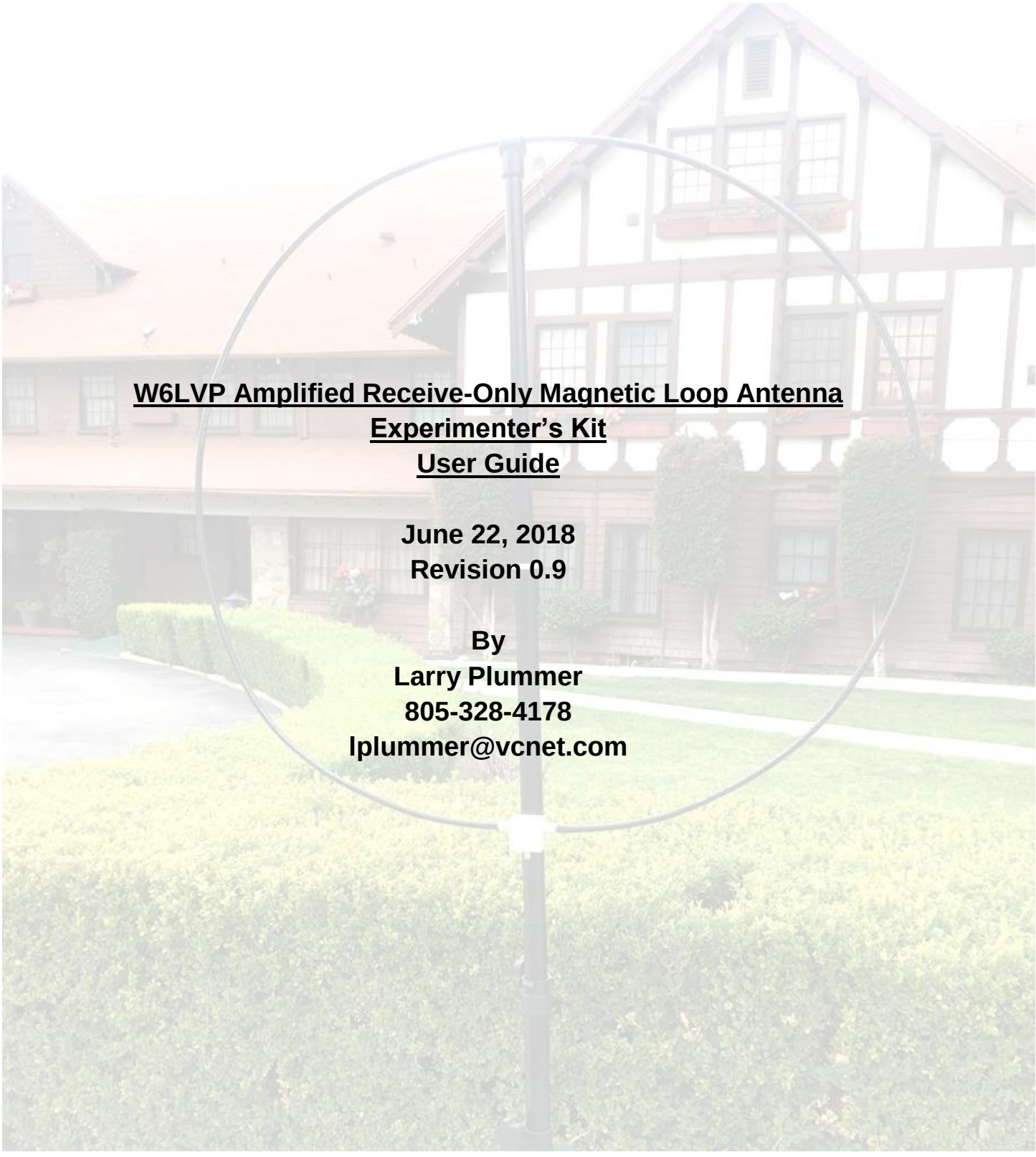


W6LVP Amplified Receive-Only Magnetic Loop Antenna
Experimenter's Kit
User Guide

June 22, 2018
Revision 0.9

By
Larry Plummer
805-328-4178
lplummer@vcnet.com

Building Ideas

There are many antenna structures and building materials options to construct a working magnetic loop antenna starting with the experimenter's kit. The options are limited only by your imagination. The purpose of this user guide is not to present a complete list of construction ideas but rather by presenting just one, illustrate some of the key issues.

Except for the experimenter's kit, my objective is to get 100% of the materials at a local hardware store, Lowes, or Home Depot. I also like to use materials that are taking up space in my garage just looking to be put to use.

One key attribute of a magnetic loop antenna that makes this project easier, is that mounting the antenna higher is not necessarily better. Typically, six to twenty feet is a good range. The loop needs only to be high enough to have an unobstructed view of the sky in the directions of interest. My personal primary loop antenna is only about 1 foot above the top of my back wrought iron fence that is itself 5 feet tall.

I love making things out of PVC pipe so that will be an important building material for me. Second, I noticed an unused patio umbrella stand beside the house. This stand is made of plastic and filled with sand. With the sand, it is heavy and will make a stable base for a loop antenna.

Unlike transmit loops where the loop resistance is very important, an untuned receive-only loop antenna has low Q so there is no size requirement for the loop material. For me, the key loop material parameter is stiffness to maintain a fairly round shape. However, a perfect round shape only serves your ego. A bit of deformation won't reduce the antenna performance.

My experiments have demonstrated very little difference in performance between 6 foot circumference and 20 foot circumference loops. Clearly a small loop is much easier to support, manage, and maintain shape. I used a 6 foot length of 12 gauge insulated solid copper house wire for a loop that I took aboard a cruise ship. I will use the same for this loop example. House wire often goes by the brand name Romex at your hardware store.

The summary of the loop structure plan is to use a 5 foot length of 1 inch PVC pipe to support the loop. (Again, I chose the length and size of the PVC because it is what I have.) The base will be a sand-weighted umbrella stand. And, the physical loop will be 6 feet of 12 gauge Romex. (Actually, just one of the three Romex conductors is used.)

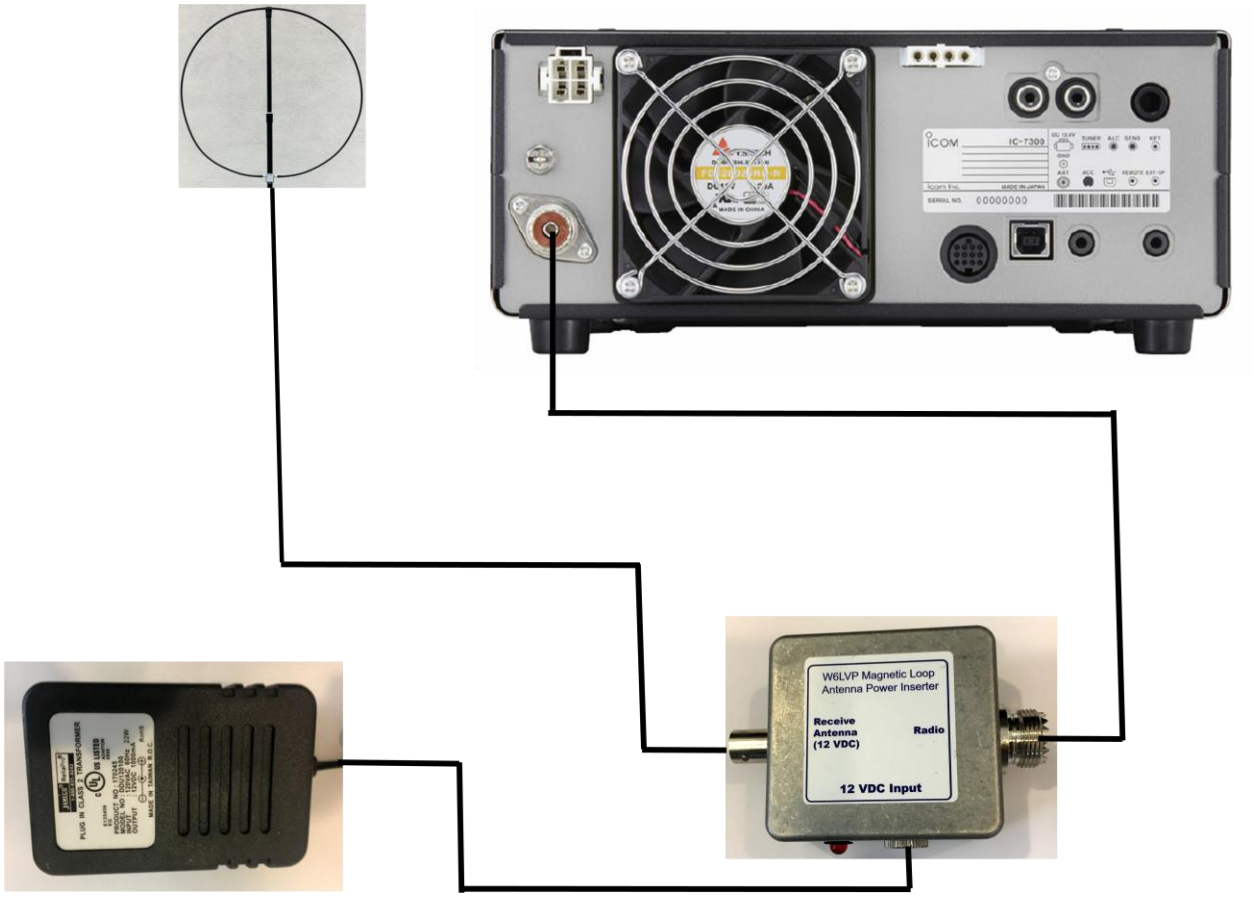
The only other construction detail is mounting the W6LVP loop preamp. I will use a couple cable ties to fix the preamp to the PVC pipe at the point where the loop looks somewhat round. Even after you pull the cable ties as tight as you can, the preamp will slide up and down the PVC pipe to adjust the roundness of the loop.

Although not a requirement, I added a PVC cap to the top of the PVC for looks. I then drilled a hole through the cap and PVC pipe for the loop wire to pass through.

And here is the completed loop antenna.

Using your new mag loop antenna and power inserter with a transceiver with separate receive antenna input or with a receiver separate from the transceiver .

When using the W6LVP magnetic loop and power inserter with a transceiver having a separate receive antenna input or with a receiver, connect it as follows:



- Connect a short 50-ohm cable with PL-259 connectors between the transceiver receive antenna connector or the receiver antenna connector and the RADIO connector on the transmit/receive switch.
- Using a 50-ohm coaxial cable with BNC connectors or other connectors and BNC adapters, connect the power inserter RECEIVE ANTENNA input to the loop amplifier output. Although the loop preamp and the input to most radios are 50 ohms, my experiments indicate that quad shield RG-6 cable with F to BNC adapters is not only inexpensive but has good common mode rejection.
- Connect the 12 VDC power adapter and the LED will illuminate indicating power is applied.

TIPS

The loop antenna can be oriented either for optimum desired signal reception or minimum noise. Testing has indicated that orientation for minimum noise has the greatest benefit. Noise sources change throughout the day and on different bands making a rotator very handy. There may be cases where the loop can be rotated to separate two stations operating on the same frequency – optimize one and minimize the other.

A 1” PVC compression coupler available from hardware stores for about $5 is a great aid to either extend the lower section of the loop PVC tube or to attach the loop directly to the top of a speaker tripod. If using the coupler to extend the lower PVC tube, use an appropriate length of 1” PVC pipe and the coupler will fit perfectly on both the bottom section of the antenna support tube and the top of the PVC extention. If using the coupler to attach the antenna to a speaker tripod stand, one end of the coupler will fit directly to the bottom of the loop PVC 1” pipe. However, the diameter of the top tube of the speaker stand is slightly too large to fit the coupler compression nut. In order to make it fit properly, remove the compression nut and slightly enlarge the hole in the compression nut to fit the top of the speaker tube. The hole can be enlarged using a half-round file, a rat-tail file, or a short piece of ¾” PVC pipe with fairly course sandpaper wrapped around it to form a round file.

If a permanent extenstion to the lower 1” PVC pipe is necessary, a 1” to 1” PVC slip coupler can be used between the lower section of the antenna structure and the top of an appropriate length of 1” PVC pipe with both glued into the coupler.

Use only the supplied 12 VDC linear power adapter or equivalent. Do not use a switching 12 VDC power adapter as it will inject noise into the received signals.

NEVER CONNECT THE POWER INSERTER RECEIVE ANTENNA CONNECTOR (BNC) TO THE TRANSCEIVER ANTENNA OR RECEIVE ANTENNA CONNECTOR. THE CABLE FROM THE POWER INSERTER TO THE LOOP IS USED FOR BOTH THE RECEIVED RF SIGNAL FROM THE LOOP AMPLFIER AND 12 VOLTS DC POWER FOR THE LOOP AMPLIFIER. THAT 12 VOLTS DC COULD DAMAGE THE INPUT TO A TRANSCEIVER OR RECEIVER.

NEVER CONNECT THE OUTPUT OF A TRANSCEIVER OR POWER AMPLIFIER TO THE MAGNETIC LOOP AMPLIFIER. THIS ANTENNA IS FOR RECEIVE ONLY.

Warranty

All products manufactured by W6LVP are warranted to be free from defects in material and workmanship for a period of one (1) year from date of shipment. W6LVP's sole obligation under these warranties shall be to issue credit, repair or replace any item or part thereof which is proved to be other than as warranted; no allowance shall be made for any labor charges of Buyer for replacement of parts, adjustment or repairs, or any other work, unless such charges are authorized in advance by W6LVP. If W6LVP's products are claimed to be defective in material or workmanship, W6LVP shall, upon prompt notice thereof, issue shipping instructions for return to W6LVP (transportation-charges prepaid by Buyer). Every such claim for breach of these warranties shall be deemed to be waived by Buyer unless made in writing. The above warranties shall not extend to any products or parts thereof which have been subjected to any misuse or neglect, damaged by accident, rendered defective by reason of improper installation, damaged from severe weather including floods, or abnormal environmental conditions such as prolonged exposure to corrosives or power surges, or by the performance of repairs or alterations outside of our plant, and shall not apply to any goods or parts thereof furnished by Buyer or acquired from others at Buyer's specifications. In addition, W6LVP's warranties do not extend to other equipment and parts manufactured by others. The obligations under the foregoing warranties are limited to the precise terms thereof. These warranties provide exclusive remedies, expressly in lieu of all other remedies including claims for special or consequential damages.

SELLER NEITHER MAKES NOR ASSUMES ANY OTHER WARRANTY WHATSOEVER, WHETHER EXPRESS, STATUTORY, OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS, AND NO PERSON IS AUTHORIZED TO ASSUME FOR W6LVP ANY OBLIGATION OR LIABILITY NOT STRICTLY IN ACCORDANCE WITH THE FOREGOING.