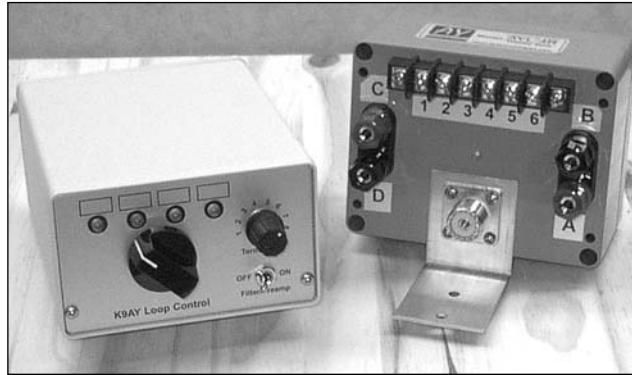




## Model AYL-4 — 4-way K9AY Loop System



This is the popular K9AY Loop receiving antenna, as described in the September 1997 issue of *QST*, “The K9AY Terminated Loop-A Compact, Directional Receiving Antenna,” by Gary Breed, K9AY. This system provides a cardioid directional pattern in four different directions. The AYL-4 consists of two units, an indoor control box and an outdoor direction-switching relay box. The control box includes a 15 dB preamplifier with a bandpass filter covering the 160 and 80 meter bands, with excellent rejection of Broadcast Band signals and signals above 5 MHz. The AYL-4 is used with two loops installed using a single support, oriented at right angles to one another. It is intended to be used with either the AYL-M mast, hardware and wire package, or with “homebrew” loops constructed by the user.

### Specifications

<i>Antenna type:</i>	Terminated loop
<i>Pattern:</i>	Cardioid, switched in four directions
<i>Peak front-to-back:</i>	Greater than 20 dB, typically greater than 30 dB
<i>Feedpoint impedance:</i>	50 ohms nominal; low-loss transformer matching to the antenna
<i>Frequency range:</i>	Very low frequencies to 5 MHz, using published dimensions
<i>Direction change:</i>	Feedpoint/termination switching relays
<i>Direction control:</i>	Connected with a 6-conductor control cable
<i>RF connection (antenna):</i>	SO-239 (UHF) connectors at control box and outdoor relay box.
<i>RF connection (radio):</i>	Phono connector output to receiver external antenna input
<i>Termination Adjustment:</i>	Eight resistances from 340 to 680 ohms, selected by front-panel rotary switch
<i>Power requirements:</i>	+12 to 13.8 VDC, 400 mA max., (provided by customer, to be fused at 0.5 A)
<i>Preamplifier:</i>	15 dB gain, feedback type, using a silicon NPN transistor
<i>Filter passband:</i>	±2 dB from 1.75 to 4.5 MHz
<i>Filter stopband:</i>	−55 dB at 7 MHz, −50 dB below 1450 kHz (typical)

### Required Area

The AYL-4 K9AY Loop System requires 15 feet in four directions from the center of the antenna, plus additional distance depending on the guying method. The base of the supporting pole and the ground rod are located at the center. With the AYL-M kit, 21 feet in each of the four directions is required. The center support is 25 feet high, and must clear any objects above.

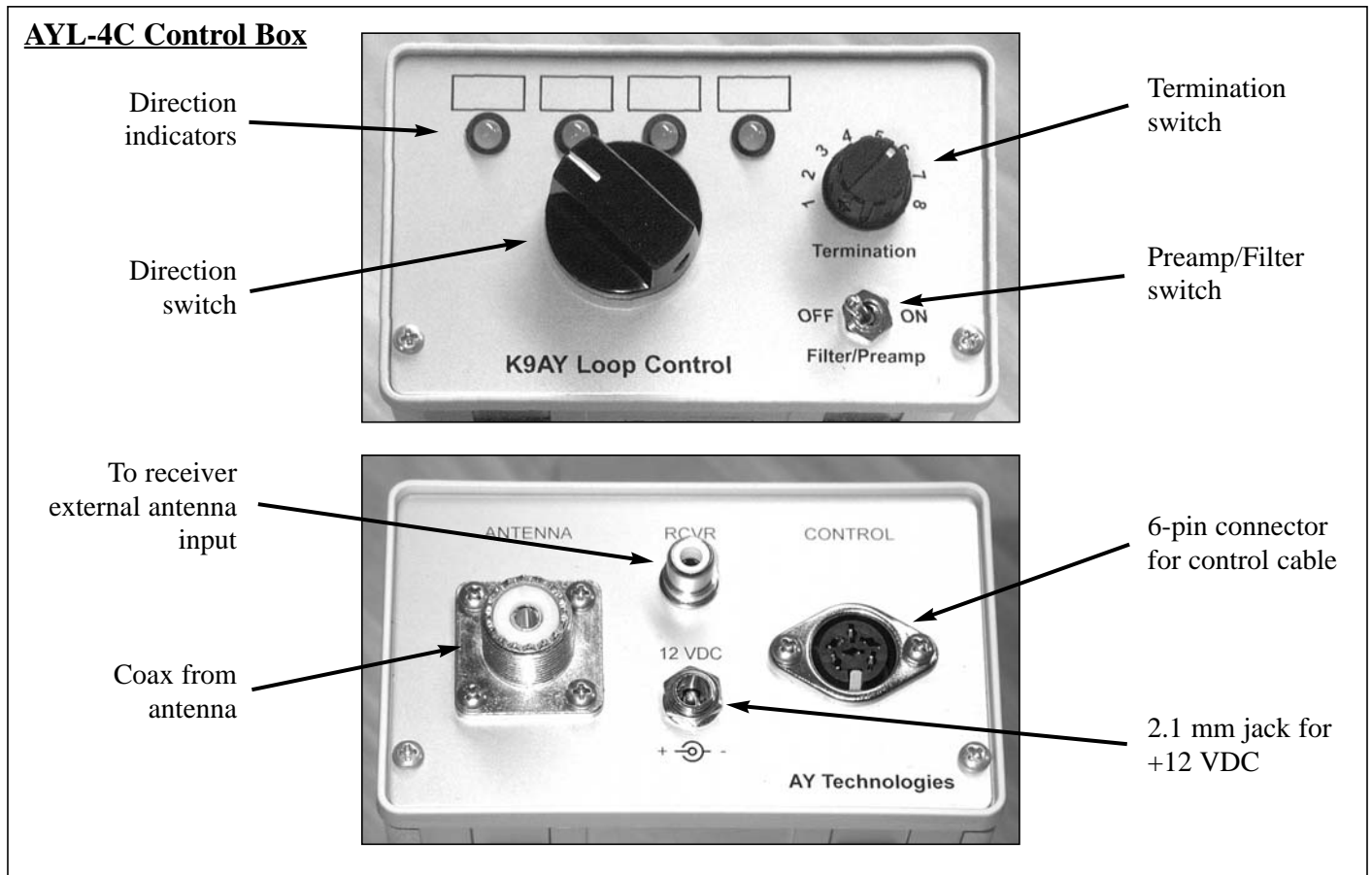
# Installation Instructions

## AYL-4 — 4-way K9AY Loop System

*Package contents:* AYL-4C control box with filter/preamp  
AYL-4R outdoor relay box  
DC power connector  
6-pin DIN connector

*You will also need:*

1. The K9AY Loop antenna wire, support and ground system. All materials are included in the AYL-M mast, wire and hardware kit, or you may choose to construct the loop from your own materials using the instructions in “How to Build the K9AY Loop Receiving Antenna” which is enclosed with the AYL-4, and also available in the “Tech Notes” section of our web site — [www.aytechnologies.com](http://www.aytechnologies.com)
2. Coax cable to run from the AYL-4C control box to the AYL-4R relay box, which is located at the antenna.
3. 6-wire control cable to run from the AYL-4C control box to the AYL-4R relay box, which is located at the antenna. #20 AWG wire is recommended for runs up to 250 ft. Larger wire is recommended for longer runs.
4. A source of 12 volt power. Typically, this will be from your station power supply.

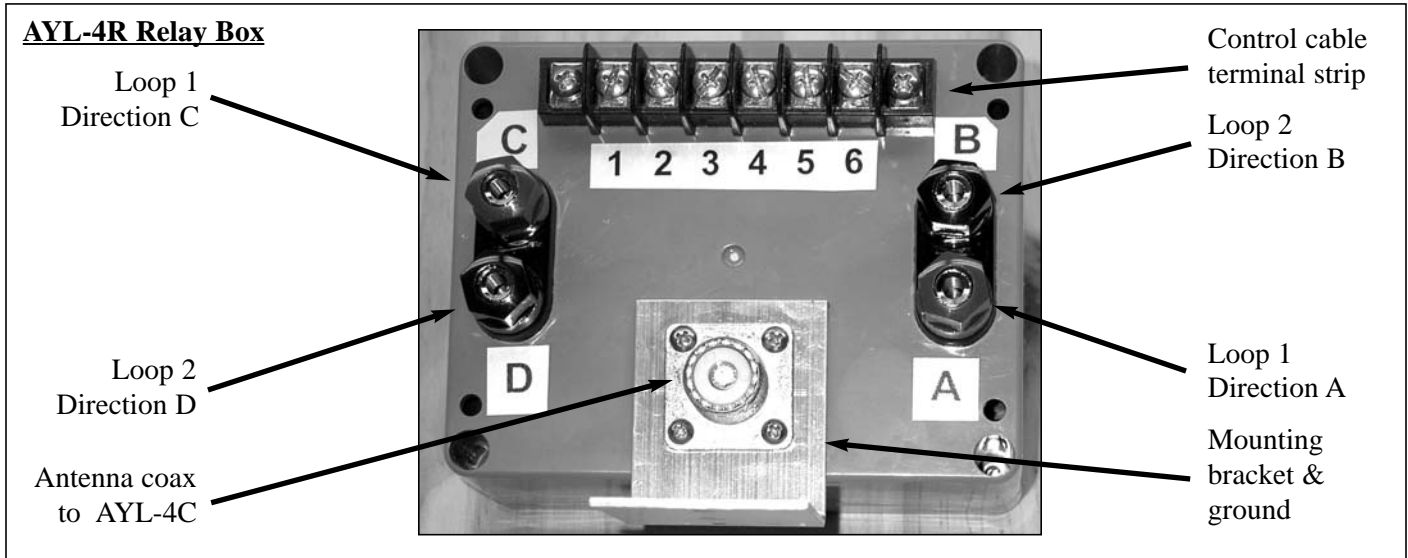


### Connections to the Control Box:

1. Solder the wires of a 6-wire control cable to pins 1 through 6 of the male 5-pin DIN connector provided. This cable will run to the AYL-4R relay box. The pin numbers are marked next to the solder pins on the connector. Write down which wires are connected to each (e.g. Red = 1, Grn = 2, Yel = 3 etc.)
2. Connect 12 volts (typically 13.6 VDC) using the provided plug. Positive is connected to center pin.
3. Connect a coaxial cable to the SO239 “ANTENNA” connector. This cable will run to the AYL-4R relay box.
4. Connect a cable from the “RCVR” phono connector to the external antenna input of your receiver.

**INSTALLATION SUGGESTION** — Some of our customers have had difficulty installing large-size, solid-conductor control wires to the 6-pin DIN connector that plugs into the back of the AYL-4C control box.

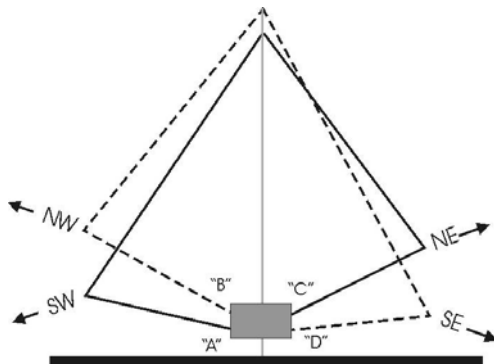
If you plan to use a “stiff” control cable, we suggest that you start with a six- or eight-foot cable of #22 stranded wire, soldered to the DIN connector. At the other end of this smaller cable, connect the six wires to a terminal strip (from your junk box or Radio Shack). It is much easier to connect the heavier wires of the main control cable to this terminal strip, rather than to the DIN plug.



**Relay box installation:**

1. Mount the box at the base of the loops. This is where the ends of the loop wires come together, and where the ground rod is located. The mounting flange has two holes for mounting screws, or a clamp may be used to attach the box to the antenna support or other mounting. Orient the box so that directions “A” through “D” are what you want. Most hams prefer “A” to be SW, “B” NW, “C” NE and “D” SE.
2. Connect the mounting flange to the ground rod with a short piece of wire. The antenna **MUST** be grounded to operate properly. Pin 6 of the control cable terminal strip may also be used for the ground connection (it is grounded inside the box).
3. Connect the coaxial cable and the 6-wire control cable. Terminals 1 through 6 are connected to the same wires that go to pins 1 through 6 on the DIN plug at the control box.
4. Connect the wires from the two antenna loops. Loop 1 is oriented in the direction A-C (typically SW/NE), and has its wires connected to binding posts “A” and “C” — Loop 2 is oriented in the direction B-D (typically NW/SE), and has its wires connected to binding posts “B” and “D.” Note that each loop is connected to binding posts with the same color: “A” and “C” are red, “B” and “D” are black.

**Quick installation checklist**



1. Control cable wired correctly: Pins 1 through 6 on the DIN connector go to terminals 1 through 6 at the relay box.
2. The control box mounting bracket is connected to the antenna ground system (the ground rod, plus any radials)
3. Each loop is the proper size—25 ft. high, with corners 15 ft. on either side of the center (about 85 ft. of wire)
4. The two loops do not have any electrical connection other than their connection to the relay box. They are not shorted to each other at the top, or to the mast, etc.
5. Loop 1 — SW end to "A" and NE end to "C" (typical)
6. Loop 2 — NW end to "B" and SE end to "D" (typical)

## OPERATION

Operation of the K9AY Loop receiving antenna system is easy. Once everything is hooked up, simply select the desired direction with the front panel switch. Signals from the opposite direction can be reduced by up to 30 dB or more, depending on the arriving wave angle. For amateur band operation, the preamplifier/filter will greatly reduce AM Broadcast signals, as well as signals above 5 MHz.

Like all small antennas, the K9AY Loop is much less efficient than your transmitting antenna or a Beverage receiving antenna. To compensate, the preamplifier provides 15 dB gain, with a filter that passes approximately 1.75 to 4.5 MHz. When the preamplifier is switched off, the filter is also bypassed, and the antenna may be used on any frequency.

**Adjustable Termination**—The termination establishes the optimum front-to-back ratio. The best termination value will vary somewhat with the frequency, with the local ground conditions, and with the size and shape of the loop. The resistance is adjustable using the 8-position switch on the control box. The resistance range was designed to cover all expected variations in installation and local ground conditions. The nominal resistance for each position is:

Position 1	680 ohms
2	595 ohms
3	530 ohms
4	475 ohms
5	435 ohms
6	400 ohms
7	370 ohms
8	340 ohms

**PLEASE NOTE** — There are two very important things to note about the adjustable termination of the K9AY Loop:

- 1) The termination does not tune the antenna or steer the nulls! The termination only optimizes the front-to-back at the frequency you are listening. The setting will not change unless there is a change in the antenna itself or in the ground (e.g. from very wet to dry soil). Moderate changes in frequency (less than 1 MHz) will rarely require a change in the termination resistance.
- 2) Most K9AY Loop users (80% or more) will find that they only need two switch settings—one for 80M, and one that covers 160M and all lower frequencies. To find the best termination setting for your installation, we recommend starting with position #6 for 160M and the AM Broadcast Band, and #5 for 80M.

When you first install your K9AY Loop system, we recommend that you spend plenty of time listening, to gain an understanding about how the antenna works and what termination settings work best for your loop and your local ground conditions. Good sources of test signals are WWV at 2.5 MHz and, of course, ham radio signals in the 80 and 160 meter bands. AM radio stations high in the band are also good, but remember than local stations may not show as much front-to-back as distant stations—this is because the null of the K9AY Loop is greatest for skywave signals.

The circuit diagram and other technical information is available on our web site: [www.aytechnologies.com](http://www.aytechnologies.com)

Enjoy your K9AY Loops!



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