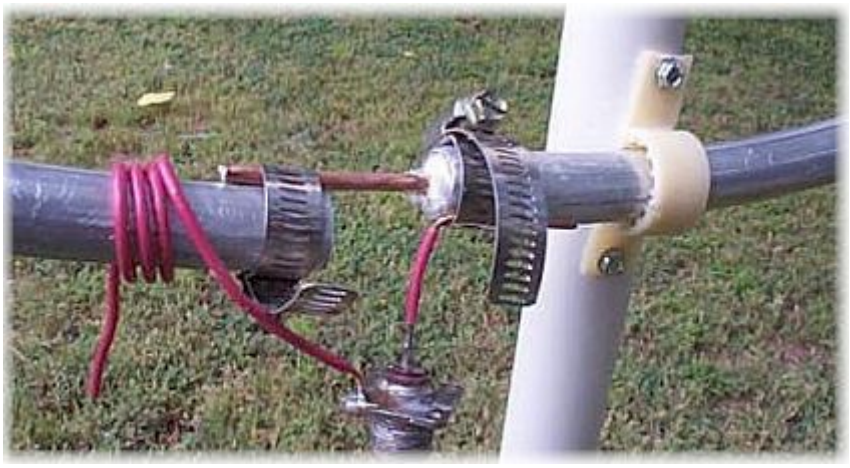
WANT TO GO ON 40 METERS?
By George Sharp KC5MU and Jef Verborgt

Look no further! Here is all you need: 10 feet 3 inches of 3/4-inch hard line, 2 hose clamps, a chassis connector, a little bit of house wire, and you could be in business as shown in the photo below:



About a year ago we presented you with some ideas for building very small mono-band magnetic loop antennas from coax cable (see Small Magnetic Antennas in Archive IV). The idea behind these small magnetic antennas was to use the inherent capacity between the coax center and the braid of the coax to resonate the loop antenna. Using this method, no external capacitor is needed to resonate your loop antenna. But there is no such thing as a free lunch: the price you pay for using this technique is that the antenna is a mono-band antenna.

We also presented a novel way to directly feed these small magnetic antennas without the use of any coupling loop, gamma match or variable capacitors. By doing away with variable capacitors, we solved the problem of obtaining a high quality variable capacitor. We also reduced the ohmic losses due to poor contact points simply by eliminating them!

Two ways were presented to hook up the coax feeder. Today we present you with an antenna using the second way to connect the coax. This way of connecting the coax allows for a considerable tuning range with George's new trick of tuning the antenna. An entire ham band can easily be covered with the method.

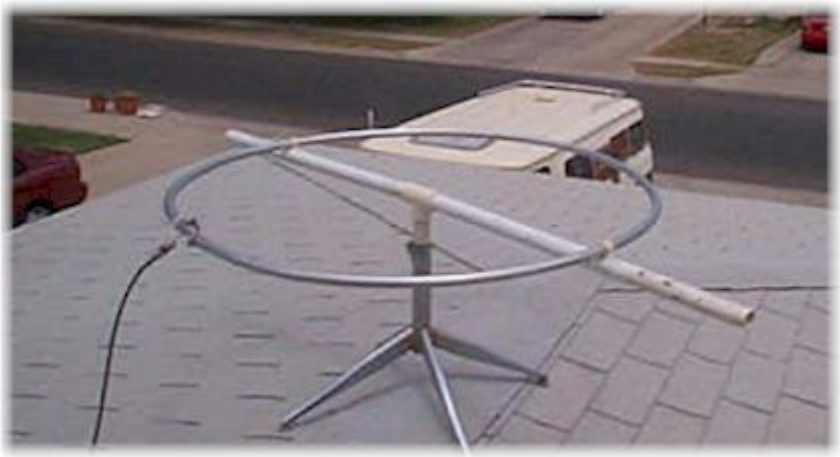
KC5MU KICKS IT UP ANOTHER NOTCH
The antenna built by George provides several advantages over the previous ones:

- The use of hard line to build the loop results in greater stiffness and avoids sagging of the loops.
- The use of a length of single house wire wound on one loop end to create a "variable capacitor" without any moving or connecting parts. We can absolutely avoid any losses due to poor contacts, since the wire has no moving contacts. The method is simple indeed, but very suitable to this application.

The possibility of building these stiffer loops for the lower frequency bands by making two or even three turn loops.

Visit your nearest cable company and ask for some 3/4-inch hard line a little longer than 10 foot 3 inches. Remove 2 inches of jacket and insulation from one end. From your cut, measure 10 feet 1 inch and cut off the other end. Form the hard line into a circle, and add the clamps and chassis connector as the picture shows. Three or so turns will give an SWR near 1:1 close to the top of the band. More turns will do the same close to the bottom of the band. The bandwidth between 2:1 SWR points is about 50 KHz.

Located on George's roof on a 10 foot piece of 1 inch PVC pole, this antenna proved as good as his ***MFJ***. (It was sometimes better for NVIS). It's about 17 feet above ground level, but who knows where the actual ground is in this desert area of Roswell, New Mexico, USA.



George tried it horizontally but it didn't work very well in that position.

George has used the same system of self-resonance with 3/4-inch hardline on 80 and 160 meters with fair results, but the loops are too big (about 6 and 10 feet in diameter, respectively) so, George took them down because, with the high winds, he was afraid they would go "looping" down the street!

Soon George plans to try three 40-meter loops secured together to get more capacitance and to get more surface area.

Further suggestions for improvement and experimenting:

- From the pictures, you can see that the outer shield of the hard line is made of aluminum and the center is made of copper. Corrosion problems may occur under most climatic conditions. Use copper sleeves made from a length of copper pipe cut longitudinally that will give a tight fit over the loop ends. The wire connections can then be soldered firmly to these copper sleeves to reduce ohmic losses. The two hose clamps should also be made of stainless steel to avoid further bimetallic corrosion problems. These precautions should result in a narrower bandwidth and increased efficiency.

- Weatherproofing of the contact points is a must. We leave this one up to the imagination and creativity of the individual experimenter.

- One could also envisage copper plating the entire loop, or at least both loop ends, for better conductivity and for better soldering contacts.

- If you cannot find the hard line coax cable, do not despair! You might wish to experiment with building your own hard line from soft drawn copper tubing and a length of house wire or smaller diameter copper tubing such as “copper brake line.“ Your local hardware store sells lots of small diameter plastic tubing that can be used to fabricate your own homemade hard line coax with even better conductivity in the exterior shield. Use some silicone lubricating spray to insert the plastic tubing in the copper tube. This does make the job a lot easier, as you will find out for your self.

- The required length of the coax can be calculated from the equation: F = square root of 25330 / (L x C). The higher the capacity per foot the shorter your loop has to be to resonate at a given frequency.

- To measure the L and C value of your hard line coax, use of an L/C meter, such as the one that can conveniently be bought here at the ***antenneX*** Shopping Shack in the Equipment Section.

- As already mentioned above, there is no reason why you could not build a version for the 80 or even 160 meters by making a two or even a three-turn loop using the same principles.

- The antennas presented are strictly mono band antennas. However, you can connect two or more antennas for different bands to the same coax feeder, giving you a little more room to move around.

- The antennas show directivity when mounted vertically along the plane of the antenna. If you build two of them, you might build an end fed array for increased directivity and gain.

- You might wish to add a small sensing vertical antenna in the same way as is done in direction finding magnetic antennas. This way you can increase the forward gain of this small antenna and, with a small rotator, the world is yours!

ABOUT THE AUTHORS:

GEORGE F. SHARP, KC5MU

"Old George" (as he refers to himself) has been a Ham since he was 16 (now 86) years of age. He has experimented with antennas, especially small ones for 80 and 160 meters for the last 18 years. He admits there have been a few successes and many failures! His best successes have been with 10-foot diameter loops made of 3/4-inch hardline using their internal capacitance for resonance on 80 and 160. George is a retired Navy Captain (Submarines) USNA Class 1939 with some extra electronics courses back in the tube days. He has the usual Ham gear powered by Solar charged batteries and the best and well-used test equipment is an MFJ Analyzer.

DR. JEF VERBORGT

Jef Verborgt **was born in 1944 in Belgium. Jef was saved from a certain early death by meningitis by the American soldiers having the first penicillin for which he is still grateful. He went on to obtain a Ph.D. degree in Polymer Chemistry in 1970 at Louvain Belgium followed by a postdoctoral Fellowship with Dr. C.S. Marvel at the *University of Tucson*, Arizona. Jef has been Director of Research for *Sigma Coatings* for 15 years after which he became Director of the International Business Operations for Marine and Protective Coatings. Jef further held the position as President of *Sigma Coatings USA* in New Orleans, Louisiana. Jef now lives in Florida. He is married to Marijke from Holland where Jef had lived for some 20 years. He is the father of one daughter and two grandchildren who live in Belgium. Jef says he enjoys fishing, Louisiana food, experimenting with antennas and living in the USA.**

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