

DIY

Worthwhile projects you can build on your own

Multi-cable entry enclosure

Many of you know that our family recently moved across town. This gave me an opportunity to do a few things a little differently as a result of past lessons learned. While I was somewhat proud of my cable routing job at the former house overall, my cable entry left a lot to be desired, so I decided to focus some of my new home shack efforts there. The goal was to bring three coax cables through a single weather-proof opening in my house, and make it look professional, or at least tidy.

First, I had to convince my good wife Lisa KR5LYS to allow me to drill a big hole in the foundation, something I realize that few hams, let alone their spouses, would ever tolerate. Being a ham herself, she didn't require a lot of convincing, but she cried once and got it over with. I promised her that it would look good in the end. We'll see whether I've lived up to that.

Next, the most difficult part was the planning, including numerous measurements, calculations, and mistakes. I'm listing the parts needed for three cables, one each for HF, VHF/UHF, and 6-meters. I've omitted everything on the other (non-enclosure) side of the arresters, including the coax, the antennas, and the anchoring, which I'll leave for you.

Parts list

One 8″ x 4″ x 3″ weatherproof ABS enclosure

One 8′ x ½″ ground rod

Three Alpha-Delta ATT3G50U arresters

One pkg drywall anchors and masonry bit

One tube DAP Ultra Clear sealant

One pkg Nashua Stretch-and-Seal silicone tape

One pkg 5/8″ rubber hose washers

Blue painter's tape

Three SO-239 bulkhead barrel connectors

One ½″ ground clamp

Three 1-foot RG-8X coaxial cables PL-259

Three 15-foot RG-8X coaxial cables PL-259

Two 2½″ corner braces

One 1¼″ x 2′ PVC tube

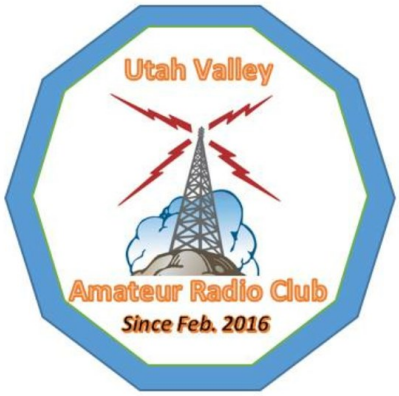
One 1¼″ HD rubber grommet

Planning ahead

I had to decide where and how to bring the coax cables into the house. We decided to locate my ham radio shack in an unused basement bedroom, which I'm also using for my office. I don't care for bringing coax, especially three of them, through the basement window well. I could have used some flat pass-through connectors, but that still means unsightly cables snaking down the window well and potentially obscuring my view. My remaining option was to bring them through the wall. The problem is that the yard outside comes up to about four inches below my ceiling, so I only had four vertical inches to play with, and behind those four inches of wall was the house foundation.

I rented a hammer drill ("rotary hammer") with SDS-Max bit size, and a 18-inch 1¾″ concrete SDS-Max bit (mine was 12″) to go with it, since I had planned to drill through the foundation. I also used my own hammer drill, which has an SDS-Plus bit size, along with a ¼″ concrete SDS-Plus bit to make a pilot hole. If you only need to drill through the wall, you'll need a stud find-





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er. Going through either required me to penetrate sheetrock on the inside, so I used both a 12-inch ¼″ regular drill bit and a 1¾″ hole saw to get through it. I also gathered my drill motor and a bit set, including a 5/8″ wood bit (I would've used a metal bit, if I had one). With my 8-pound hand sledge (thanks, Daylon WB6KIT), I was ready to drive the ground rod into the dirt and break through the rocks.

Because I needed to bring three coaxial cable lines into my shack, I decided to use a 1¼″ ID tube as a conduit. This size allowed me to run multiple cable lines into the house with the PL-259 coax connectors already installed at the factory, without needing to cut off, then re-install new connectors. It also gave me the freedom and flexibility of introducing future cables through the conduit. In spite of its 1¾″ OD (outside diameter), the tube turned out to be large enough to serve my cable routing needs without being unsightly large.

Enclosure-tube assembly



I drilled a 1¾″ hole in the back of the enclosure at an appropriate location. In my case, I had to get the hole as low as I could, since it ended up just inches above the dirt. Afterwards, I drilled three 5/8″ holes in the side of the enclosure for the SO-239 bulkhead barrel connectors. (If I had to do it over again, I would've drilled them on the other side, so that the closing latches would end up opposite the connectors.) I then cut the PVC pipe tube long enough to stick out ½″ from the concrete foundation and out of the inside wall about two inches. I then cemented the tube into the back of the enclosure using DAP Ultra Clear between the tube and the enclosure about ¼″ both inside and outside the enclosure, and let the sealant set for a week at room temperature.

Drill the big hole

My next job was to pinpoint exactly where to drill the hole. Half-way between the ceiling and the yard seemed reasonable, so I believe I had the vertical location figured out. I measured a spot that was a particular distance between where the window well glass meets the visible window edge and the inside wall of my shack closet. This way, I could measure that distance outside as well as inside, since the visible glass edge was common to both sides. These two gave me the hole location, and X marked the spot on the wall outside.

Foundation (concrete) hole

I first drilled a ¼″ hole through the foundation using my hammer drill and my ¼″ SDS-Plus bit. Then, I used the 12-inch ¼″ bit to slip into the new foundation hole and drill through the sheetrock into the shack. Using that as the pilot hole, I then used the 1¾″ hole saw and drilled a 1¾″ hole in the sheetrock from inside the shack. Once I secured the 1¾″ SDS-Max bit onto the SDS-Max hammer drill, I drilled straight through the foundation, using the ¼″ hole as

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the pilot. *Holding the hammer drill straight, pulling the trigger, and pressing on the drill body while supporting its weight was no easy task, and can easily wear you out*.



Wall (non-concrete) hole

In my previous house, I had drilled a similar hole, and at the same diameter, but through the studded wall instead of the foundation. I used the stud finder to help me drill away from the studs, but I had to track where the electrical wires ran, so I could miss those too. For the wall, using the regular drill motor was a lot easier than with a hammer drill. I still had to use a 12-inch long ¼″ pilot bit, but all I needed to do was follow it with a 1¾″ hole saw from the outside, then with the same hole saw from the inside at the pilot hole.

Installing the enclosure-tube assembly

I slipped the enclosure-tube assembly into the 1¾″ hole I drilled into the foundation. I then drilled two 1/8″ holes into the back of the enclosure for wall-mounting the assembly, marking the foundation with the drill bit. I removed the enclosure-tube assembly and drilled the holes in the foundation with a ¼″ masonry bit where I marked them with the 1/8″ bit. I then hammered the drywall anchors into the holes.



I removed the enclosure-tube assembly from the foundation hole just a few inches, and liberally applied more DAP Ultra Clear around the gap between the tube and the foundation hole. I slipped the assembly all the way into the hole, applied the drywall anchor screws through the 1/8″ holes in the enclosure, and tightened them reasonably snug.



Next, I removed one nut from each barrel bulkhead connector, slipped the barrel through one of the three 5/8″ holes in the enclosure side, slipped a rubber washer over the thread from the outside, and re-applied the nut to the barrel on the outside and tightened the nut to the washer. I repeated this with the remaining barrel connectors.

I attached the rubber grommet to the shack-end of the tube, routed the three shack cables through the tube one-by-one from the shack end, then connected them to the bulkhead barrel connectors inside the enclosure. That completed the enclosure construction.

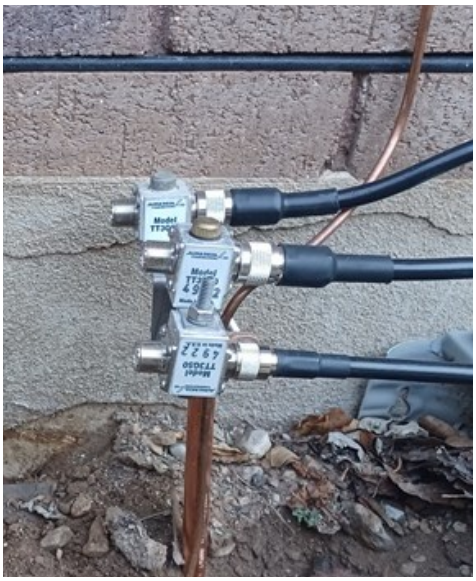


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Grounding



After I picked a spot in the dirt about seven inches from the foundation (for convenience) and about eight inches from the enclosure, my grandson Calvin helped me pound the ground rod into the dirt with my trusty 8-pound hand sledge. I then attached the ground clamp to the ground rod about four inches from the top of the rod. I drilled out the holes of the two corner braces with a ¼″ bit and attached the braces to the ground clamp. I then bolted the arresters to the corner braces. I wish I had taken more photos of this detail, but maybe next time.

I laid out the 4 AWG ground wire on the roof and draped it down to the ground rod to measure. Then, I attached a ground clamp to the antenna masts on the roof and routed the ground wire through all the rooftop ground clamps and then the one on the ground rod, all of them through the screw hole of the clamps.

I connected the 1-foot coax cables between the barrel bulkheads of the enclosure and the arresters, and the coax coming down from the antennas to the other side of the arresters. I finished up the whole project by wrapping all nine weather-exposed connectors with silicone tape, not including the ones on the roof at the antennas.

Summary



Just so you'll know, this was no single afternoon project, but it was a rewarding multiple-day effort that paid off both technically and aesthetically. This enclosure not only looks neat, but is completely weather-proof against the elements. Most importantly, Lisa approves.

Noji Ratzlaff, KNØJI (kn0ji@arrl.net)



