	VA7BEC	10m	28.464	SSB	CN89la		Canada
2025-10-26	19:58	HP1Z	10m	28.303	SSB	FJ09fa		Panama
2025-10-27	23:58	N7BER	10m	28.413	SSB	CN85qq		United States

If you're still reading, and would like to build one of these yourself, please see below!

Here is the component list that I came up with:

Components:

Quantity	Description	Use
2	6 foot long pieces of EMT conduit (one ½” diameter and the other ¾”)	Main radiator element
1	18” piece of 1” schedule 40 PVC pipe	Insulator between radiator and radials
2	#8 1.5” machine screws (any screw or bolt will work as long as it fits your eyelet)	Connection points for main feed and radials
4	Nuts and washers to fit the screw/bolts	Attach feedline and radials
1	PL-259 “pigtail” with an eyelet on the braid and one on the center conductor	Coax connection to antenna
1	18” piece of #14 THHN wire	Center conductor feed point
120’	Feet of wire (use what insulated wire you have)	12-10’ radials
14	Eyelet connectors for wire size(s) you are using. Less will be required if you place 2 radials per eyelet as I did.	Use for radials, radial main connection point, and feed line to radiator
2	Hose clamps sized to fit the ¾” conduit and the PVC pipe	Holds the conduit joint and the insulator in place
Varies	Aluminum tape* or other aluminum shim material	Used to “fill” gap between the ¾ and ½” conduit joint
Varies	Non-conductive string or rope	Used for stabilization of the radiator if needed
Varies	Stakes for string or rope	
Varies	Something non-conductive to place the PVC “insulator” on top of on the ground	I used a fiberglass electric fence stake
Varies	Zip ties and electrical tape	

*if you need some aluminum tape, let me know. I have a couple of thousand feet in the shop.

Tools Required:

Hacksaw
Screwdriver or nut driver to fit the hose clamps
Wrench to fit nuts on screws/bolts
Wire cutters
Connection crimpers or soldering iron. Both if possible
Drill with bit sized for the screw/bolts used

Assembly pictures weren't taken, so I'll explain what I did, and you can use the pictures as a reference. It goes together quite easily.

I first placed the $\frac{3}{4}$ " conduit in a vise and cut 4-2" long slits into the top of it and bent them out just a bit. These slits will be "closed up" with the hose clamp over the top of the $\frac{1}{2}$ " conduit. While the conduit was in the vise, I drilled a hole all the way through for my center conductor feed to attach to 16" up from the bottom of the conduit. I then sanded off the galvanized area around the hole and installed the screw with a single nut. This one can be final tightened at this point because the feed point will use one of the additional nuts and washers for connection.

I then slid the $\frac{1}{2}$ " piece into the $\frac{3}{4}$ " and measured the entire length to around 8.5 feet long. 1 quarter wavelength is ~8.2 feet, but where we tap the feed and such does affect the length, that's why I opted for the hose clamp instead of a mechanical connection.

Once the approximate length was achieved, I folded some aluminum tape onto itself and then flattened it out to a thickness that just fit between the $\frac{1}{2}$ " inner and the $\frac{3}{4}$ " to make a shim. Once the shim was in place I added the hose clamp and snugged it down. Don't tighten it too much at this point, adjustments will need to be made later.



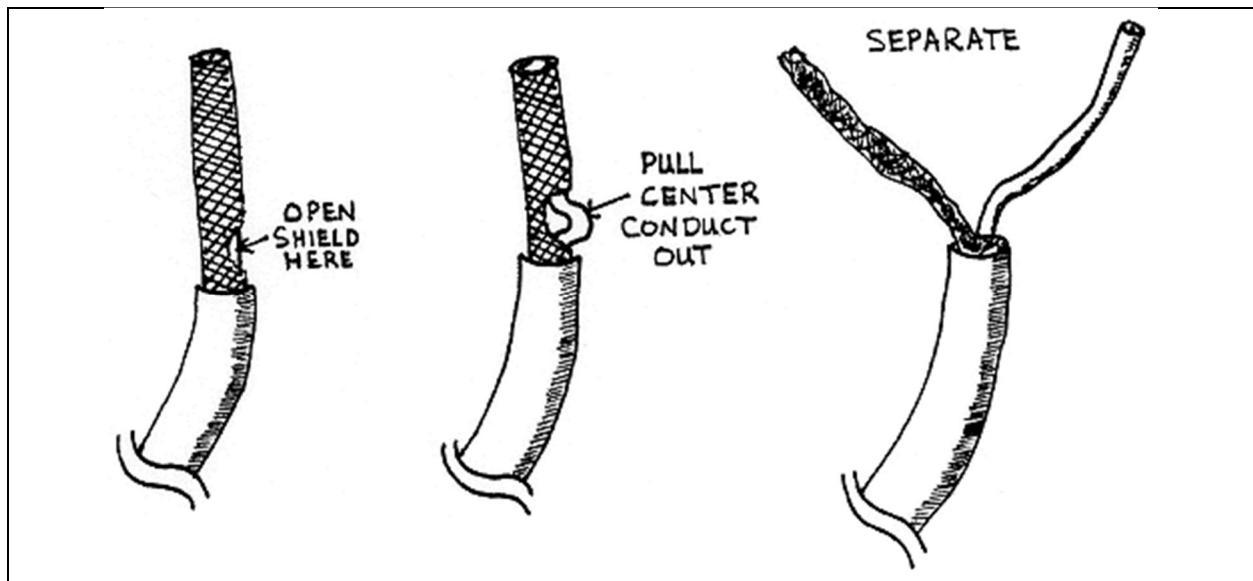
Place the radiator portion aside and get the PVC pipe into a position to cut quite a few slits into the top of it. Using the hacksaw, I made 4 total cuts giving me 8 "tabs" that the hose clamp will press against to hold the radiator in place.

Now insert the radiator into the PVC about 12-14" and clamp in place with the other hose clamp. This clamp can be final tightened since you won't be making any adjustments at that point again.

Put the assembled radiator/insulator over in the corner, it's time to cut some wire and solder a bit.

For the “pig tail” I used about 12” of RG8x with a PL-259 already on it. I then stripped back the outer jacket and exposed about 3” of the braid and center conductor. Gently tease the braid apart, keeping as much of it as possible, remove the center conductor, and then twist the braid wires together.

The below isn’t my picture, but it shows what needs to be done. The picture was “borrowed” from AA5TB



Add an eyelet to the now twisted braid. For the center conductor, strip back enough of the insulation to expose the center copper wire and solder it to the 18” piece of #14 THHN.

After crimping/soldering the eyelet and #14 wire in place, wrap the pig tail with electrical tape real well. Leave all but the solder joint on the #14 wire exposed.

If you haven’t already, cut the 120’ of wire into 10’ lengths for the radials. I was able to get 2 #12 wires into a yellow eyelet and still crimp well before soldering. Crimp and solder all, roll each set into 12” or so loops (trust me) and either tape or zip tie together, and then place them aside, it’s time to go back to the radiator, you’re almost ready to install!



At this point everything should be ready for final assembly.

- Radiator and insulator are together and secure,
- Coax feed point is made.
- Radials are cut and ready.

Lay the radiator on a table, sawhorses, or other flat surface and secure the bottom of the feed point wire a couple of inches up from the bottom of the base insulator. Just temporary for now, you're about to remove it.

Take the feed point wire and see where the end of it is in relation to the screw that was placed into the radiator section. Where the wire end area meets the screw in the radiator is where you will want to install the final eyelet. After the eyelet is installed on the wire, attach it to the screw with a washer and nut, then do a final tightening. Make sure the wire is running straight down the base insulator towards the bottom.

Secure the pig tail to the base insulator with zip ties and/or electrical tape.

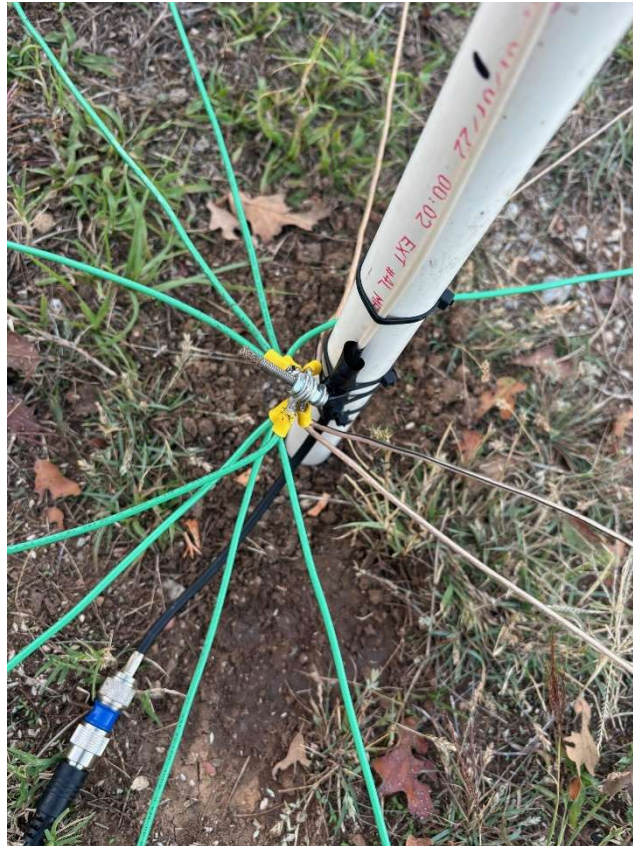
Install the radial eyelets to the eyelet on the braid portion of the pigtail with the screw and nut and tighten well.



Drive a non-conductive "stake" into the ground to set the bottom insulator over. I used a 3-foot fiberglass electric fence post that is about $\frac{1}{2}$ " in diameter. This is to keep the bottom in place. Take some string or rope and "guy" the mid portion of the radiator as well. It should stand and work well if you don't have high winds.

Remove the zip tie, or tape, for one roll of radials at a time, then begin placing them on the ground. Continue this until all wires are on the ground in a 360 degree pattern. The radials will have a memory and will want to roll themselves back up. To correct this, I made some

“staples” around 6’ long out of some wire coat hangers and placed one at the end of each radial. A couple of wires needed 2 so I added more as needed. They press pretty easily into the ground and will keep the wires straight.



Since I used a PL-259 I needed a barrel adapter to connect to my 50 foot run of coax back to the radio. There is no reason that a straight run of coax couldn't be used for this by just adding the pig tail to the unterminated end. In the picture above I'm using RG8x to feed the antenna with.

Time to tune it up!

Hook the antenna up to an analyzer or SWR bridge to see where the antenna shows resonance. Loosen the hose clamp at the top of the $\frac{3}{4}$ " conduit and either shorten or lengthen the antenna by sliding the $\frac{1}{2}$ " conduit in or out of the $\frac{3}{4}$ ". Be careful not to lose your shim! I speak from experience. After each adjustment double check your SWR at the middle of the frequency range you want to work. Once there, tighten it up and make some noise on 10-meters!

A few notes:

- Overall length of this antenna is going to vary from QTH to QTH due to soil conditions, surrounding area, etc. The beginning length mentioned above should get you started close.
- Yes, the radiator of this antenna is made from steel and not aluminum. It will still radiate and work well for you (think AM broadcast antennas). No, it's not as efficient as aluminum, but like the title said, Quick and easy. I've had EMT conduit antennas work for several years and only needed to clean a connection or 2 now and then, just like I would with aluminum antennas.
- A lot of people are going to tell you that each radial should be cut to $\frac{1}{4}$ wavelength. This would be true if the radials were elevated. The radials used here lie on the ground and are detuned once they hit the dirt or grass. With the radials that this antenna uses, you will have 3.6 wavelengths of wire on the ground acting as a ground plane thereby increasing ground conductivity.
 - In our area (Montague County) the soil conductivity is 15-30 millimhos per meter, which is pretty good compared to the rest of the US that isn't on a coastline.
- Finally, don't over think it. If you have questions, ask around. MCARC has a wealth of information within the membership, and I feel certain most all would be will to advise as needed.

Let me know if you build it and how it works for you!

Charlie

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