

Air Band Antennas

Apparently, there are quite a lot of aviation comms fans out there among our readers. I never realized just how popular it is to listen on Unicom Channel or to the local airport control towers. I have personally avoided communicating with control towers since I sold off my half of an Aerocoup years ago, but our valued readers have spoken, and this construction project was suggested by one of them.

In **Photo A** and **Photo B** you see a two-element and a three-element Yagi antenna designed around 125 MHz, but they have more than enough bandwidth for the entire VHF comm band.

In **Plot 1** you see a network analyzer plot of the two-element Yagi. The -10 dB line represents about a 2 to 1 SWR, and the -20 dB line represents about a 1.2 to 1 SWR. As you can tell, we have a pretty good SWR over the aircraft VHF communications band.

Construction

If you've been following "The Antenna Room" columns, you know I like to use that J-shaped driven element on my beam antennas, but this time we're going to use a simple dipole driven element. For you folks who already have antenna modeling software, yes, I'm again using element-to-element spacing to load the 72-ohm driven element down to 50 ohms. Most Yagis

have different stubs, bars, or capacitors on the driven element to impedance-match the driven element to the 50-ohm coax, but this design uses the construction of the Yagi itself and the distance between elements to do the impedance matching for you. Just build per the dimensions and put it up.

For the elements I used bronze welding rod, but just about any stiff wire will work. Aluminum rod from another antenna, coat hangers, copper wire, hobby tubing, or thin water tubing can all be used. Heck, I even used clear plastic tubes full of salt water, but that's a story for another column.

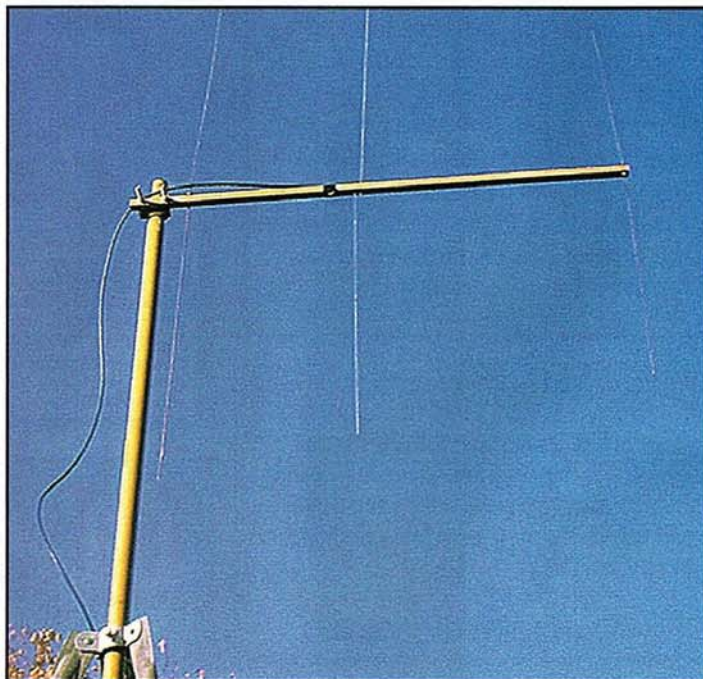


Photo B. The three-element air band Yagi.



Photo A. The two-element air band Yagi.

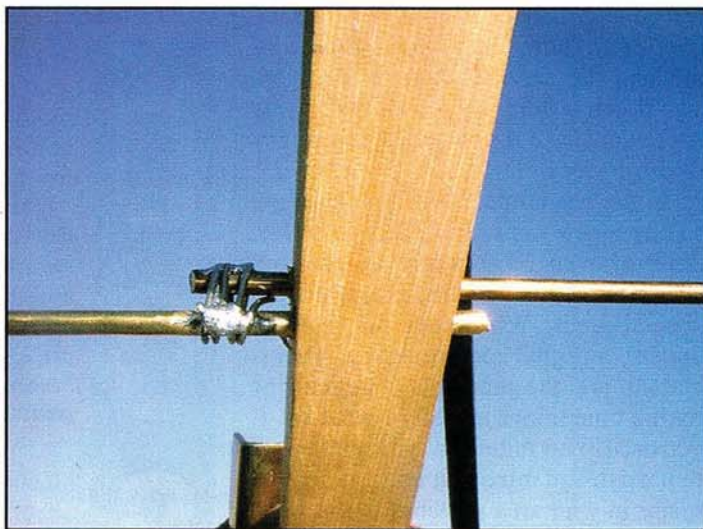
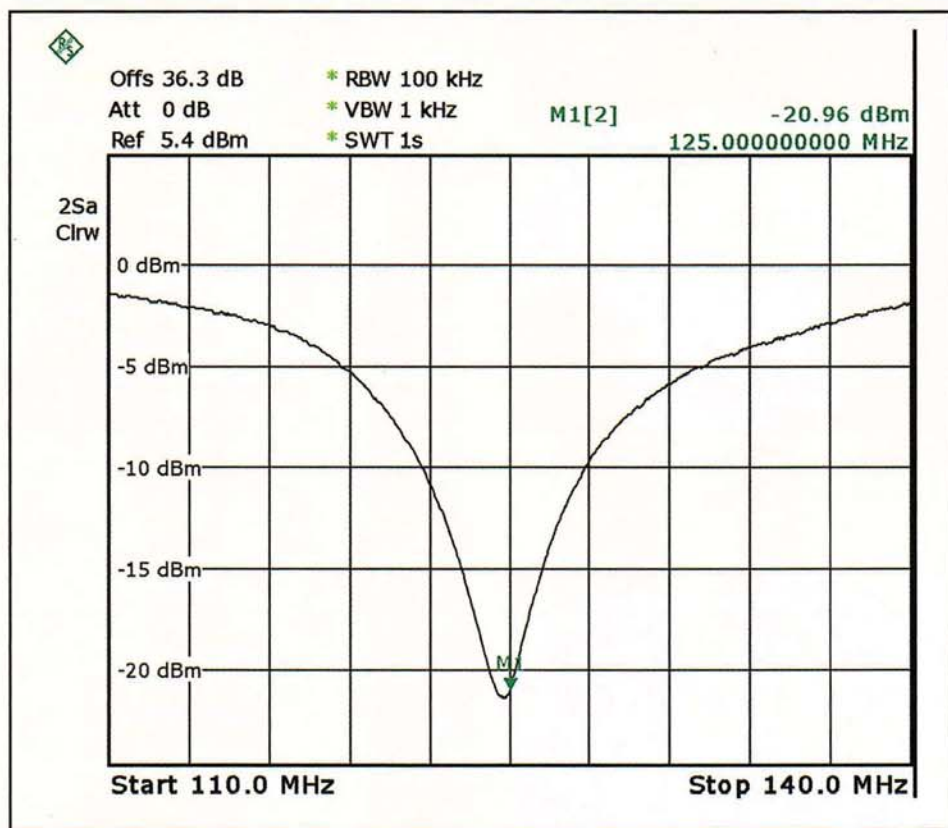


Photo C. Element-to-element connection.



Plot 1. Network analyzer plot of the two-element Yagi.

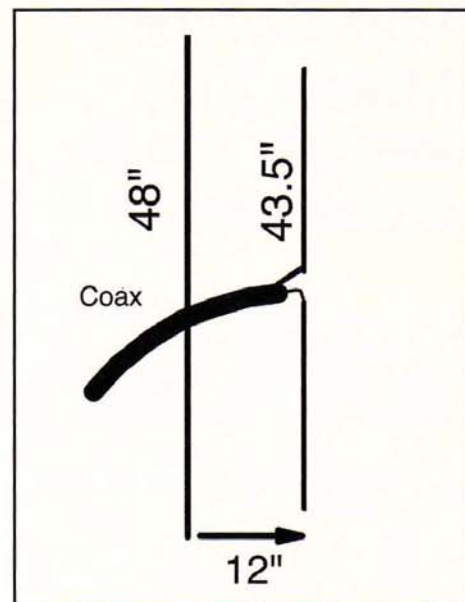


Figure 1. Two-element Yagi dimensions.

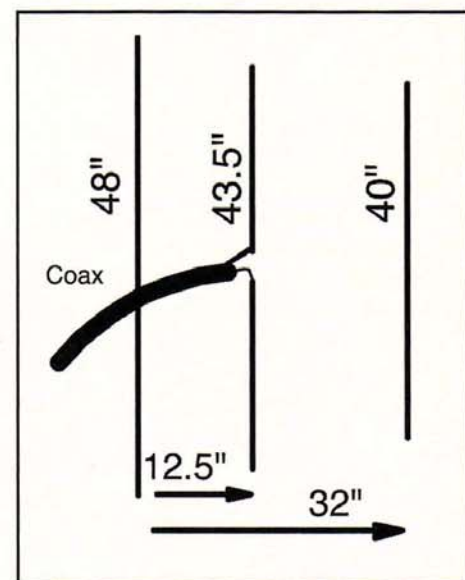


Figure 2. Three-element Yagi dimensions.

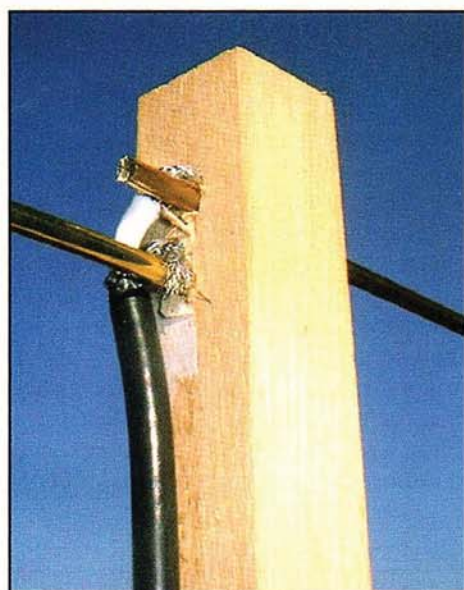


Photo D. Attaching coax to the driven element.

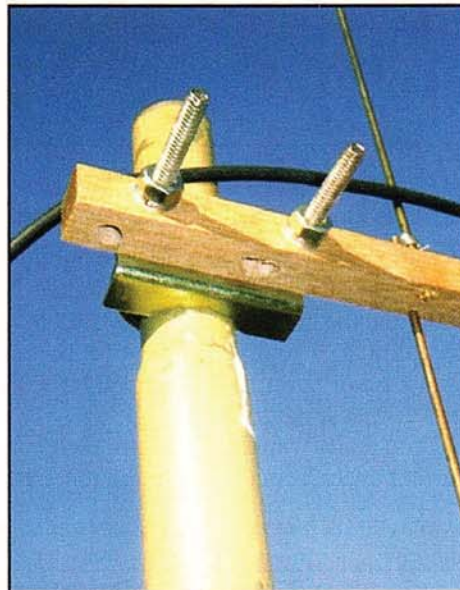


Photo E. Antenna-mast mounting.

Because 48 inches is kind of long for most rods and tubes (they seem to come in 36-inch lengths), I just drilled two holes in the boom, pushed them through, and as you can see in **Photo C**, just soldered a strap between the two. This shorts out the two pieces and makes it one long element.

The elements can be between 1/8 and 1/2 inch in diameter without changing performance. For the driven element you really want to use a material you can sol-

der to. Again, I used bronze welding rod, which solders pretty well, but it's possible to make some clips out of brass or tin and solder the coax connections to the clips. In **Photo D** you can see where I have the coax shield soldered to one element, and the center conductor of the coax to the other element. You want to use RG-58, RG-8X, RG-8, or some other 50-ohm coax. If you plan to mount the antenna outside, I would suggest some RTV or

similar glue on the open part of the coax shield to help keep water out of the coax.

For the boom you can use from 3/4 x 3/4 to 1-1/2 x 1-1/2-inch wood. Yes, you can use PVC pipe, but I'm not a fan of round plastic booms. Again, if you plan to mount the antenna outside for long periods of time, a quick coat of paint on the wood will add years to its life. Spar Varnish seems to work best, but clear spray paint, epoxy paint, and even house paint works well also.

Mounting

For testing, I mounted the antennas horizontally. That's good for testing but

Pop'Comm March 2008 Reader Survey Questions

This month we'd like to ask you about your reading habits concerning *Pop'Comm*. Please use the Reader Survey Card and circle all appropriate numbers. Thanks for participating.

Are you currently a subscriber to *Pop'Comm*?

- Yes 1
- No 2

If not, where do you usually procure your copies of *Pop'Comm*?

- Bookstore 3
- Electronics Store 4
- Supermarket 5
- Convenience Store 6
- Newsstand 7
- From a friend 8

How many years have you been reading *Pop'Comm*?

- Less than 1 year 9
- 1-5 years 10
- 5-10 years 11
- 10-20 years 12
- Since its launch 13

How many of the last four issues of *Pop'Comm* have you read or looked through?

- Four of four 14
- Three of four 15
- Two of four 16
- One of four 17
- None 18
- Haven't yet received
four issues 19

About how many times do you refer to a typical issue of *Pop'Comm* before you are finished with it?

- Once 20
- Twice 21
- Three to four times 22
- Five to six times 23
- Seven to nine times 24
- Ten times or more 25

When you are done with a typical issue of *Pop'Comm* what do you do with it?

- Save it 26
- Throw it out 27
- Pass it along to someone else . . 28



Photo F. Antennas that are not what they appear to be.



Photo G. Close-up of the hidden antenna.

poor for reception since most air band signals are vertically polarized. When I mounted the antennas vertically for photographing, I realized my wood boom was kind of short, and it needed to be 4 or 5 inches longer.

You really want that reflector element farther away from the mounting mast. In

Photo E you can see where I had the boom drilled for vertical or horizontal mounting, but the three-element is really good close to the mounting mast for good performance.

On The Air

You're going to see quite a boost in those air band signals. First off, they're AM signals, not FM. So a little more signal really knocks down the background noise. Next, most scanner antennas are not really tuned to 108-135 MHz, so these Yagis end up giving you nearly 15 to 20 dB more signal than a typical scanner ground plane or discone antenna.

While they work best in the air, you can also get good service mounting the Yagis inside your attic. This keeps them out of the weather and away from the prying eyes of neighbors. I've had some similar antennas in my attic for over 15 years now, and except for a little dust, they still look and work fine.

Other Uses

The first request for air band Yagis came from a CAP (Civil Air Patrol) organization. They were interested in using these on 121.5 MHz to track down ELTs (Emergency Locator Transmitters). If you're involved in a group like this (or any other group), it's good to know that you can build a handful of these Yagis for just a few dollars.

And, sometimes, you may want an antenna that isn't what it appears to be. You see lots of these set top TV antennas with a small dish for UHF reception like the one in **Photo F**. But...there is a bit of a problem here. For a dish to bring a radio wave to a proper focus, it really

Coming In April...

EPA Report: SWR Declared Endangered Species

We have all gone to great lengths to clean off those little pesky SWRs that crawl all over our antennas. It looks like we've done too good a job.

From EPA researcher, Dr. Chart Smith, we learn: "It is a classic case of habitat destruction. With all the new antennas getting their SWR count under two, the little critters just never have a chance to breed."

New research on an SWR habitat is being conducted. It is hoped the researchers can find that elusive antenna with an infinite SWR, thus creating a home for all the SWRs in the universe.

Not really, I just couldn't resist. And not being scheduled for the April issue, I had to get my little April Fool's joke in early.—kb

should be 10 wavelengths across. You can get by with only five wavelengths across, but at reduced efficiency. At TV CH 68, a radio wave is just over a foot long. So a UHF TV dish antenna needs to be at least 5 feet across! So what's the deal with this 6-inch dish?

Have a close look at the edge of that plastic dish in **Photo G**. See the wire embedded in the rim? That is a loop antenna just like the UHF loop on most indoor antennas. The "dish" is just for show. But hey, 99 percent of TV antennas are sold on marketing, not because of how well they work. I guess the best example of this kind of marketing is how many dogs buy dog food?

A Reader Question

From California we get this question: "Silver has less resistance than copper. Would a silver wire antenna work better on shortwave?"

The short answer is not really. A long wire antenna has about a 1000-ohm impedance. A 1-ohm loss in copper versus a .8-ohm loss in silver wire is not going to change signal levels very much. And on shortwave your big enemy is usually noise, not signal levels. So you would never hear a difference between copper and silver antenna wire. But let's look at a mobile antenna.

A mobile antenna for 3 to 7 MHz may have a radiation impedance of only 1 or 2 ohms. Now that few tenths of an ohm can make an improvement, especially if the antenna is used for transmitting. You also have additional inductors in the matching network that match your 50-ohm transmitter to the low-impedance antenna where a little less loss is again a big help. So you pick up a few percentage points more efficiency, but not much.

But whenever Room Temperature Super Conductors become available, I'll have several antenna designs I want to play with! Zero Loss Near Infinite Q...now those will be interesting antennas.

Topic Suggestions?

As always, you, our readers, are the best sources of topics for this column, and we are happy to help you with your antenna questions. Just drop an email to wa5vjb@cq-amateur-radio.com or visit www.wa5vjb.com/, where you can also see some of my other antenna projects (see the Reference section).

Each month, we select representative reader letters for "Our Readers Speak Out" column. We reserve the right to condense lengthy letters for space reasons and to edit to conform to style. All letters submitted must be signed and show a return mailing address or valid e-mail address. Upon request, we will withhold a sender's name if the letter is used in "Our Readers Speak Out." Address letters to: Edith Lennon, Editor, Popular Communications, 25 Newbridge Road, Hicksville, NY 11801-2909, or send email via the Internet to editor@popular-communications.com.

On Scanning In New York City

The following letter was sent to Ed Muro, author of "Scanning Heats Up For The Holidays In New York City" in the December 2007 Pop'Comm.

Dear Ed:

My family and I just returned from a four-day trip to New York City. The day before we left, I got the December issue of *Pop'Comm* in my mailbox. Your article certainly attracted my attention. I only planned to take a small ham HT along with me. Now that I had actual frequencies listed for me, along came my ICOM R5 scanner as well. (One day, I'll feel rich enough to get a 396 or new 500 handheld scanner. It sure would have been nice to have that near-field capability numerous times!)

We stayed at the Hampton Inn just south of the southwest corner of Central Park. From what I could figure, we were in the NYPD zone 4. Here at home (near Atlanta), I enjoy listening to the police traffic when I can. In my county of Cobb, they went trunking AND digital, so until I'm rich(!), I'm out with the locals. So it was fun using the scanner up there. I didn't find too much activity on FRS, and no activity on GMRS. Ditto for CB (although I only had a rubber duck). A local ham (K2MAK) showed me his handheld and how he listens to the traffic copters directly. Used to do that here in Atlanta too, but they moved to cell phones and reports from lay people like you and me instead. Cheaper than running a copter I guess?

So *thanks* for taking the time to write the article. I found it very useful. It was also simply amazing how much RF is in Manhattan. Even with my squelch all the way tight, I still had intermod all the time (unless inside a building). Sure seems like PL or DPL is the way to go up there?

Tim Lemmon, WK4U
Via email

And here's another take on the same article...

Dear Editor:

Your December cover story, "Scanning Heats Up For The Holidays In New York City" made me laugh when I read the suggestion: "In this post-911 world, if you plan on taking a handheld scanner to some event, make sure you use discretion and don't make a 'public spectacle' of yourself" so as not "to be mistaken for a 'techno-geek terrorist.'" So does this mean *Pop'Comm* readers shouldn't act like the fellow on your magazine cover publicly displaying his handheld scanner at Rockefeller Center?

Are terrorists really going to risk making a "public spectacle" of themselves by waving around handheld scanners? Or are law enforcement officials in New York City naive and clueless enough to believe they would? What's a "techno-geek terrorist" anyway, and how many have been apprehended? Too many people, including government officials, conflate the fanciful plots and stereotypes portrayed in TV dramas and Hollywood movies with reality.

The misconception that people who appear to be technologically "geeky" and carry around electronic devices pose some kind of threat to public safety is one that we should dispel, rather than foster by suggesting we should be "leaving the radio home or hidden." That seems cowardly and counterproductive: If more citizens conspicuously carried radio scanners, they wouldn't appear so threatening in the eyes of ignorant people.

In this "post-911 world" we DO indeed have a responsibility: To exercise our rights more than ever, rather than meekly allowing over-reactionary officials to take away or have a chilling effect on the very freedoms we should be defending. It is not illegal to carry a scanner in New York City or any other U.S. city, and any law-enforcement officer who says it is needs to take remedial courses in criminal and constitutional law. Such ignorance should be nipped in the bud before it continues spreading like a cancer that further erodes our valued freedoms.

A. Listener
Northeast, Pennsylvania