Hammin' It Up

CAPTN News

Volume 2, Edition 2 **Cherokee Area Preparedness & Training Net News** **September 2008**

The "Stink pipe Stinger" - Part 1

We've all looked for a simple antenna from time to time. It's just the nature of ham operators to look for easy and inexpensive solutions. Well, the J-Pole in all its variants doesn't get much simpler. There are all kinds of them. You can make them from copper pipe, solid copper wire or other material, twin lead or even metal tape. They can be single band or dual band. They can be made permanent or portable. Like I said, there are all kinds of them.

I'd been wanting to devise a 2 Meter J-Pole capable of handing full power for field operations, class demonstration and home use by the new hams I'd been training. It needed to be portable but adaptable to fixed use, light, as weather proof as possible, capable of handling full power radios, simple and inexpensive. Not too full a laundry list of requirements, right?

Well, as I said, there are all kinds of these things and I certainly didn't come up with anything revolutionary in this project but I decided to make my model out of 450 Ohm ladder line, encase it within a schedule 40 PVC radome and feed it with about a 5 foot piece of RG-8X coax.

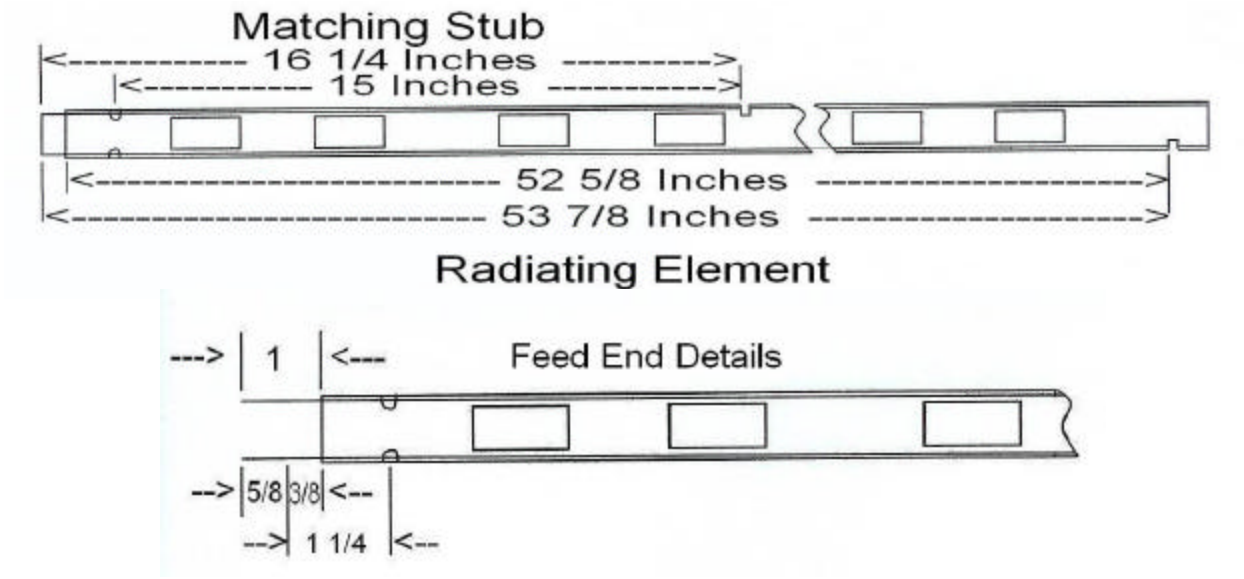
The basics of any J-Pole antenna are that you have two parallel conductors which are shorted at the bottom of the antenna element. One of the conductors is the actual radiating element while the other is a matching section. The radiating element is usually about a half wavelength at the operating frequency. The matching stub usually is around a quarter wavelength. These are rough estimates because the material used will influence the actual dimensions you wind up with but I'm going to give you the materials I use and the dimensions that I wound up with so that you can duplicate the antenna fairly easily.

As mentioned, I decided to use 450 Ohm ladder line which I bought at about $20.00 per 100 feet. The price is up a bit now but is advertised by HRO by the foot at $.29. I've presented some preliminary drawings below to help explain some of the steps.

First I looked over a length of the line noting the spacing of the windows and did a little preliminary layout work. I found that I could, with the particular brand of line I had bought, lay out the antenna so that the feed end could be positioned with a window opening that corresponded with where I wanted to first strip the insulation off. This allowed me to strip 1 inch of insulation off easily and the rest of the dimensions would fall into place nicely allowing mechanical support of the elements. The overall length I cut off the spool was 55 inches.

After exposing 1 inch of the wires I then measured 3/8 inch from the end of the insulation on each and bent the wires toward one another. I then used some 22 gauge wire winding them together and soldered it all for strength.

From this soldered shorted end I then measured 1 1/4 inches up the feed line



Stink Pipe Stinger *(Continued from page 1)*

and cut the insulation in semi circles exposing the wire. This is the point at which the RG-8X coax feed line will be attached. Do not cut the wires or deeply score them. Above all, be careful in cutting so that the job gets done and you don't get blood all over the place!

One side of the ladder line will be the matching stub while the other side will become the actual radiating element. The matching stub length is, as detailed in the drawing, 16 inches from the shorted end. Simply cut about 1/4 inch of the conductor out. The radiating element is similarly done by cutting a 1/4 inch notch 53 7/8 inches from the shorted end.

I then punch a hole in the center of the insulation at what will be the top of the antenna so that I can tie a length of string to the ladder line later. Don't worry, I'll explain later.

This entire thing is going to be encased inside about a 5 foot length of schedule 40 PVC pipe the top of which will be capped. At the bottom of the PVC radome I use a standard 1 inch to 3/4 inch PVC T connector. The straight through portion will be used to attach the completed antenna assembly to a mast that we'll talk about later. The 3/4 inch side outlet of the T is where the RG-8X feed line will enter the antenna housing through an end cap. We'll have more detail soon but I mention this now because you need to have a cap with a hole drilled in it to accommodate the RG-8X coming through it, the T connector itself and a short piece of 3/4 inch pipe about of PVC pipe to attach the pieces together. Through these the cable will be threaded. The picture in the next column visually explains it better than words.

Once the coax is connected to the antenna element and a PL259 is on the cable just isn't the time to be thinking about this point in the project.

Some will ask why I didn't just run the RF feed straight down and out the bottom of the structure using an SO239 or something. Two reasons really: 1.) I was thinking ahead as to how I was going to utilize and mount the antenna and 2.) I wanted to minimize the possibility of any moisture collecting at the bottom and causing any problems.

Take about a 5 foot piece of RG-8X cable and strip the insulation off exposing about 13/16 inch of the braid and center conductor. Separate the strands of the braid from around the center conductor insulation and twist the braid into a short pigtail. This will be connected at the 1 1/4 inch point on the feed line matching stub. Trim the insulation off of the center conductor leaving about 1/2 inch covering the center conductor. This will be attached to the radiating elements at the 1 1/4 inch point. Center the cable axis on the 450 ladder line and solder these two connections. Be careful not to melt the insulation. I then tape this portion of the antenna with electrical tape to minimize any possible flex and increase mechanical strength. Additionally, I fill any void between the tape covering and the ladder line insulation with silicone sealant for the same reasons.

At this point you can thread the coax through the T connector, short tube and cap. I'm assuming that you didn't put the PL259 on yet. If you have you're very likely to be somewhat annoyed at

(Continued on page 3)

"Be Prepared"

Most will recognize the above title phrase as the Boy Scout motto. It is certainly fitting. September has been National Preparedness Month. Yeah, I know this is late but preparedness is not just a one month event but a year round concern. As one friend puts it "When a disaster strikes is not the time for preparation". We have been spared many difficulties in our area. Yes, there have been a few storms and even a tornado or two in the general locale one of which did rustle a few leaves in the yards of our members. The Ward has also extended itself in grand fashion to families in the area that had much greater difficulties than most of us did. The efforts on the Western borders of our Ward were greatly appreciated. All that having been said the question begging an answer for each of us is "Am I and my family prepared for the unexpected?" For our leadership it is "Are we prepared to deal with disaster? What is our plan for the time of testing?" I think that most will admit that they can readily identify a few areas to work on.

To that end here are a few web sites that you might peruse and give thought to.

www.providentliving.org
www.ready.gov
www.ready.ga.gov
www.fema.gov/plan/index.shtm
www.gema.state.ga.us
www.weather.com

(Continued on page 3)

Stink Pipe Stinger (Continued from page 2)

yourself. Just take my word for it.

Now that you have these components all together you can slip the antenna into the 5 foot piece of schedule 40 pipe that will be the radome. I tie a piece of string to the top of the antenna element and drape the ends over the top of the pipe when the element is positioned inside the pipe. I then put the top cap on securing the string at the same time. This prevents the antenna element from slipping down while it's inside the radome.

Now lightly slide the T connector onto the bottom of the radome pipe. Lightly slide the 1 1/2 inch long, 3/4 inch pipe stub into the side port of the T connector. Now carefully slide the cap through which the coax is fed lightly onto the stub. Look things over and make sure the assembly will fit together and that all parts are positioned correctly. If everything looks good, unslip the parts and, using PVC cement, glue the parts in the following order (work quickly on each joint as PVC cement sets up quickly. Also, generally, you will not glue any part that has a joint facing downward):

1. Glue the T to the bottom of the radome pipe. Make sure it is on fully.
2. Glue the short 3/4 inch stub into the side of the T connector. Do not insert this more than 3/4 inch into the T.
3. Glue the cap onto the open end of the short stub.

Finally, all that assembly stuff is done! Oops! Not quite yet though. You still will need to install a PL259 connector on that RG-8X coax and don't forget to use the UG-176 reducer.

There you have it! Your "Stinger" portion is ready to go. Next edition we'll go over how you can easily mount it on your roof or make a very portable base to set it up in the field or anywhere else.

Be Prepared *(Continued from page 2)*

www.weather.com/maps
www.weather.gov/outlook_tab.php
www.nhc.noaa.gov
earthquake.usgs.gov

Some of these may provide you with a healthy informational start as favorites on your web browser. As an aside, I've modified my browsers somewhat providing a tool bar of frequently used links as categories. It speeds things up a bit for me.

Recently being at the Crabapple Kroger I noted that they still have the Midland weather radio in supply. Price is still 30 bucks. If you don't have one of these you ought to get out there and pick one up. We still have months to go before the stormy season is over.

We've all heard of putting together a 72 hour kit but did you ever consider a "Day kit"? George House demonstrated for us his approach at a past workshop and it may be something that you might want to think about. Another related item though is that, whether it is a day kit or the 72 hour version, you need to re-examine your kits periodically to rotate out and replace any items that may expire over the next time period. Even beef jerky has a shelf life. Also, you may need to consider if the contents of your kit are appropriate for the anticipated seasonal changes you may see. A jacket is not likely to be needed in July and things can be downright exasperating if batteries in a flashlight are dead.

What about your individual skills and capabilities? Are you first aid and/or CPR qualified? CERT (Civilian Emergency Response team) training may also be a good thing to have in your repertoire.

What is your plan and are any changes needed to it that have been dictated by changing circumstances? If you're at work when problems arise will you have planned for alternate routes home? Do you have a designated place to meet your family if circumstances dictate that. Do you have a designated contact relative or friend outside your geographic area where folks can call if they can't get directly in touch with you? Do you have some alternative form of communications available to you.?

If you're a radio operator you need to think about a communications focused go kit of some sort. Again, this kind of thing can be simplistic in approach or a full blown communications station. Spare batteries of some sort are a must and maybe a spare radio of some sort like an HT. Each person will have different requirements.

Of course, we as individuals or as families aren't the only ones to consider. What about your Home Teaching or Visiting Teaching families? Don't forget them in some of your alternative plans. At a minimum have them in your cell phone if you have one. You might want to even have an alternate family contact for them in there too. A small version of the Ward list in your kit(s) or vehicle is a good idea also.

I hope that some of this has generated some ideas for you. I certainly don't have all the answers and have a long way to go myself but we live in a vastly different world than many of us have known in the past. There is one constant though. That old saying "An ounce of prevention is worth a pound of cure" is still just plain good advice and that old Boy Scout motto of "Be Prepared" is still great.

FEEDING A LINE

In our last edition we looked at some upgrades that I've been making to my station in the way of fabricating new bulkheads for transmission lines making their way to the external environs and getting the signal to the various antennas I have up in the air. We covered the materials I used as well as the layout of the connectors and also touched on some of the details about mounting those plates. We left some tasks to complete though that center on station grounding issues so we'll address those in this final article.

Let's explore this topic of the station grounding a bit more.

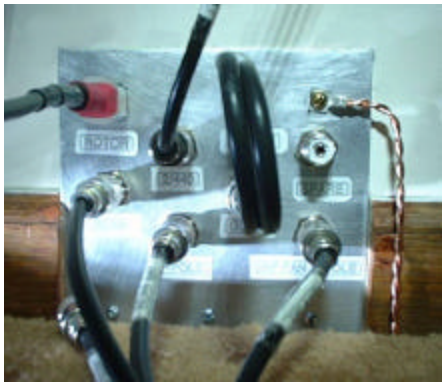
A good grounding system lessens the chances of damage from lightning and

(Continued on page 4)

(Continued from page 3)
from stray RF in the shack.

For years I had only minimal grounding in place and had no particular problems under normal circumstances. I was pretty religious about disconnecting all feed-lines coming into the shack if I wasn't operating and double checked things if storms were in the area. We've had 3 lightning hits in 23 years and one almost direct hit involved an antenna. It was disconnected from the equipment so no damage there but I did find that the lightning had come down the center conductor of the coax and then turned the inside bakelite insulator of the old style PL259 into carbon when burning a path to ground on the connector shell. When I took the connector off its terminal the guts of it sprinkled out like pepper flakes. It was a real easy trouble to shoot.

By the way, ground ain't necessarily ground. Even though you might have ground rods pounded into the ground there can be a difference in their relative effectiveness because the earth itself has different conductivity properties. If it's wet it conducts better. Various chemicals in the ground also affect its ability to conduct. Add to the mix that there are actually electrical currents that flow in the earth too that can cause electrical differences between different physical points. To help solve these problems you tie everything together with good solid conductors of fairly heavy wire or braid. In short, since the "ground" may not really be a good ground you make sure everything is electrically the same as best you can. Well, let's cover features that I've implemented in this project. We'll first look at the mop board bulkhead that I fabricated. Here it is in place.



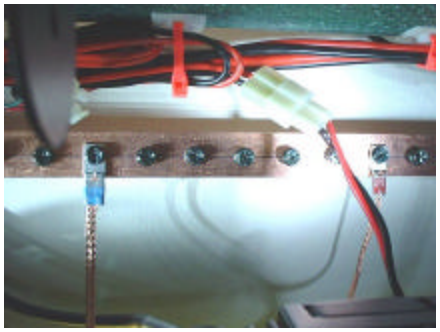
At the top left is the beam antenna rotor control cable. At the upper right is the ground cable from the radio shelves. This stranded cable doesn't go into the floor but I routed it along the mop board and then up to the shelves. All the metal shelving supports are grounded together. More about them later.

The grounding wire shown connects on the other side of the bulkhead to a heavy ground wire tied to a common ground in the house in the form of the copper water pipe. Also that same wire connects to the outside bulkhead which is connected to an 8 foot ground rod I drove into the ground. You'll see that soon. Additionally, on the outside there is another heavy gauge ground wire that ties back to the main interior and exterior ground for the home. All this tying together of ground points is an attempt to ensure that there is a minimal difference in voltage potential between any of the grounded points. Minimize the voltage difference and you minimize the possibility for any damaging electrical arcs shall we say.

The various coax cables shown go to an antenna switch panel co-located with the radios. There is one spare cable going to the outside bulkhead where the antenna cables connect.

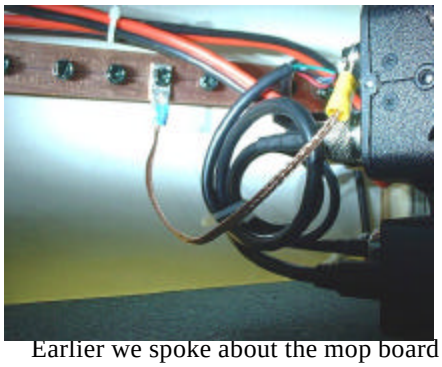
Toward the upper center of the bulkhead you'll note a cable almost in the vertical plane. This is actually a looped patch cable that ties two of the barrel connectors together. One connector comes from a G5RV HF wire antenna outside. I then patched it to another cable I have run to another room where I have been working on some equipment. All cables and connectors are labeled, of course.

What about the equipment? After all, one of the main objectives is to provide a level of protection for our gear. Just how do we make our grounding available for all that stuff? What I did was install a ground "buss". No I didn't misspell (that time). This "buss" doesn't have wheels. This kind of buss is just a common point to connect wire or leads. You can have a ground buss or, for that matter, you could even have a power buss (or busses), one for the positive leads to connect to, another for the negative leads but that's another topic. Anyway, what I did was make a buss bar out of a 28 inch scrap piece of 1/2 inch copper tubing. I flattened it and drilled holes every 2 inches and



threaded them with a 10-32 tap for common ground screws available at any Home Depot. I might have gone to an electrical supply shop and bought a regular buss bar. Where's the fun in that anyway? Also, there's no promise that it would match up with how I wanted to mount it to the shelf supports. Besides, this was cheaper and it was late at night when I did this part of the job.

To the buss bar I attached braided leads that I fashioned from coax shield. Each lead, similar to the one shown here, goes to a ground lug connection on the radios or other equipment :

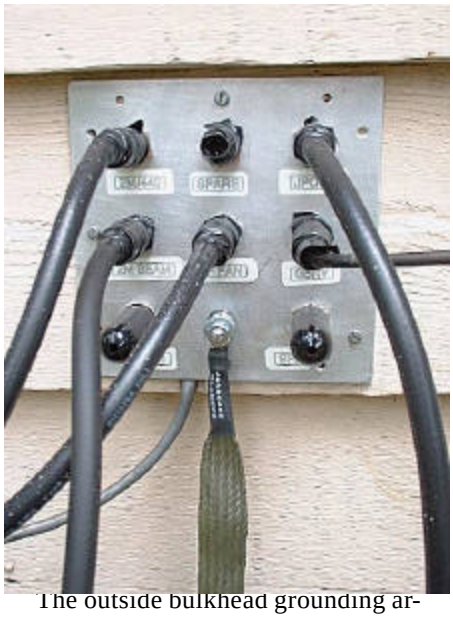


Earlier we spoke about the mop board bulkhead and the fact that it has a copper wire going to a water pipe and then goes on to attach to the interior surface of the exterior bulkhead. On the next page is a picture of the interior of the exterior bulkhead but before we go there let's talk about what I did.

You'll see the labeled coax cables going to the bulkhead. Also, on two of those cables are two black block like components. These are lightning arrestors. The intention of these are to provide a low resistance path through a special cartridge to the ground side for

(Continued from page 4)
any lightning coming down the center conductor of the coax. More need to be installed but these will serve for illus-

trative purposes. Many times these are located on the outside of the building but I elected to have them on the inside of the bulkhead out of the weather. In so far as any lightning is concerned it is a small difference. The current then goes over a copper braid to the heavy ground wire at the right of the picture. I just made the ground wire into another type of buss using 4 split lug connectors. Similarly the large 1 inch braid comes from a 1/4 inch bolt going through the bulkhead itself to another of the split bolt lug connectors. It's all pretty simple really.



The outside bulkhead grounding arrangement has the other side of the 1/4 inch bolt going through the bulkhead to which a 1 inch braid is connected going to the 8 foot copper ground rod pounded into the ground.

The next picture shows the braid attached to the rod. Also, from the lug on the ground rod where the braid is attached I also attached a copper ground wire which I routed around the periphery of the house siding to the main ground servicing the house. All of this provides 2 connected paths to solid grounds. Also seen is the old copper pipe I used in the previous grounding arrangement. I'll just tie that to the ground rod too. I'd break my back trying to haul it out of the ground!

Well, that pretty well wraps it up. An awful lot of words and pictures to detail a fairly simple concept. Installing effective grounding of our equipment provides a level of protection of our investment, a level of personal safety and a higher likelihood of trouble free operations. All this needs to be referenced with a caveat though. If we are unlucky enough to experience a direct full power lightning strike there is not really much that will help but any protection measures that you take will ameliorate the event to some extent.

A direct hit can be a stupendous thing indeed. As a kid I remember lightning hitting our home one time. It blew the gutters off and penetrated to the interior of the house where it blew dishes completely out of a cupboard and blew an AM radio to smithereens. Luckily no fire was started.

WHAT NOW?

In so far as emergency communications we've seen some changes and a bit of progress recently. At the Stake level we've seen that Sid Bishop—KB4QKZ has been called as the Stake Emergency Communications Director. This is great news and I'm certain that we'll see some great things coming our way from him. One thing that has been tossed around a bit is a combined workshop and breakfast for all the radio operators in the Stake. We do need to build a real spirit of unity and teamwork and mutual assistance. Also, we need to build the level of expertise of the available operators so that the right trained resources can be deployed anywhere needed in times of hardship.

Locally we have now begun to formally build a cadre of operators that have been given the specific Priesthood assignment of filling the role as Radio Communications Specialists. I am very grateful to those that voluntarily accepted this charge. Operationally we will continue on basically the same path we've been on but will heighten our efforts on getting folks equipped and on the air, trained from a practical standpoint and participating. Just look back at where you were 3 years ago. You didn't have a license then. In fact, you may not have even considered the possibility of being an amateur radio license holder. Now, quite a number of you are not only licensed but are operational and even have been exploring other related avenues. Just imagine what can happen and what you'll be able to do in another 6 months!

In your assignment we will amplify that personal growth and I pledge a **PACT** with you providing you opportunities for

Personal Accomplishment & Competency Training

Until next time, Stay Pure and 73.

Jim—N1ABM