Model AYL-4 — 4-way K9AY Loop System

This is the popular K9AY receiving loop, as described in the September 1997 issue of QST, "The K9AY Terminated Loop-A Compact, Directional Receiving Antenna." 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. 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 a customer-supplied installation of the loops.

Specifications

Antenna type:	Terminated loop
Pattern:	Cardioid, switched in four directions
Peak front-to-back:	Greater than 20 dB, typically greater than 30 dB
Feedpoint impedance:	50 ohms nominal, with transformer matching to the antenna
Frequency range:	Very low frequencies to above 5 MHz, using published dimensions
Direction change:	Feedpoint/termination switching relays
Direction control:	Connected with a 3-conductor control cable
Power requirements:	+12 to 13.8 VDC, 400 mA max. (provided by customer)
Preamplifier:	15 dB gain, feedback type, using a silicon NPN transistor
Filter passband:	±2 dB from 1.75 to 4.5 MHz
Filter stopband:	–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.

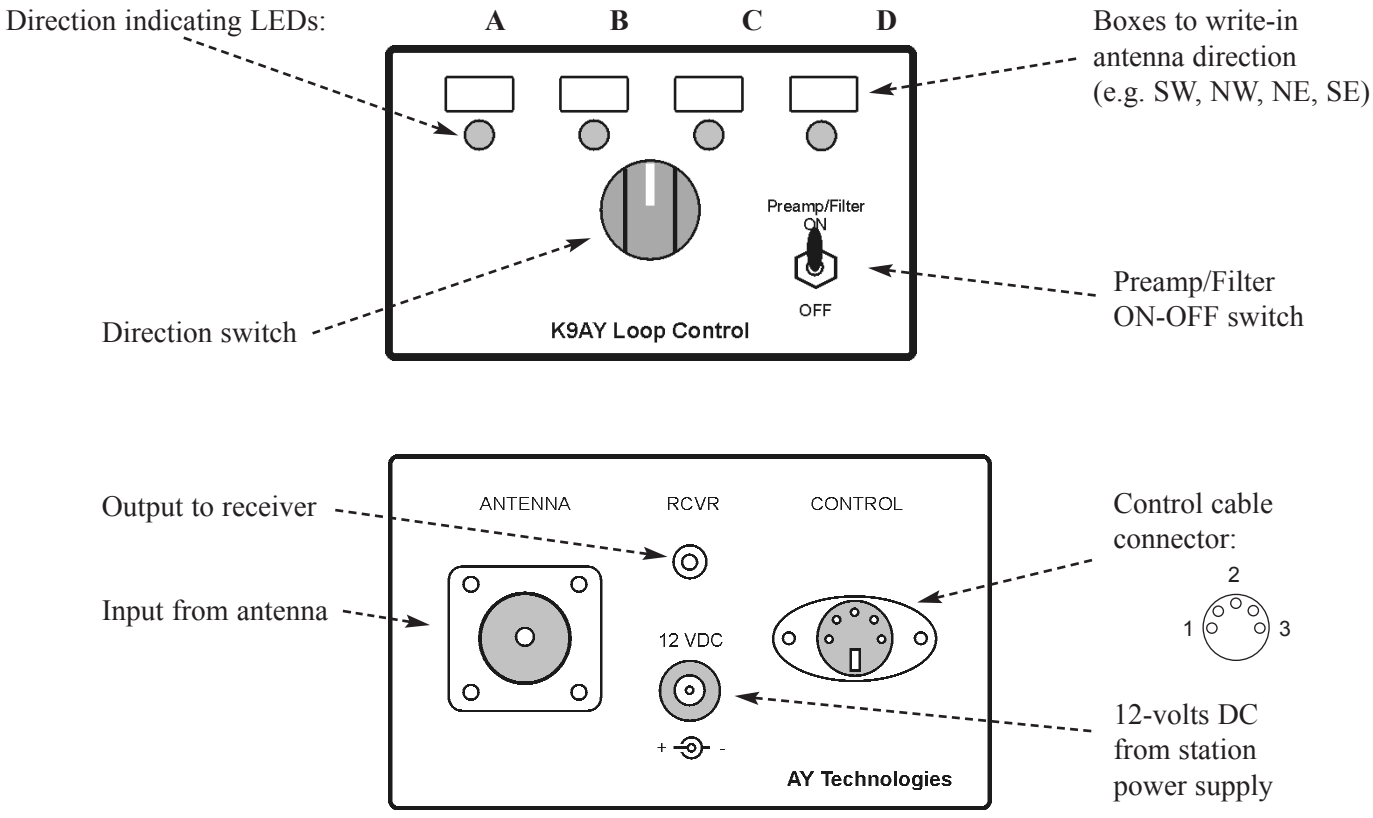
Installation Instructions
AYL-4 — 4-way K9AY Loop System

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

You will also need:

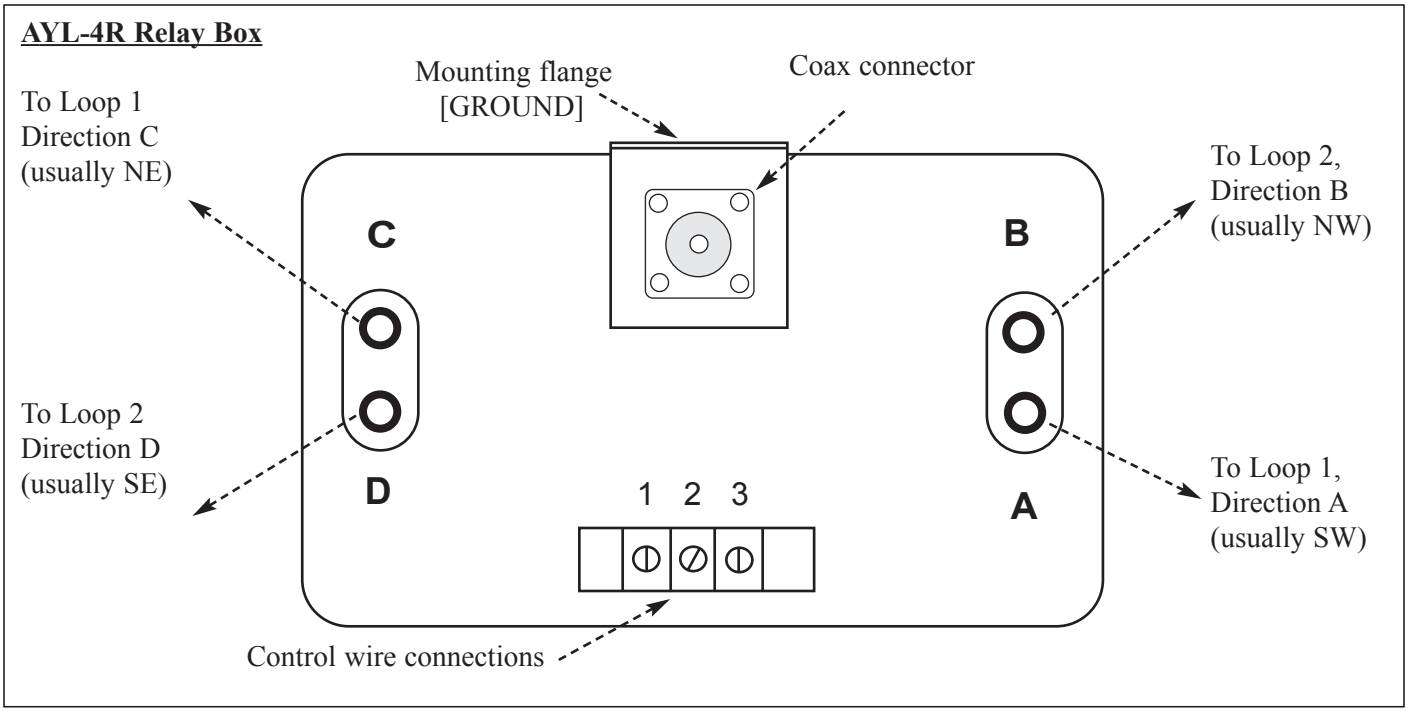
1. The K9AY Loop antenna wire, support and ground system. All materials are included in the AYL-M mast, wire and hardware kit, or you may choose to construct the loop from your own materials using the instructions in "How to Build the K9AY Loop Receiving Antenna" which is enclosed with the AYL-4, and also available in the "Tech Notes" section of our web site — www.aytechnologies.com
2. Coax cable to run from the AYL-4C control box to the AYL-4R relay box, which is located at the antenna.
3. 3-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 100 ft. Larger wire is recommended for longer runs.
4. A source of 12 volt power. Typically, this will be from your station power supply.

AYL-4C Control Box



Connections to the Control Box:

1. Connect 12 volts (typically 13.6 VDC) using the provided plug. Positive is connected to center pin.
2. Connect a coaxial cable to the SO239 "ANTENNA" connector. This cable will run to the AYL-4R relay box.
3. Connect a cable from the "RCVR" phono connector to the external antenna input of your receiver.
4. Solder the wires of a 3-wire control cable to pins 1, 2 and 3 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.



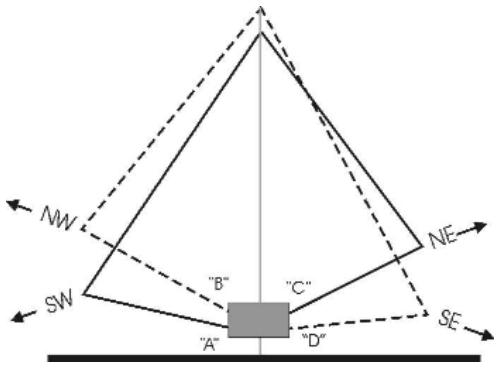
Relay box installation:

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 "A" is toward the direction you want. Most often this will be Southwest.
2. Connect the mounting flange to the ground rod with a short piece of wire. The antenna MUST be grounded to operate properly. Pin 3 of the control cable terminal strip may also be used for the ground connection (it is connected to the mounting flange inside the box).
3. Connect the coaxial cable and the 3-wire control cable. Terminals 1, 2 and 3 are connected to the same wires that go to pins 1, 2 and 3 on the DIN plug at the control box.
4. Connect the wires from the two antenna loops. Loop 1 is 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.

Optional termination adjustment — The AYL-4R has three termination resistance options. The unit is shipped with the termination optimized for the 160 meter ham band. This also works well for lower frequencies, including the AM Broadcast Band. The other two options provide an optimum termination for the 80 meter band, or a compromise setting between the 80 and 160 meter values. Unless you will only operate on 80 meters using the K9AY loop, it is recommended that you keep the factory setting. Even with the 160 meter termination setting, the antenna has a useful front-to-back ratio in the 80 meter band.

The switch to select the termination is located inside the box. Remove the four screws and take off the lid. Inside is a circuit board containing the switching relays, matching transformer and terminating resistors. A three-position switch will be easily seen on the p.c. board, with the positions marked on the board. Move the switch lever to the desired position, then carefully replace the lid, being sure that it fits properly to obtain a good weather seal.

Quick installation checklist



1. Control cable wired correctly: Pins 1, 2, 3 on the DIN connector go to terminals 1, 2, 3 on 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. Not shorted to each other, or to the mast, etc.
5. Loop 1 — SW end to "A" and NE end to "C"
6. Loop 2 — NW end to "B" and SE end to "D"

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 will 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. From approximately 1.75 to 4.5 MHz, the preamplifier provides 15 dB gain to compensate for the inefficiency of this small antenna. When the preamplifier is switched off, the filter is also bypassed, and the antenna may be used on any frequency.

When you first install your K9AY Loop system, we recommend that you spend a little time listening, in order to gain an understanding about how the antenna works. The directional behavior should be evident when listening to AM Broadcast stations, WWV at 2.5 MHz and, of course, with ham radio signals in the 80 and 160 meter bands.

The most common misunderstanding about this and other small directional antennas is that it is not a “beam.” The direction of maximum signal is very wide. The value of this antenna is the area of rejection in the opposite direction, where a deep null helps reduce interference from unwanted signals.

Enjoy your K9AY Loops!

AY TECHNOLOGIES

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