

Constructing the SARA 408 MHz Quagi Antenna

By Chuck Forster

This pictorial guide has been prepared to assist in the physical realization of the antenna design by Hal Braschwitz and Jim Carroll. Read the paper on this antenna design before constructing the antenna.

The antenna has a wooden boom. You may use fiberglass or any other non-metallic support as long as the boom remains straight and true. I suggest a solid wood boom of aspen, oak, pine or similar wood.

After the holes are drilled and before elements are installed, coat the boom and remaining wood parts with several coats of exterior grade varnish or oil based paint. A wood sealer used for decks could be also be used.

The loop reflector, loop driven element and wire directors can all be constructed using 1/8" diameter brass welding rod. This is available from any welding supply store or well stocked hardware store. The elements should be cut to within +/- 1/16" of the dimensions shown.

The corners of the loop should be bent wire sections with splices along the straight sides of the loop. Overlap the splice points, wrap with small copper wire and solder the entire splice. Clean the brass before soldering and remember to use rosin core "radio-TV" solder, not acid core solder.

The driven element is fed at the center of one of the sides of the loop that is in the same plane as the directors. The driven element is approximately a one-wavelength loop. The fed side determines the E-plane. See ARRL Antenna book, 17th edition, page 5-2. Also review page 18-33 for Quagi construction if the book is available to you.

Use 1/4" wood laths to support the reflector and driven element loops. Use two laths on the driven element for support of the coaxial cable connection.

Connect the braided shield of the coax to one side of the open loop and the center conductor to the other side. Seal the open coax to prevent moisture from entering the cable. I suggest using RG-8 or RG-213 (50 ohm coax) if the distance between your antenna is greater than 20 ft. Do not run more than about 100 feet.

Remember the sensitivity of the telescope is severely degraded with every foot of coax you install. Mount the receiver as close to the antenna as possible. For distances less than 20 feet consider using RG-8X. This is a small 50 ohm coax that is available through Radio Shack. The cable has the same diameter as 75 ohm coax used for cable TV. If all else fails you can use cable TV coax.

Want to make an interferometer?

Construct two antenna's. Set them about 50-100 feet apart on an east-west base line. Aim them both at the same declination, with each pointing due south. To each antenna connect an equal length of coax (about 60 ft if the antennas are 100 feet apart).

Combine each end of the coax from the two antennas to a coaxial "Tee" fitting. Connect the tap on the "Tee" fitting to the receiver. Aim the antennas such that that sun will pass directly through the main lobe of the beam and look for the rise and fall of the interference pattern. The main lobe of the antenna is directly in line with the boom.

Supporting the antenna near the ground - Danger!

Be sure to protect yourself and others from the sharp ends of the director wire elements.

Mount the antenna so it is aimed straight up or at no more than 60 degrees from the zenith (at least 30 degrees above the horizon).

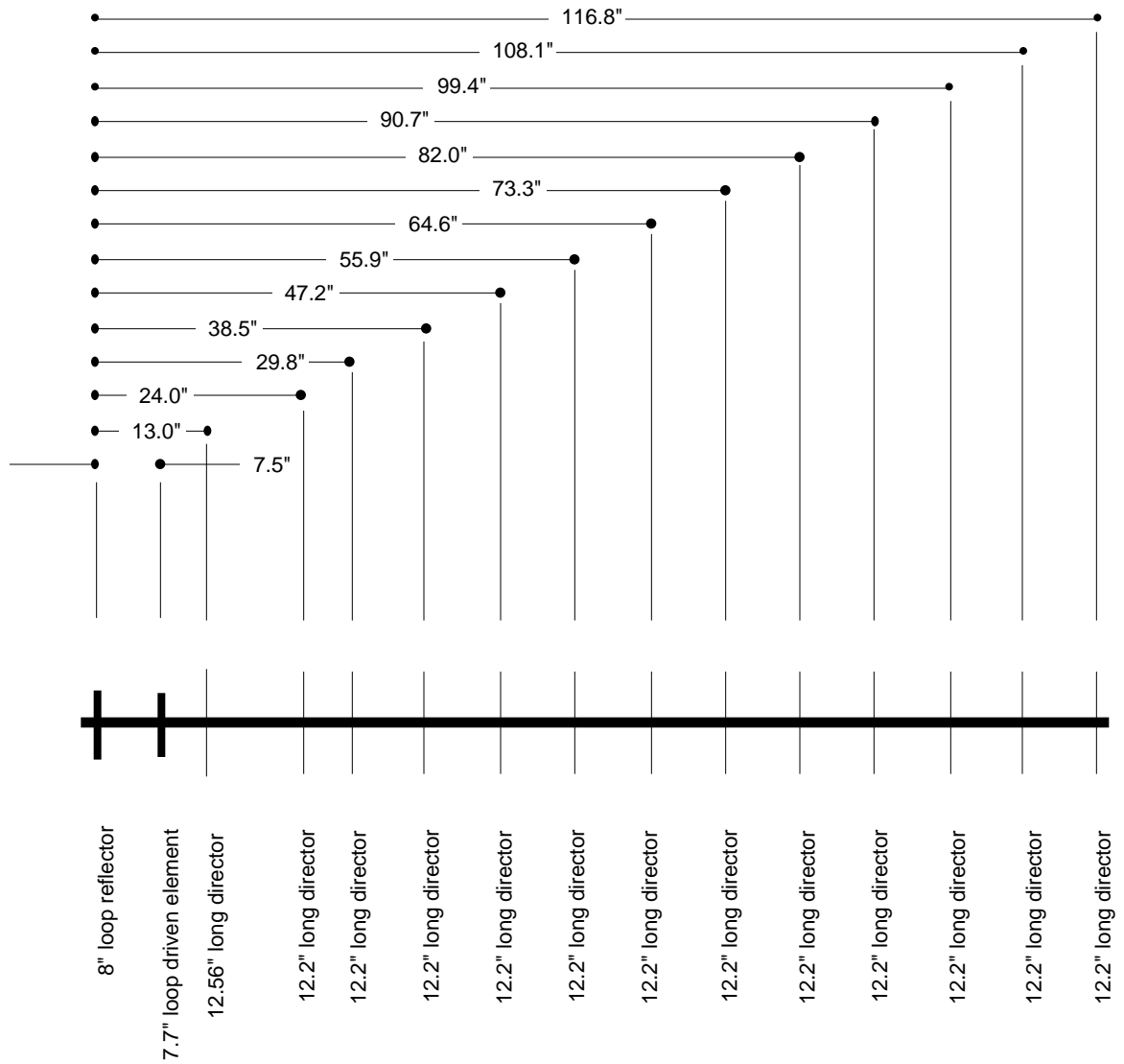
The rear (reflector) loop on the antenna can be close to the ground if the antenna is close to vertical. If you need to operate at angles closer to the horizon, raise the antenna mount so the antenna is at least one boom length above the ground.

Make sure the antenna supports to the side and in front of the antenna are non-metallic. Antenna supports behind the antenna can be metallic.

It is acceptable to mount the rear of the wood boom onto a metal pipe in order to extend the antenna above ground.

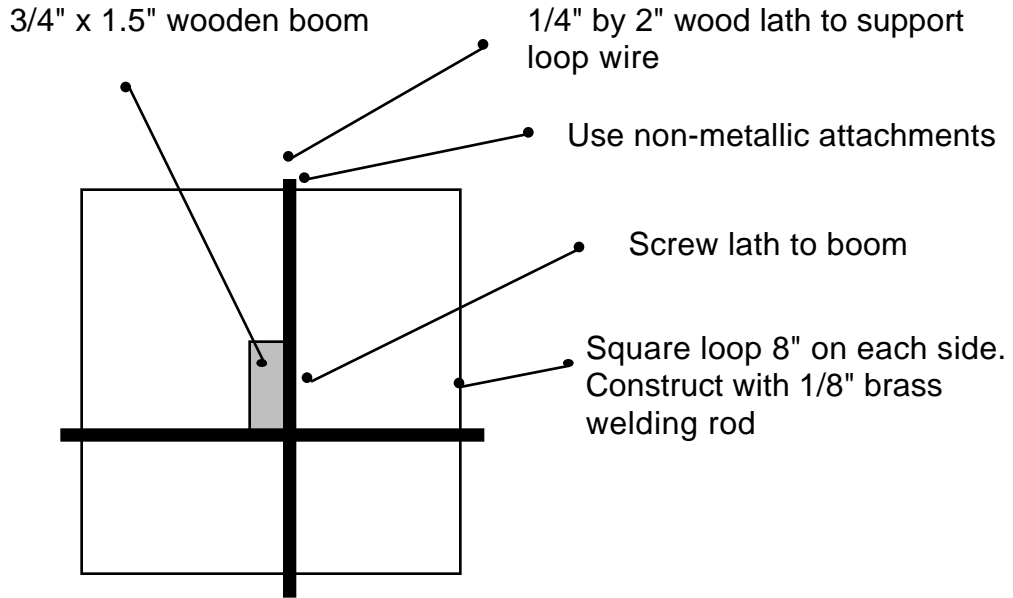
The remaining construction of the antenna should be self-explanatory. Just remember to keep all elements symmetrical about the boom.

The following shows the antenna as viewed from above. This is your guide for all drillings and mounting details.



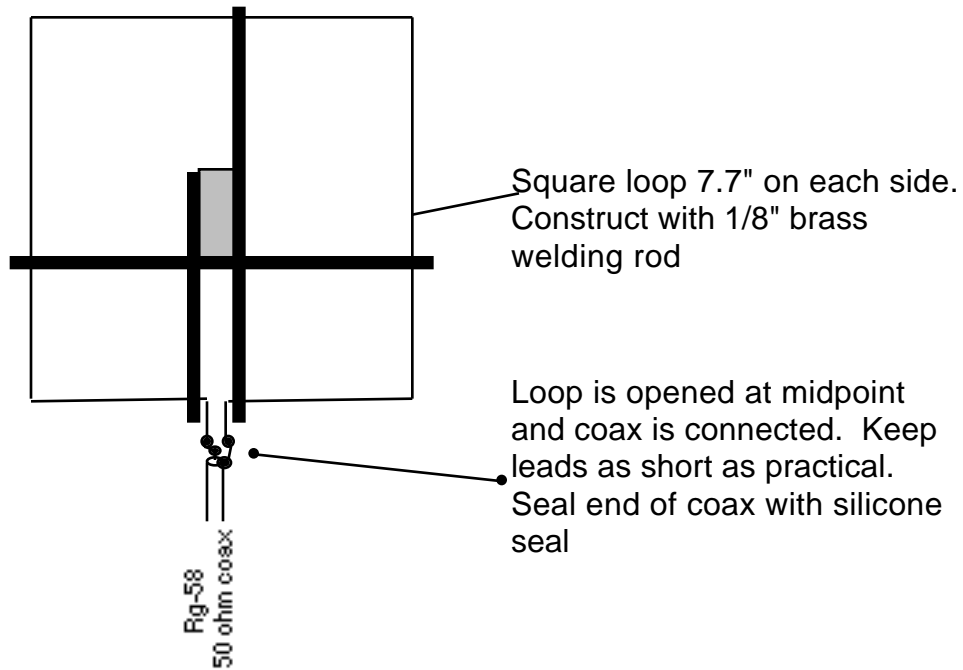
Top view of antenna

The following detail shows the reflector loop construction:



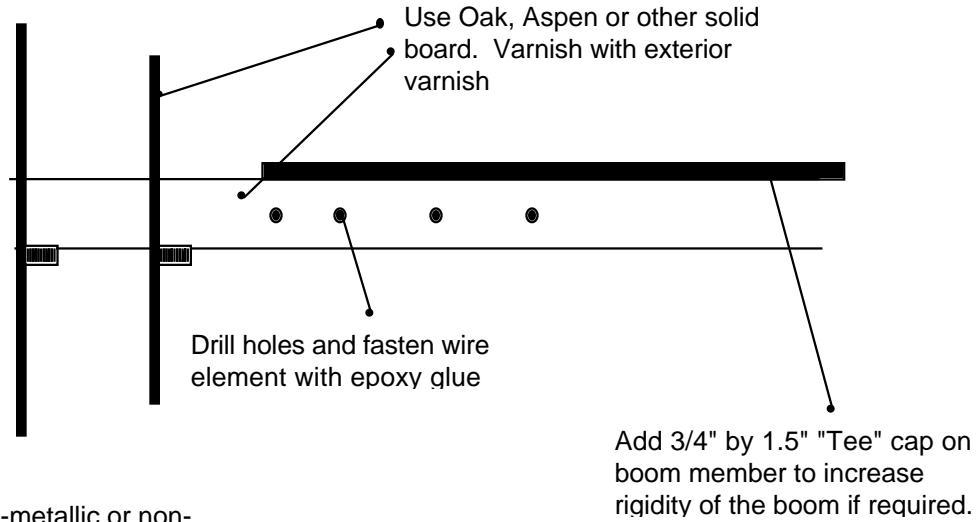
Reflector Loop Detail

The driven element loop is as follows:



Driven Element Loop Detail

A side view of the boom shows how to brace the boom with a second piece of wood if determined to be necessary.



Any non-metallic or non-conductive material can be used for the boom construction and loop support.

Wooden Boom Details

Have a good time building your antenna.

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