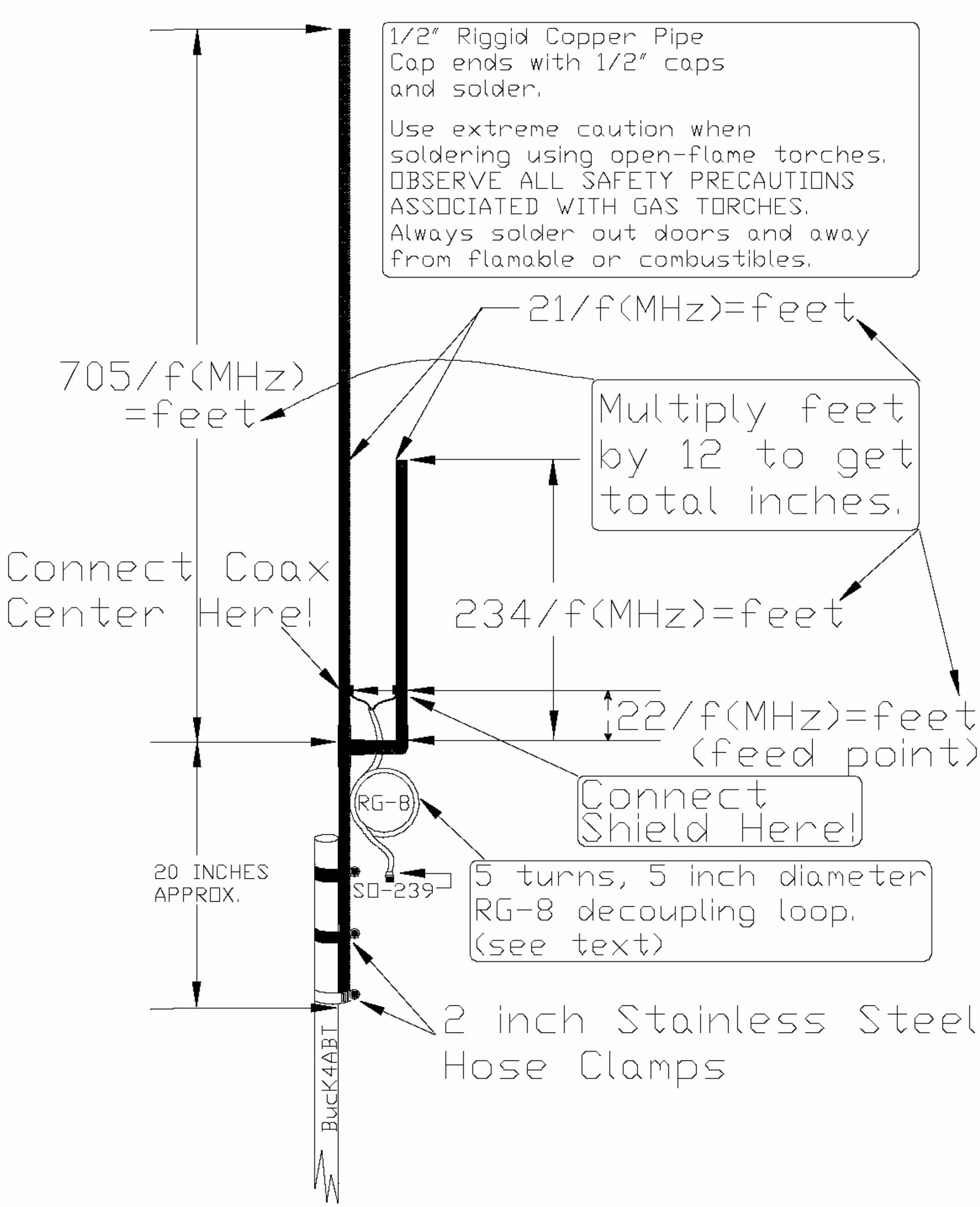

Notice how the decoupling loop is formed from a length of the coax coiled into a 5 turn, 5 inch diameter loop. The coil is then attached it to the mast as shown above. For the final touch, attach an SO-239 (female) coax connector; see text.

A more efficient decoupling transformer is available from:

BUX CommCo, at: [**www.BUXcommCo.com**](http://www.BUXcommCo.com)

AN OUNCE OF LIGHTNING PROTECTION:

The shorted matching stub of the J-pole also appears as if it is a short circuit across the antenna terminals of the connected radio or transceiver. There is also and ounce of protection from static discharges via the antenna port even if you don't make a practice of disconnecting your antenna before a storm. To make life easier and, should you ever need to exchange or replace the antenna, you may wish to do as I have. I made up a section of RG-8 coax. I then dressed and tinned one end and inserted it/them under the feed-point hose clamps. I then coiled a length of the coax into a 5 turn, 5 inch diameter coil (the decoupling loop). I attached it to the (metal) mast as shown in **figure 2**. For the final touch, I fitted the (lower) end with an SO-239 (female) coax connector.

To adjust the Vswr to frequency (145.770 MHz for 2 meters or 51.12 MHz for 6 meters) slide the feed point (hose clamps) up or down as required. You should be able to set the VSWR very close to 1:1 (It is best to make the VSWR setting using at least 25 feet of coax between the SWR meter and the J-pole connector). I have a ten foot section of 1 & 1/4 inch pipe standing in my backyard with three feet of it in the ground. I attach the antenna to the pipe using 2 inch hose clamps. A long length of (not coiled) coax allows me to move away from the antenna at least a wavelength while making the VSWR tests. In short; Do not stand near the antenna while testing VSWR.

Having Fun while saving lives with PacketRadio is what we're all about. For more information and illustrations for the J-pole, visit the PacketRadio Networking home pages on the internet at; http://www.PacketRadio.com/jpole.htm

You will find even more PacketRadio information at:

http://www.PacketRadio.com

or http://www.PacketRadio.org

Visit my personal pages at: `http://www.BUXcommco.com`

`You may send Email to me at:` k4abt@PacketRadio.com

`73 de BucK4ABT`

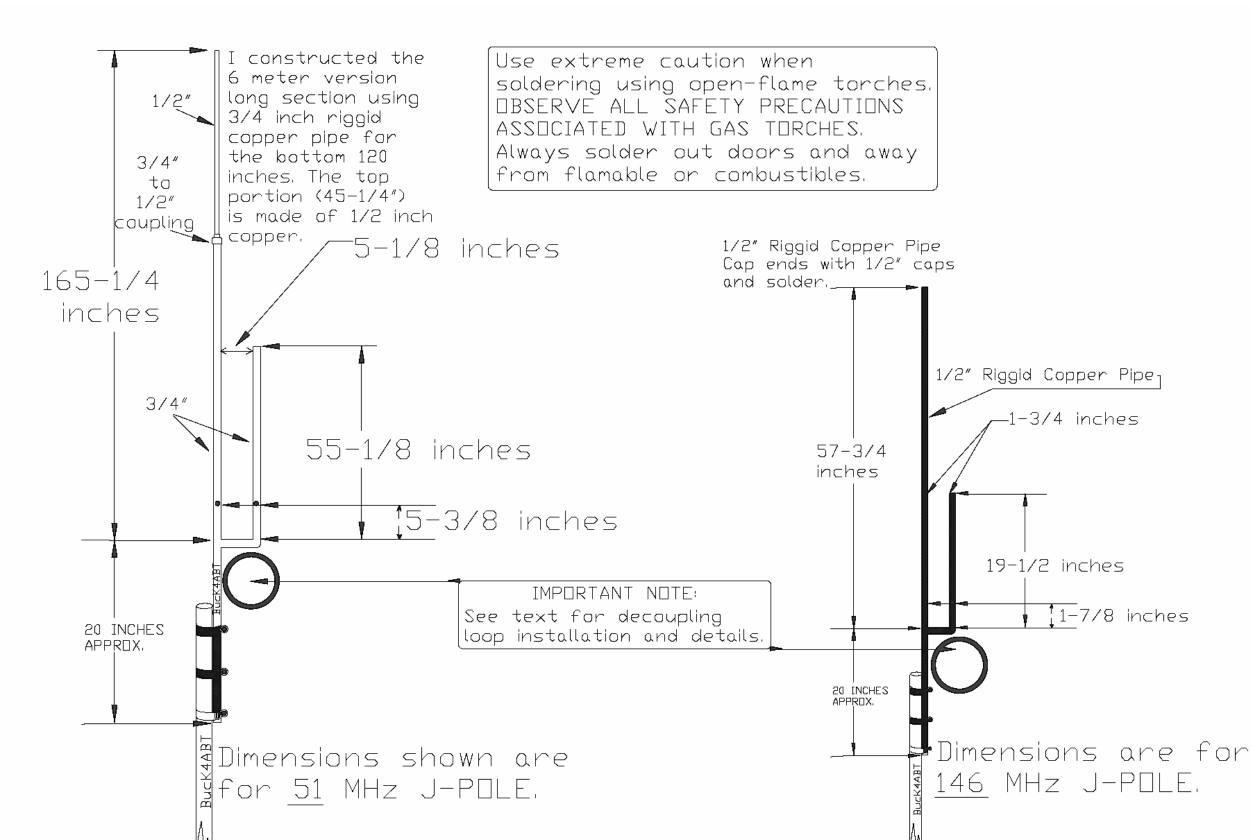

Figure 1a Figure 1b

Rigid copper water pipe is not as heavy as some might think. Especially when it is only 58 inches long at 2 meters (1a), and when used at 6 meters (1b), a J-pole is about 166 inches long (see text).

To get the correct amount of heat to braze the EMT together, I must use a combination torch/flame that uses oxygen and acetylene gas or a less expensive Benz-O-Matic™ oxygen and MAPP gas.

The latter is available at most Lowe's Building materials for less than 40 dollars ($39.95). The kit comes with enough welding rods to build one antenna. It also comes with two disposable tanks; one of oxygen and one MAPP. The catch is… one canister of oxygen is not enough to finish the job (one 6 meter J-pole). If you ever consider such a project, make sure that you have at least two canisters of oxygen ($7.95 each).
In any case, make sure you are out of doors and away from combustible materials while using this type welding system. ***PLEASE use extreme caution when working with open flame torches of any kind.***

SOME NOTES ABOUT J-POLES:

There are very good reasons why the J-Pole antenna has become so popular in the past few years. They are economical and easy to build. Now that we have the support data, we are finding they are also rugged enough for the more hostile environments that we have at our node and repeater sites, even below 145 MHz... on our 9600 baud backbone at 51 MHz.

The 6 meter J-poles that I've installed on my nodes are exhibiting over 4 db increase in signal strength above the dipoles that were in use on my 9600 baud (6 meter) nodes.

The most recent antenna I replaced with a J-pole was a 2 meter (see figure 1b), aluminum, base station, commercially built, amateur antenna purported to have more than 3 db gain over a dipole. The J-pole I replaced at node K4ABT-7, alias 007 has increased the average signal at fifteen (15) miles by more than 5 db; ENOUGH SAID!

Our J-pole does not have radials! SO WHAT.. well this is what. Without radials, there are antenna (RF) currents that flow along the outer surface of the coax cable shield that introduce VSWR along its length. This kind of RF action tends to corrupt performance of an antenna that has no radials. Two things can happen; RF may be absorbed and hot-spots along the coax shield will raise the VSWR to an unusable level. To prevent this from happening we add a form of decoupling loop just below the feedpoint of the J-pole (see figure 2).

Our decoupling loop is sometimes mistaken for a matching balun. This is OK as it does perform some of the properties of a balun while altering the flow of RF back onto the coax cable shield. In short, this decoupling loop performs by canceling these effects, and creating a balanced to unbalanced matching transformer. Oh, didn't I say that before… the J-pole is a "balanced" fed antenna… the 50 ohm coax that we use to feed it with is "unbalanced," thus we have another reason for adding the decoupling loop… .. OK Lew, … it's a balun.

To make our decoupling loop, for the 6 meter J-pole, let's use a length of the same type coax that we use as the feedline. Make a five (5) turn coil (**4 turns for 2 meters**), five (5) inches in diameter and tape it to J-pole mast, below the feed point(s).

We do this near the point where it connects to the antenna (***see figure 2***). In either case, this five turn, five inch diameter coil serves to isolate the feed line's outer conductor from reflected energy (RF) of the antenna radiating element(s).

To set some of you at ease with the feed point question: I did run some tests on the two ways to feed the antenna…e.g. whether it made a difference if the center conductor were connected to the short tuning stub or longer (radiator) section of the J-pole?

Zig or Zag:

Although there is not a big change in VSWR, let it be known! There is a *pronounced* (***worse***) difference in field intensity when the coax center conducted is attached the short stub of the J-pole; NOT GOOD! Without a lot of fanfare, ... **A RULE**; ***Be sure the coax CENTER conductor is attached to the LONGER SECTION of the J-pole*** and the coax shield attaches to the short section.

SOMETHING TO THINK ABOUT:

All the SNO's who support the Packet habit by supporting a Packet node at a high location knows or has experienced what I'm saying. So while I was atop one my Packet node sites an idea hit me… as Steve N4JTH says… I had a brain.. uh.. "wind-breaker."

Most of the antennas that I have been installing at the new node sites are the copper version of the J-POLE. I've removed most of the fiber-glass antennas and ALL the aluminum composition types and models.

I've learned that aluminum was not intended for use at high elevations, especially where ice and wind wreak havoc on them all winter… or until they succumb to the onslaught of this kind of environment.

I tried the next level of durability in the metallic family; copper. Rigid copper water pipe is not as heavy as some might think. Especially when it is only 58 inches long at 2 meters and when used at 6 meters, a J-pole is about 166 inches long. To make the 6 meter version a bit lighter, and still maintain the durability, I make the bottom 120 inches of 3/4 inch rigid copper, and the final (top section, 45 and 1/2 inches), I make of 1/2 inch rigid copper pipe(see figure 1a). We'll discuss this idea further, a bit later. For the record, I find that EMT makes a great J-pole and I find the same characteristics with 1/2" EMT as I find with 1/2" copper.

LET'S TALK ABOUT THE J-POLE:

The J-pole has, for the most part, been a 2 meter and 70 cm antenna. Matter of fact, the first ones were designed and constructed using 300 ohm, television twin lead (or 450 ohm ladder-line, See Lew McCoy W1ICP J-pole article, JULY 1994). Not many configurations are supportive of building J-poles for frequencies below 144 MHz or for environments that were demanding of a more rugged type antenna.

A few years ago, I replaced a 6 meter **<u>di</u>**pole at one of my Packet node sites (3000 feet) with a six meter **<u>J</u>**-pole (see figure 1a). The first thing I noticed was that instead of just hitting the local 9k6 backbone nodes (those within 50 miles), I am suddenly reaching nodes a hundred miles away.. atop Herndon Mountain in **WEST** Virginia. That is a bit farther than 100 miles. The path is there 95% of the time with the J-pole. The path was there 0% of the time with the old 6 meter dipole.

To help support this data and the use of the more "durable" J-pole, and at frequencies below 145 MHz I received some welcome help at gathering data from **AL (K4ZMC):**

Al Feldman K4ZMC is a long time friend who has been around Packet radio as long as Packet radio has been around. AL installed a 6 meter (copper) J-pole at his "very hostile environment site" above 4000 feet. The node site K4ZMC-7=**MARS** (NO, not on planet MARS.) is near ***Mars*** Hill, NC. Actually, the first antenna went to the 9600 baud backbone node on six meters, K4ZMC-9, alias 9600.

When AL installed the J-pole at node 9600, I had the support I needed to begin compiling data on the performance of the J-pole at six meters… and with Als location being such that it is, it gave support for the durability of the ruggedized version.

Since then, I've begun using three-quarter inch (3/4") electrical metal thin-wall conduit, or EMT as it is called, to construct my 6 meter J-poles. EMT, although a bit heavier, is yet stronger and sustains even stronger winds than the copper version does. I used the EMT version at K4ABT-4=9603 atop Poor mountain SW of Roanoke, VA. The reason I did so here is because I've lost several aluminum antennae at this location, and I felt that I needed to make this antenna a very "beefy" version to handle the high winds and heavy ice loads at this site.

The reason I've not said a lot about the EMT version is because the rigid copper water-pipe version can be built (joints soldered, sweated together) using a single canister, Benz-O-Matic™ propane torch.

This is **<u>not</u>** the case with the EMT version. It must be built using brass compound brazing rods. Thus we have a requirement for a hotter melting flame than a propane torch can produce.

Packet Users Notebook

January 1999

by

Buck Rogers K4ABT

For association and the record, the ZEPP was one of the early antennas used as a "trailing" antenna behind the Zeppelin (Blimps) of the early forties. Later it was fashioned into an antenna for higher frequencies, and in the seventies, and early eighties the name was changed to the "J-pole" to favor its appearance when constructed as a VHF vertical.

In the late fifties or early sixties, I read an article written by Lew McCoy W1ICP. It was about an antenna called a "Zepp." In his reference the antenna resembled one I had raised called a, "windom." After building Lew's version, I liked its performance better.

Thus began a new era for me, experimenting and building the Zepp (J-pole) antennas. I've since built J-pole antennas that operate on ham bands from 14 MHz all the way to 912 MHz. I've build J-poles of everything from 300 ohm TV twin-lead, 450 ohm ladder line, copper rigid water-pipe and even electrical metallic thin-wall conduit.

As I add new nodes to mountaintops here in Virginia, I often come up with another idea for a future **PACKET USER'S NOTEBOOK** article. For me, finding material for a future PacketRadio column is always easy. There is so much to write about, it's as if there is a never ending supply of fodder just over the next ridge.

This time, I think I have come across something that will be of interest not only to the PacketRadio system node operators, but to the voice repeater operators as well. Especially where the Packet node or voice repeater is situated on a mountain top that is a weather hostile location during the winter months.

Adding a new PacketRadio node or voice repeater is only half the battle. When I talk about "hostile environments," I am referring to the torture that our node or repeater antenna is subjected to during the heavy ice loads, snows, winds, and rain. When we are warm and comfortable in our home, the node or repeater site high on that mountain top may be receiving gale-force winds and the antenna may be slowly loading up with a new layer of radial ice.
My friend Chuck and I were atop one of these mountain tops recently and the wind was coming at us like a cold … no, a frozen knife. The gusts were topping over 50 mph. Now to some, this is not too heavy a wind, but when the wind continues at this clip, hour after hour, the toll on the site usually begins to show signs of wear and tear early on.

The part of our site that takes the worse beating is the antenna. I've tried almost every kind, shape, and model at these sites. At 3000 and 4000 feet, we begin to see damage to the antenna soon enough.

I began thinking; If this is bad here on this lil 3000 foot knob, then ole Fred WB4QOC really has a problem with his node antennas. atop Grandfather mountain, NC (nodes WB4QOC-5 and WB4QOC-6) and Mount Mitchell, NC (nodes WB4QOC-2 and WB4QOC-3). Grandfather mountain is over 5400 feet and Mount Mitchell is the highest point in the USA east of the Mississippi river at 6684 feet.

We do know that winds in excess of 190 mph have been recorded atop Grandfather mountain, but we understand that the equipment used to measure the wind velocity at Mount Mitchell was blown away… pegged out, and burned out the bearings in the anemometer. The first winter that node 6684 was active, he replaced the ISO.. something-another with a stainless-steel whip. It lasted the rest of the season… until it was found in the parking lot of a nearby lodge. It was shot!. Our next try was with a very stubby, quarter inch diameter Wintenna dipole. Dern that thing lasted through the next winter. It must have been a good one… someone climbed up there and took it. We know it was not blown away… wind don't use cable cutters to remove antennas. I think Fred went with a insulated chunk of water-pipe. That is until now.