

# THE \$4 SPECIAL

by Joe Tyburczy, W1GFH

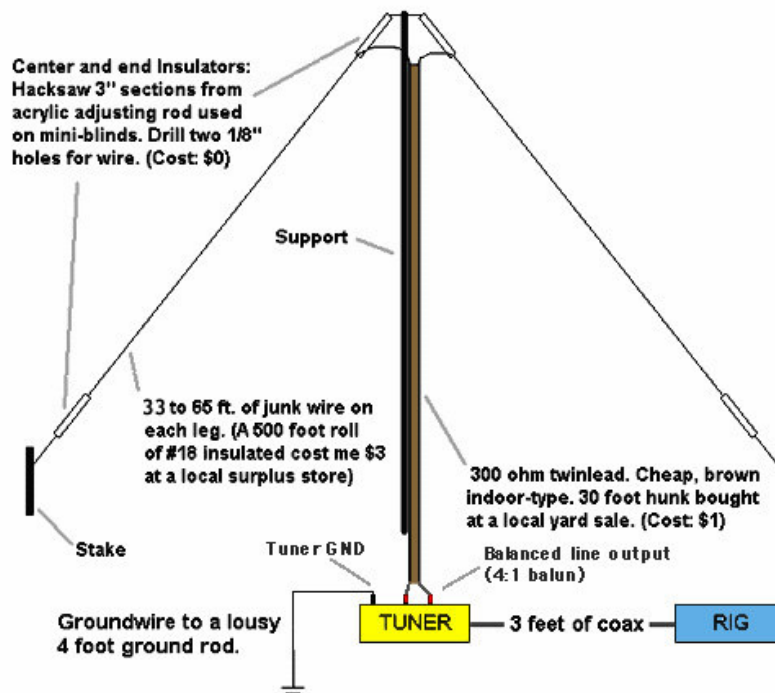
Sure, you can find "all-band wire antennas" for sale in the back pages of Ham magazines costing \$150 or more. But beware: *Marconi spins in his grave everytime a ham buys an aerial instead of building it.* The plain and simple truth is that wire antennas for the HF bands were intended to be *hand-made* and not store-bought.

Untold generations of intrepid Radio Hams have fashioned their own equipment out of spit and baling wire. Do you think the spark-gap dudes of the 1920's just went out and bought ready-built G5RV's from HRO or AES? No way! They slapped together aerials out of bedsprings, chewing gum, and frozen cow poop. For them, every day was Field Day. I think that home-built antennas should of their ingenuity. And in this world of microprocessor controlled micro-rigs, constructing one may be your only chance to build something and actually see it work on the air. Think about it.

RadioWorks, Alpha-Delta, MFJ, B&W, Van Gordon, W9INN, and W7FG...nothing wrong with the wire antennas they sell. But buying one is no substitute for "rolling your own". Don't be overawed by their advertising rhetoric. You can make an antenna every bit as good as theirs, and even better in many cases.

Don't be intimidated by SWR, either. Your rig will not blow up and kill you. Most modern rigs will politely refuse to transmit into a really bad match. A perfect 1:1 SWR is for sissies, anyway. All \*real\* hams have conducted perfectly good QSO's at 3:1 (or more) at some time or another. You may be surprised to know that the vast majority of hams didn't fret about SWR until after WWII when coax cable and SWR meters ("SWR Bridges" as they were first known) became available on the commercial market. Before that time, you simply cut your antenna to frequency, loaded the transmitter final for best output according to the plate current meter --- and that was that.

I am a big fan of "balanced line" (twinlead, open wire line, etc.) vs. coax. By using balanced line and a tuner you can have one antenna that works well on all bands. You can't do that as easily with coax. The basic "W1GFH \$4 SPECIAL" shown below is a variation on the type of versatile skyhook I've been using for years.



Now at this point, some of you may be looking at the diagram and muttering, "Darn it to heck Joe, that's just a dipole fed with twinlead and used with a tuner". Well of course it is. Virtually all antennas are "dipoles" (i.e. "two sides") in some form or another. This one just happens to be made from low-cost materials.

I won't go into the theory here, but trust me: balanced feedline, properly used, does not "leak" RF and is less lossy than coax. I've tried the commercial 450-ohm ladder line, but prefer 300-ohm TV twinlead, and the cheaper the better. Radio Shack TV twinlead is ideal. Home Depot has some good stuff, too. Forget all the obsessive junk about SWR, impedance and velocity factor. What you really need to concentrate on is getting an interesting set of antenna insulators.



Back during the disco era when I first got on the air, I got a pair of really cool antique pyrex antenna insulators from a flea market table in Derry, NH for 25 cents each. They looked like the kind Hiram Percy Maxim used in 1910, and seemed able to pull in exotic DX all by themselves. The other day I found out that Radio Shack wants \$5 apiece for insulators made from some kind of white plastic crap. So I improvised my own by sawing up pieces of an acrylic adjusting rod from a discarded miniblind. I think Hiram Percy Maxim would've been proud of me.

Hang the center of the antenna from a tree limb, or use a support as pictured. The exact height of the antenna's feedpoint is not crucial. The higher, the better. 20 feet might be considered the minimum. 60 feet is ideal. However, in the real world, 30-50 feet is average.

The ends of the antenna will be "hot" with RF, so it's a good idea to keep them out of reach of people and pets, say, at least 10 feet above ground. However the antenna will still function if you bring the ends down closer to the ground.

An antenna tuner with a balanced output is a must. Using one is a simple matter of adjusting capacitance and inductance for the lowest SWR on a given frequency. Always begin your adjustments at low power, increasing to full power only when you have a reasonable match. My first tuner was an MFJ-949C I got at a swap meet for \$15 a long time ago and features connections for balanced lines on the back. (\*Make sure YOUR tuner is an outboard manual type antenna tuner such as this, and not an "automatic" or internal tuner that is a pushbutton feature on many modern rigs.) Many of the MFJ's are fine. So are Dentron's, Drake, Vecronics, Nye Viking, etc. A link-coupled balanced tuner arrangement like the Johnson Matchbox would be even better, but use what you have. Or make one. Ham radio isn't a competition to see who can own the best or most expensive gear. The idea is to get on the air

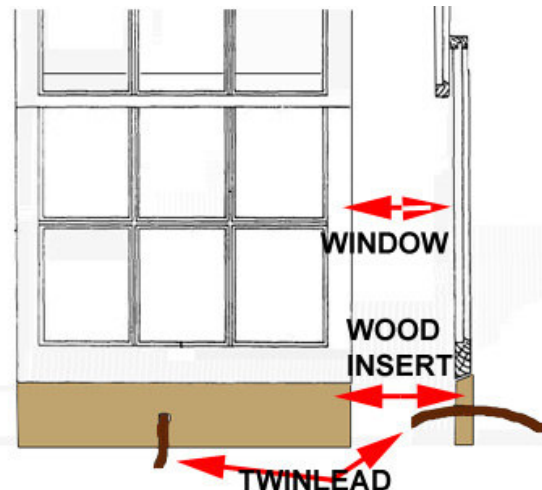
with what you have or can afford, enjoy your self making contacts, and as time and money permits, try something else.

I had a 65ft. per leg version of this antenna working in Massachusetts, and it'd tune up on all bands 80-10. At my Burbank, California QTH, I used a 35 ft. per leg version, and it tuned up on 40-10. By the way, you'll notice it's an inverted vee --- a real advantage if you don't have room for a full-sized dipole in your yard. If you still don't have room, bend and angle the legs to fit the space you've got. Antennas gently bent into Z-shapes still work fine!



THE MAGIC OF TWINLEAD

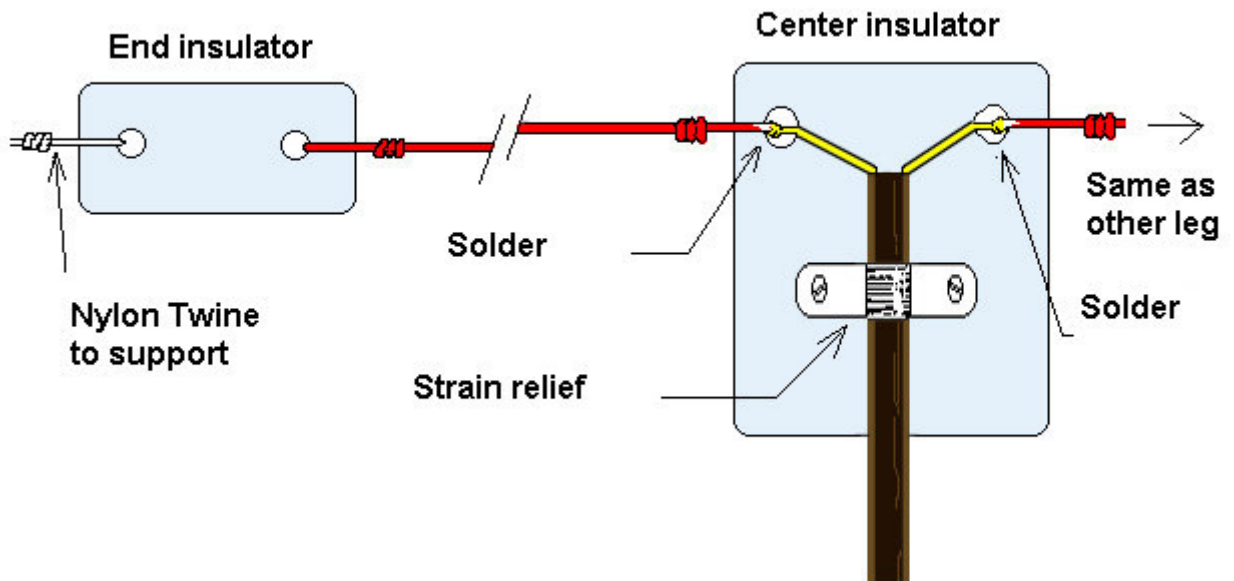
The uncut feedline comes straight in thru a clever window sash arrangement first used by hams in the 1920's. Alternately, you can attach the wires to feed-through bushings (which can be anything from two steel bolts...to a pair of banana jacks end-to-end) set into holes in the wood sash or a glass pane (or a plexiglass panel). 300 ohm twinlead only needs about 2" separation from metal objects in its path. Unlike coax, its "gotta be free" -- don't coil it up, kink it, bury it, or lay it on the ground. Gently brushing against tree limbs or tied to non-conductive surfaces like wood or plastic is OK. The 100 watt output of most transceivers makes TV twinlead a safe and practical choice, but a number of hams have used it successfully with power ranges up to 1KW PEP. You can obtain or construct an external 4:1 balun to make the transition from your twinlead feedline to a short length of coax, then bring the coax into the house via a single feedthrough hole if you'd like.



For

the antenna wire itself, virtually anything will work, but something close to #18 stranded/insulated is ideal. My favorite stealth antenna material is magnet wire. You can dig this out of an old transformer or even a busted loudspeaker's coil. This ultra-thin stuff is truly INVISIBLE to neighbors and wives alike, and it'll handle 100 watts, no sweat. If you need to keep a low profile, try it as a long longwire, end-fed from your tuner's "wire" terminal. (Be sure and ground everything in the shack like crazy) No trees in your yard? Use a sock filled with sand for a weight and hurl the far end of the wire onto a NEIGHBORS roof or tree. (I would advise doing this at night. If you are caught, claim you are "trying out an old FARMERS ALMANAC recipe to keep bats away". People universally hate bats, and love farmers) If you can't possibly scheme to get your wire more than a dozen feet off the ground, try flinging a few hundred feet of the magnet wire all around the yard in a big loop (find out measurements in the ARRL Handbook or Google "80 meter loop antenna"). Loops can perform satisfactorily at low heights. And remember, don't fuss too much about SWR. A little mismatch is good for you and builds character.

Here's a variation using center and end insulators made out of plexiglass sheet.



If you want to be adventurous, try using 110VAC lamp cord ("zip cord") as a feedline. Yeah, it'll work as a crude balanced line, believe it or not. Impedance varies, but is usually "close enough" to work. There is very little experimentation among hams these days, and most stations are cookie-cutter duplicates of one another: same antenna, same Japanese transceiver, same 599 QSO.

This is not the ham radio tradition of old. In the 1930's and 40's you might find one ham using twisted bell wire as a feedline. Another might be using bare electric fence wire on ceramic standoffs nailed to wooden planks. Another might be using copper tubing. Or pieces of metal roofing. Or auto ignition cable. Or tin cans soldered together. If you looked at their stations you'd discover a wealth of marvelous invention, idiosyncratic design, and an incredible ability to press available objects and materials into service. Improvise. Experiment. Take notes of what works and what doesn't. This is what ham radio is all about.

When you

put up your antenna is also crucial. I must mention here the importance of what many early hams called "antenna weather". That is, snow, sleet, freezing rain, or combination of all the above. It has been proven time and time again that any antenna installed in conditions better than abysmal will not function worth a damn. Or, put another way, it takes bad weather to put up a decent antenna. Dark and cold New England winter days are ideal for this activity. Any antenna erected on such a day will inevitably produce miracles.

Many

of you will recognize THE \$4 SPECIAL's design as the venerable "double zepp" aerial, a variation of the "end-fed Zepp" -- the skyhook responsible for the dramatic Hindenberg tragedy in Lakehurst, NJ. It seems the blimp's radio op decided to work a little DX while waiting for landing clearance. He sent out a few CQ's. Unknown to him, the ladder line had twisted in the breeze, shorting the bare conductors. A brilliant spark flared up, and....well, that's another story altogether.

To see an

"end-fed Zepp" version of the \$4 Special, click [here](#).

Alas, I never

had a 100 foot tower to hang this antenna from. The one in Mass. was up 50 ft. and worked what I considered terrific DX. The one I have now is only up 30 ft. and gets good to average results. It won't

outdo a yagi at 100 feet. Very few things will.

But for

\$4....who can complain?!