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The Carpet Loop -- A High Performance Indoor SW Antenna

Designed by David Moisan, N1KGH

Available Formats

In addition to the HTML version you see here, these plans are also available in [Zipped HTML](#) or [PDF](#).

Introduction

There are many shortwave listeners who can't, because of location, infirmity or a unyielding landlord, put up an outside antenna. Such people are given two choices--random wire or active antenna. Yet, for the serious listener, neither choice is completely adequate.

Active antennas are expensive, apt to generate as much noise as signal, and are prone to overload. Random wires are cheap (cheapest, in fact) and easy to put up, but are unpredictable performers. Both subject the receiver to intermod, spurious signals and other trash.

The Carpet Loop is an ideal step upward for the listener who wants something better than a random wire but doesn't want the expensive dice roll of an active antenna.

The Carpet Loop is made up of two components: A tuner, and the antenna cable itself; the cable can be either 5-conductor rotator cable or 4-conductor flat phone cable, both readily available from Radio Shack and elsewhere. The tuner couples the antenna to the radio, forming a (giant!) L-network. To tune the antenna, you turn a switch for best reception.

While NO antenna can give a cheap receiver the sensitivity, selectivity, or dynamic range it never had, the Carpet Loop will help you get the last ounce of performance out of your radio.

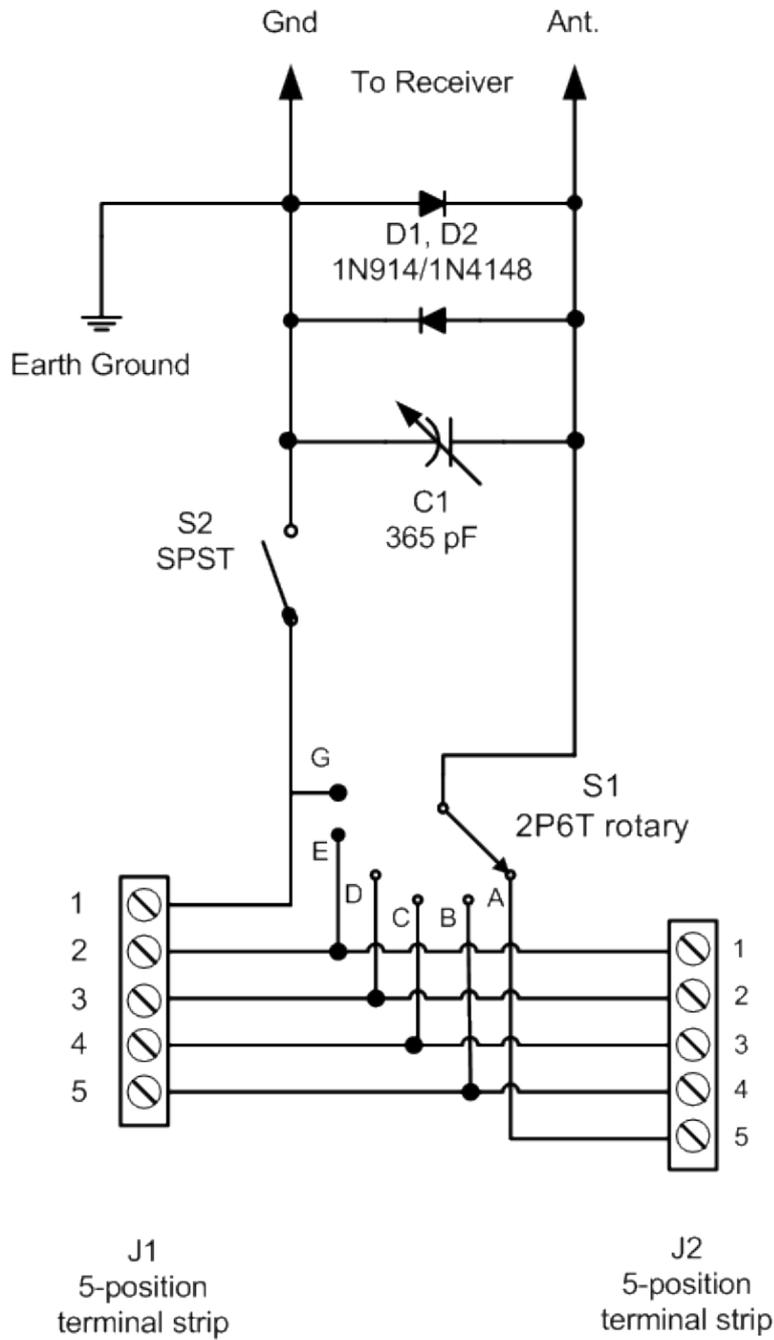
Several years ago, I was using a random wire. I had severe problems with a local AM station (2 miles away) on 1230 Khz. I was hearing intermod from it all over the 9 to 12 Mhz range.

With the Carpet Loop (which was then just the cable), the interference was almost completely gone. Also, the signals I was receiving seemed to be just a little bit stronger. A year later, I built the tuner, with much better results. I'm convinced I have the best possible antenna for my location.

If you're stuck in an apartment, if you have a portable like the Grundig Yacht Boy 400 or the Sangean 505 or 909, or if you have a tabletop receiver, the Carpet Loop may be for you. It's cheap--around \$25 in parts from Radio Shack, *much* less if you shop around, and an excellent first project for the technically minded.

Carpet Loop Schematic

The Carpet Loop --- A High Performance Indoor SW Antenna



Carpet Loop Antenna

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Parts List

C1 365 pF variable capacitor (see [construction](#))

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D1, D2 Diode, 1N914/1N4148 (RS [#276-1620](#))

S1 2P6T Rotary Switch (RS [#275-1386](#))

S2 Submini Toggle Switch (RS [275-612](#))

J1, J2 Dual-Row 6 Position Terminal Strip (RS [#274-659](#))

Other items

Enclosure (either metal or plastic, RS), jack to receiver, banana jack for earth grounding .

Antenna cable

See [construction](#)

How the Carpet Loop Works

S1, C1, and the antenna cable connected to J1 and J2 form an L-network; when S1 is switched between positions A through F, and C1's capacitance is varied, the impedance of the antenna system changes. When S1 and C1 are adjusted for best signal, the impedance between antenna and receiver is matched. D1 and D2 provide protection against static discharges. The G position of S1 grounds the antenna when not in use. S2 disconnects the ground from the antenna, making the antenna into a random wire.

Construction

Parts Availability

With the exception of C1, all parts for the tuner are readily available from Radio Shack. C1, the 365 pf variable capacitor, can be gotten out of an old radio.

You may need to dig around for antenna rotator cable. Radio Shack no longer sells 6-conductor rotator cable, though they do sell 3-conductor cable. Either use two of these rotator cables, or else use 4 or 6 conductor flat or round phone cable. Network cable is widely available, but I have not tried it. In theory, the twisted pairs may impede reception. Or not.

Substitutions

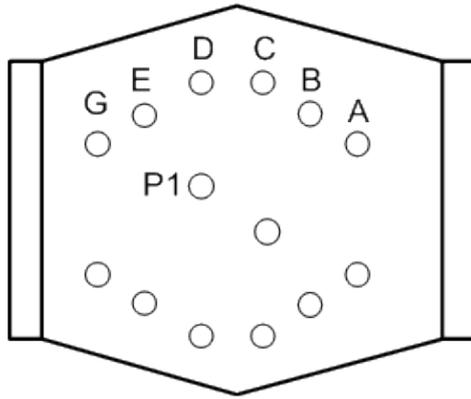
There are no critical parts in the tuner; as long as S1 has at least six positions, it will do. D1 and D2 can be any silicon diode. Use any enclosure that's big enough to comfortably install components in.

The choice for J3, the jack to the receiver, depends on what connector your radio uses for an external antenna. I used an SO-239 (RS [#278-201](#)).

Step-by-step Instructions

1. Mount the components on the enclosure you'll be using—all wiring is point to point. I suggest mounting J1 and J2 on opposite sides, S1 and C1 on top, and J3 on the other end of the enclosure.
2. Wire S1 to J1 and J2. If you use the Radio Shack DP6T rotary switch, you'll be using just one of the poles. The diagram of the switch is below:

Radio Shack 2P6T Rotary Switch Terminal Diagram



Note: Only the first pole is used

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Wire as follows:

(Note: If you're using the Radio Shack terminal strip, you will need to drill a hole in the cabinet to pass the wires through from inside. Use a rubber grommet to keep the wires from chafing and fraying)

S1 Term.	--to-->	J2 term.	J1 term.	--to-->	J2 term.
A		#10	#2		#6
B		#9	#3		#7
C		#8	#4		#8
D		#7	#5		#9
E		#6			

Connect a wire from J1 terminal #1 to the G terminal on S1, and this step is done.

3. Install and wire C1. Connect one terminal of C1 to the P terminal on S1. Connect the other end to J3. If using the SO239 or phono jack, connect to the center conductor. If using screw terminals, connect to terminal #1 on J3. Skip ahead to step 5.
4. Connect the P1 terminal of S1 to J3. If you're using the SO239 or phono jack, connect to the center conductor. If you're using screw terminals, connect to terminal #1 on J3.

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5. Connect the G terminal on S1 to J3. Connect it to the ground shield if it's an SO239 or phono jack, or to terminal #2 if it's screw terminals.
6. Connect D1 and D2 across J3's terminals; remember that D2 is connected opposite of D1.

That completes construction of the tuner.

Antenna Construction

Choosing cable

The kind of cable you use depends on where you're putting it and how much you're willing to pay for it.

If you plan on running it under carpet, then use the 5-conductor rotator cable mentioned in the parts list. This cable can easily withstand being stepped on; more importantly, there are no exposed wires to trip over. It's also easier to wire than phone cable. (In my old apartment, this cable was still good when I pulled it out of the carpet it sat under for 3 years. The carpet, on the other hand, was shot.)

If you're not running it underfoot, or if you're cheap, you can use 4-conductor flat phone cable, available just about everywhere. It's a good choice for running around baseboards, around windows or in attics.

When running the cable around, start at your receiver and go around the room—or the house—and back to the radio. If you're using the rotator cable, you can make corners by folding the cable at a 45 degree angle, like origami. (In the computer industry, there used to be an art to folding ribbon cables; if you've ever seen an old DEC minicomputer, you know what I'm referring to.)

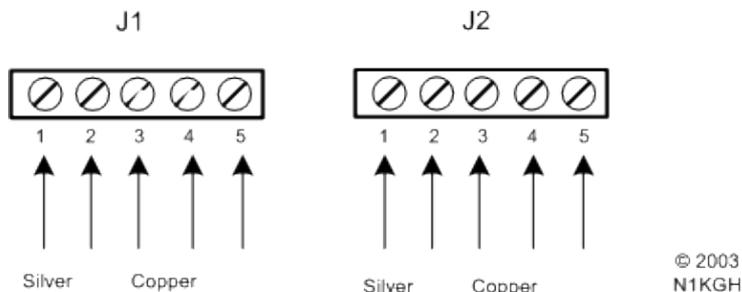
I have used lengths of 25 to 30 feet for my carpet loops; this is enough cable to go around the average-sized room. It also seems to be optimal for the SW bands, though I've never had it tested with an impedance bridge. (Anyone with a bridge is welcome to send me their results!)

Wiring the cable to the tuner

You should have two ends of the cable next to the tuner. Strip the ends and put spade lugs on all the wires. With the rotator cable, mark the *silver* conductor.

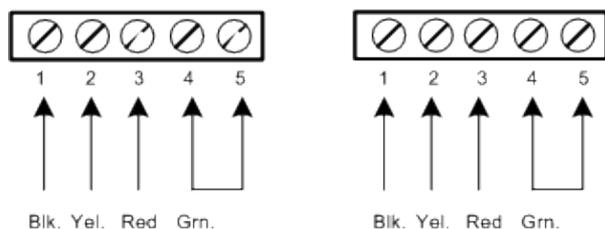
Next, connect the wire to the tuner using the following diagrams:

Wiring Diagram for 5-conductor Rotator Cable



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Wiring Diagram for 4-conductor Phone Cable



Note: Pins 4 & 5 on both jacks are jumpered

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Grounding

Run a wire—preferably a large one—from the ground terminal on the tuner (or a mounting screw on the SO239 connector if you're using one) to a suitable ground such as a cold water pipe; I grounded my tuner with a short length of RG58 coax connected to a baseboard heater via an alligator clip.

Connect the tuner to your receiver; you're now ready to use it.

Using The Carpet Loop

It's easier to use than to talk about: Tune your receiver to the desired frequency. Adjust S1 and C1 (or the antenna trimmer on the radio) for strongest signal. For most situations, S2 (Loop/Longwire) can be left closed in the Loop position; you may find that setting S2 to Longwire may work better for mediumwave listening.

Conclusion

The Carpet Loop is an inexpensive, easily built, high performance antenna that can work in almost all apartments.

Contacting the Author

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Let me know how the Carpet Loop works for you!

Dave

[N1KGH Radio Page](#)

[Dave Moisan's Home Page](#)

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<http://www.davidmoisan.org/radio/carpetloop/carpetloop.html>

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