OmniLoop ™ Assembly Instructions

Tools: wire cutter/stripper or pocket knife; pliers or small wrench; crimping tool. Optional : soldering iron, solder. For suspension, double dacron line is recommended. Two hundred foot spools are available from AntennasWest. To cut and to seal the ends of the dacron line, use a pocket lighter.

Step 1. Check all parts against parts list.

Parts List

1. Premeasured, kinkproof, insulated antenna loop (black #14 *QuietFlex* wire)
2. 5 egg insulators to serve as sliding tensioning insulators to support loop and pull it into desired shape
3. OmniLoop feedpoint balun. This is fitted with an SO-239 connector for 50-ohm coaxial feed.

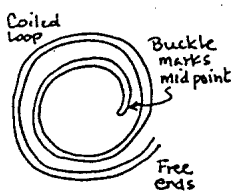
Step 2. Survey Installation Site to Determine Best Assembly Strategy

Unlike dipoles or long wires which have free ends, a loop is a continuous wire once it is assembled. This means that twists must be removed from the wire before the two ends are anchored to the feedpoint. It also means that you should think of where you will install the loop before you attach the feedpoint.

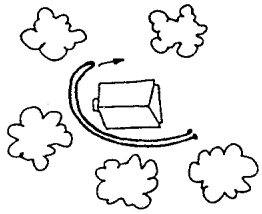
a. If your OmniLoop will be installed in the clear, supported from trees or poles located outside its perimeter, you can simply assemble the feedpoint without unrolling the wires. Just skip to step 3 below.

b. But if the loop will encircle or pass over tall trees or buildings (such loops usually work just as well as those installed in the clear), it will be easier to extend the wire fully in a circle before you assemble the feedpoint. You may attach one side of the wire to the feedpoint before beginning, then take the free end of the wire around the obstacles and return to complete the feedpoint assembly. Or you may extend the wire, then bring both free ends to a point where you can work on them and complete the feedpoint assembly all at once.

First study the way the loop wire has been coiled up. At the inside, there is a buckle in the wire marked with tape. This is the half-way point of the loop. At the outer edge of the coil are the two free ends. These will be attached to the feedpoint. By winding the coil in this fashion, the twist by coiling the wire will fall out as it is unrolled.

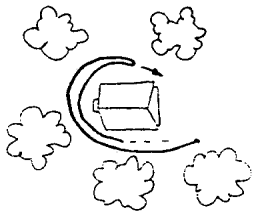


To extend the wire, first anchor the free ends to some fixed point and grasp the coil so it stays together. Then clip the bands and unroll the coil as you walk away from the attachment point, extending the wire on the ground and beginning your circuit around the objects to be encircled by the completed loop.



When you reach the end of the coil you will be half way around. Leave the wire there and return to the point where you anchored the free ends. Release one, leaving the other anchored. Drop the unanchored free end on the ground and retrace your steps to the marker. Do not carry the free end with you as you go.

Having returned to the midpoint, pick up the wire at the buckle and pull on each leg to idenfify the free one. Pull it along after you as you continue the circuit around the obstacles your loop will encircle till you arrive at the starting point. The loose end will follow you without snagging, and any twists that have by error been introduced in the wire will be removed in the process. Once the wire has been laid out around the objects, bring the two free ends together and follow the approriate instructions in step 3.



Step 3. Assembly of Feedpoint

Your OmniLoop comes completely premeasured and rolled in such a way that there will be no kinks or twists in the loop if you follow the directions.

If you will be installing the completed loop in the clear, you may proceed to attach the feedpoint without unrolling the wires. Keep the roll intact, and find the two free ends at the outside of the roll. The buckle in the center of the roll is the half way point of the loop wire and will be half way around from the feedpoint when installed. Leave the wire coiled while you work on the feedpoint.

a. Begin the coax feedpoint assembly by slipping the two free ends off the coil for a distance of 2 feet to allow easy manipulation. Place them on the

work surface in front of you. Don't clip the bands that hold the coil together.

b. Attach each end of the loop wire to the balun tie points with two half hitches. Leave a 4" pigtail for making the electrical connections.

c. Remove the cap from the balun. This will reveal the two binding posts reserved for connecting the pigtails. Notice that near each post there is a small downward sloping hole through which a pigtail may be inserted. Insert each pigtail. Be sure it is long enough to allow a good connection to be made to its corresponding binding post while still having sufficient slack that there will be no tension on the connection.

d. Notice that crimp ring terminals are provided for making a permanent connection to each binding post. Ignore these initially, and make a short-term test connection for initial evaluation. Once you have tried it, you may desire to shorten the loop to raise its resonant frequency. If so, it is easier to make this adjustment if the ring terminals have not yet been crimped or soldered to the Pigtails. For the present, loosen the nuts on the binding posts sufficient to allow space for a pigtail to be wrapped around each one. Taking each pigtail in turn, remove 1" of insulation, then wrap the wire tightly around the appropriate binding post. Tighten the nuts.

e. Replace the balun lid. Notice that it will click into position, forming a weather-tight seal.

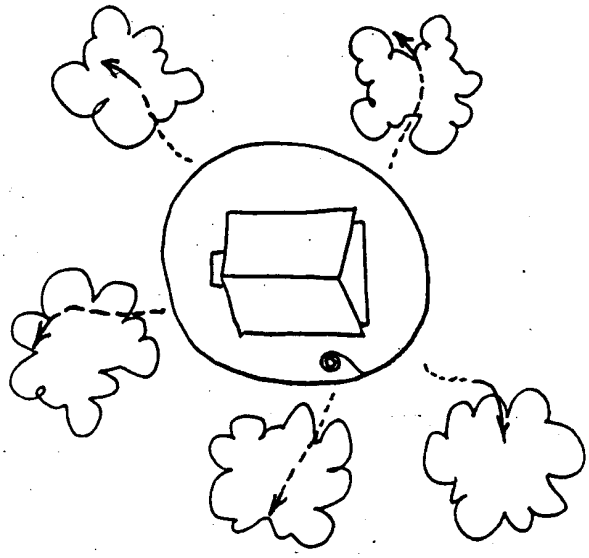
This completes the temporary assembly of the feedpoint. Next, complete the antenna installation and measure the SWR on each band.

Step 4. Installing your OmniLoop

Vertical dispositon may have some advantages on a loop's fundamental resonant frequency, but for general purpose all-band use, we recommend a horizontal or sloping attitude. (A short discussion of the trade-offs is given later in a side-bar.) As to shape, the avaiability of trees or other supports will influence the range of possibilities. The advantage of one shape over another is of little consequence so long as you remember that greatest bandwidth and efficiency in any location occur when the area enclosed by the loop is maximum.

Installing it: The recommended approach is to lay the loop out on the ground in the location where you intend to suspend it. Toss lines over the available supports.

Slip the sliding tensioning insulators onto the antenna at the appropriate place and attach to the support line. Lift by pulling on the support lines, passing from one to the next to raise the antenna progressively and clear low lying branches or other obstacles. The sliding tensioning insulators allow the antenna to slide freely to find its equilibrium while being raised to position.



In some cases, there are too many trees, and no clearing where the antenna needs to be. Don't be afraid to let OmniLoop pass right through trees or better yet simply rest on the tops of the trees themselves. At HF frequencies, there is no significant absorption of the antenna's radiation, and besides OmniLoop's wire is fully insulated to over 3000 volts. If you use a launching system like the one recommended you will find it possible to launch clear over the tops of high trees and pull the antenna wire from one to the next to obtain the shape you wish.

Launching the Support Lines: If you can suspend your loop from lines thrown completely over the tops of trees, not only do you gain in height, but the small branches will act like springs to absorb the stress of wind, snow, and ice loading, protecting the antenna from the strain.

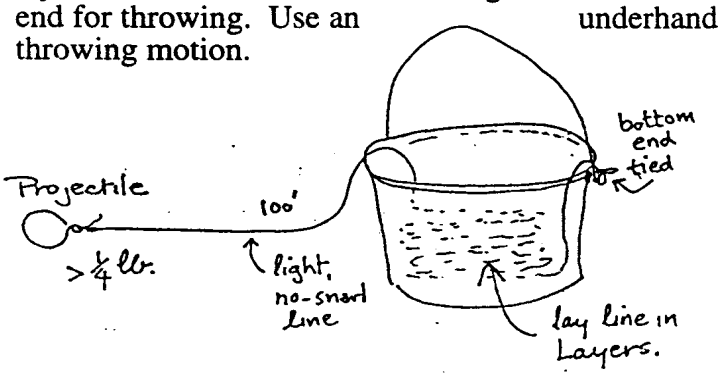
The QRV-QL QuickLaunch Wire Antenna Installation Kit (available from AntennasWest) is designed for easy installation of OmniLoops and other wire antennas. The kit contains 200 ft of extremely light and highly visible braided launch line as well as 200 ft of the highest quality UV-proof double dacron support line. It is an easy to use launching system capable of hanging antennas from trees more than 70 feet high. The kit eliminates climbing and is much easier to use than expensive bows and arrows, balky slingshots, and casting rods. With it, you can hang your antenna at considerable height without ever lifting a foot off the ground.

The QRV-QL kit also contains a book of pointers showing how to deal with tricky situations. Suggestions for assembling your own launcher patterned after this product are given below.

A Simple, Effective Launcher: The keys to any successful launch method are to eliminate drag from

the launch line and to keep the launch line from snarling or snagging. To eliminate these, you must do away with reels, avoid coiling the line, and use braided line.

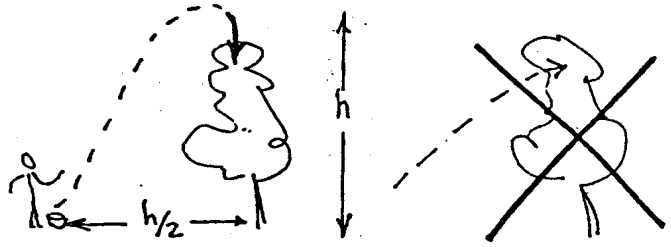
An effective line carrier may be made from a one or two gallon pail with smooth sides. Use light, no-snarl line. Anchor the line to the pail by tying its end to the handle. Then lay the line into the pail in layers. Attach a smooth round weight to the free end for throwing. Use an underhand throwing motion.



Launching hints: If you use a launcher pail as described above, you will be able to lob a spherical projectile weighing a little more than a baseball over low trees with a simple underhand toss. Such a toss is accurate and can go up 30 to 40 feet. With a few practice tosses in an open field, most hams become very accurate with this method.

For greater heights, use the same basic approach, but let the weight hang a foot or so below and twirl it by the launch line. The larger arc will produce a greater take off velocity and carry the weight heigher. Good accuracy takes more practice, but is attainable. Even those with bursitis have reported that the gentle motion required is within their capability.

With a well made launching systems designed in accordance with these principles, heights as great as 100 feet are routinely attainable.



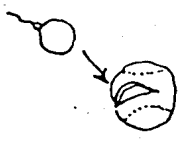
- Stand at a distance half the targeted height.
- Underhand throw gives loft.
- Aim 10 ft over crown of tree.
- Projectile should be falling before it hits tree.
- Be patient. Let the wind shake it out.

Use caution when throwing lines over buildings. Throw extra high, lest the launch line catch on the near side of the roof and cause the weight to swing back against the opposite side and break a window.

More detail is available in the AntennasWest technote titled, Wire Antenna Installation The Easy Way (US $7 ppd) You can also order high visibility light weight kink-proof launch line and optimally weighted flame red projectiles from the same source.

Launching Safety Precautions

- Stay far from power lines.
- Yell "HEADS UP!"
- Split tennis ball safety cover protects windows.



Support Lines: 80 lb monofilament fishing line is inexpensive and lasts for years, but the easiest line to work with is the new UV protected double dacron. The 3/32" size supports 250 lbs without stretching, inspite of its small diameter.

Step 5. Testing and Adjusting

Attach 50-ohm coax to the connector on the Omni-Loop balun. Notice that it is slightly recessed to provide a drip shield if the balun hangs vertically.

Connect the feedline to your receiver and listen first. Then use an SWR analyzer or make short low power transmissions while noting the SWR on each band. If your feedline is a multiple of a half wave on the fundamental frequency of the loop, your SWR readings will accurately reflect what is present at the feedpoint of the antenna itself.

Height, shape, and other conditions influence the resonant frequency of your OmniLoop. Since these vary from one installation to another, final length adjustment should be done with the loop installed.

Under normal conditions, the length of wire provided will yield an antenna with its lowest SWR near the very bottom of the band for which it represents a full wave loop. Low SWRs will also occur near each odd and even harmonic frequency, including 52.0, and 146 MHz. Shortening the loop will raise the frequency at which the loop exhibits lowest SWR.

If you desire to raise the resonant frequency of the loop, simply shorten its length in increments of 1 ft or less and track the changes on the fundamental and each harmonically resonant frequency. Find the length that gives a good coverage of the bands you like most to use.

Shown below are typical SWR readings for a horizontal 80 meter OmniLoop in a square at 35 ft in trees, without other wires, antennas, or metallic siding nearby. Installations vary, but your readings will resemble these.

Once you have adjusted the loop length to your satisfaction, make the permanent connections by soldering or firmly crimping the rings to the pigtails inside

the balun.

MHz	SWR	MHz	SWR
3.550	1.3:1	21.350	1.5:1
7.110	1.7:1	24.940	1.4:1
10.500	1.5:1	28.500	1.4:1
14.200	1.6:1	50.000	1.3:1
17.950	1.3:1	146.00	1.2:1

That's it! You're done!

You have built an effective easy to use, long lasting antenna that will give you satisfying all-band results for years to come. Now it's time to put it on the air.

The comments below suggest ways to reduce the space needed for installing an OmniLoop as well as some ideas for adapting it to favor DX on the low bands and increasing its gain by the addition of a reflector.

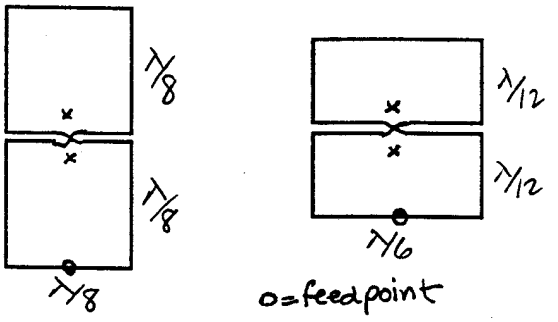
Sloping the OmniLoop

For pinched space, sloping or bending may fit an 80 meter OmniLoop into spaces no larger than would be required by a crossed pair of 40 meter dipoles.

Fold OmniLoop for Very Small Spaces

Another variation attempted with success by some hams is to fold the OmniLoop into a figure-8 shape. Hams that have done this report good results and the ability to obtain roughly the same low multiband VSWRs as are characteristic of the standard OmniLoop.

The folded OmniLoop may take either of the shapes indicated below. Note that the points marked with "x" are high voltage points of the loop, and they occur at the point where the wires cross over each other in the center of the figure.



Typical dimensions for an 80 m folded OmniLoop are 1/8wave=33 ft and 1/6 wave=45 ft.

Since loop radiation is produced by the current flowing in the wire, and current is minimum at these high voltage points, placing them at the inside of the figurewill reduce radiation efficiency very little, but it will greatly reduce the space needed for installation of the loop.

If you try this folded OmniLoop configuration, remember that the high voltage "x" points need to be separated by several inches. Do not be surprized if some tweaking and adjustment of the cross over section is needed to get the SWRs to come into line.

The folded OmniLoop has a different radiation pattern because of the phase reversal achieved by the central cross-over. You will find that this configuration increases your DX abilities on the lowest band, replacing the central broadside lobe of the antenna with a null, and pushing the greatest radiation off at a 45 degree angle to the plane of the loop. This occurs even when the antenna is low to the ground. So the folded OmniLoop is a compact and low height DX antenna perfect for the low frequency 160 and 80 meter bands. The progressively lower radiation angle on higher frequency bands however does not occur when the loop is folded.

Roof-Top OmniLoop is Invisible but Effective

Being insulated you can simply lay OmniLoop directly on the roof. If necessary to make it blend in with shingle coloring, simply mist it with the appropriate color of spray enamel before uncoiling it.

Add a Reflector to Increase Gain

For increased performance on the lower bands, you can add a reflector under the loop or a director over it. To stimulate your imagination search out the report by clever loop experimenter, WØTID. The article originally appeared in the 1987 *QRP Quarterly*, an excellent resource for the imaginative experimenter. WØTID sloped his loop from a single tall support and installed a dipole reflector beneath his loop to increas its gain. His experiences illustrate the versatility and all band effectiveness of horizontal and shallow sloping loops.

Note that adding additional elements lowers the radiation resistance of the loop, so that a modified feed point balun may provide a better match. Call AntennasWest for advice.

Be Prepared for an Emergency

A 40 meter OmniLoop is an excellent emergency antenna with manageable dimensions. With a transmatch and a Marconi Adapter it will do a good job on whatever band is open. It goes up safely and quickly wherever you need to get on the air, and it stores easily when it's time to move on.

Keep an extra OmniLoop with your emergency gear or in the trunk of your car, where it's ready for action whenever needed.

OmniLoop as a Radiator

Whether horizontal, sloping, or vertical, an OmniLoop promises plenty of RF fireworks.

Where OmniLoop's radiation goes depends on how it is hanging and how high it is off the ground. If OmniLoop is horizontal, whatever its shape and wherever you feed it, its polarization is horizontal and it radiates more or less uniformly in every compass direction. At its lowest resonance it's strongest radiation will be straight up, giving solid blanket coverage of an area out to a distance of 600 to 1000 miles. But even though that's where most radiation is directed, there will still be more radiation at lower angles than you would obtain from a half wave dipole at the same height. So in every direction and at every range, OmniLoop will beat a resonant half-wave dipole at the same height.

The horizontal loop is not a DX killer on its lowest frequency, but it becomes increasingly effective--even outstanding--for DX when used on its harmonics.

At its second harmonic the horizontal loop's major lobe will be closer to 45 degrees, and DX performance will show a strong improvement in every direction. On each subsequent harmonic the major lobe goes lower, approaching the plane of the loop, and the DX performance increases.

If a loop is mounted vertically, the question of where the signal goes gets more complicated. First of all, a vertical loop favors certain directions which change on each harmonic. On the fundamental frequency, the antenna will favor the "forward" and "backward" directions broadside to the loop, with slightly reduced radiation in the plane of the loop. But when operated on harmonics, the forward and backward lobes split, favoring the diagonal directions.

As to radiation angle, that depends on where you feed the loop as well as what frequency it is operated on. Starting with the fundamental frequency, feeding a vertically hung loop on its vertical axis, whether at top or bottom will produce a horizontally polarized radiation at a take-off angle above 60°. Signal strengths on the lowest band will be stronger beyond 1000 miles than for the horizontal loop.

Feeding the same vertically hung loop at a side corner or a vertical or sloping run will introduce vertical polarization and lower the angle of radiation toward 20°, increasing DX signal strength and attenuating the near field. So the side fed vertical OmniLoop is a very interesting fundamental frequency DX antenna.

In harmonic operation vertically hung loops become medium angle radiators because lobe splitting creates more high angle radiation while creating a null in the formerly favored broadside direction. The increasing gain shows up diagonally and off the ends. So, while the horizontal loop starts off local and gets better and better for DX, the vertical loop starts off a DX antenna but becomes a local antenna on harmonics.

So if you already have a good DX antenna for the higher frequencies and want DX on 80, 40 or 160, a side-fed vertical OmniLoop can deliver it.

If you need an antenna with a consistent signal for checking into nets across the country on all bands, look to the horizontal or gently sloping OmniLoop. Since it stays practically omnidirectional, the horizontal OmniLoop turns out to be an outstanding net antenna.

If you are looking for a single antenna that will provide good general coverage on 80 or 160 meters while delivering increasing DX results on the higher bands, look again at the horizontal or gently sloping OmniLoop.

The key thing to remember is that however your loop is hung or fed, it starts with gain and gives you more of it on each higher band. That means there is more signal to be heard in all directions and at all distances.

So, whether horizontal, sloping, or vertical, an OmniLoop promises plenty of RF fireworks.