

Array Solutions

Model AS-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 AS-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 AS-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-4 Mast/Antenna Kit** which is a mast, hardware and wire package, or with “homebrew” loops constructed by the user.

Package contents:

AS-AYL-4C control box with filter/preamp

AS-AYL-4R outdoor relay box

6-pin control cable connector

Mounting Bracket & U-bolt for relay box. (not shown above – bracket is behind grey box)

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 8 MHz, using published dimensions. With preamp switched on, the filter bandpass limits are approximately 1.8-5.0 MHz.
<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 15 VDC, 400 mA – please fuse with 1 amp fuse from your power supply if you use a large Power supply.
<i>Preamplifier:</i>	15-18 dB gain, feedback type, silicon NPN transistor
<i>Filter passband:</i>	±2 dB from 1.80 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 approximately 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

AS-AYL-4 — 4-way K9AY Loop System

Package contents:

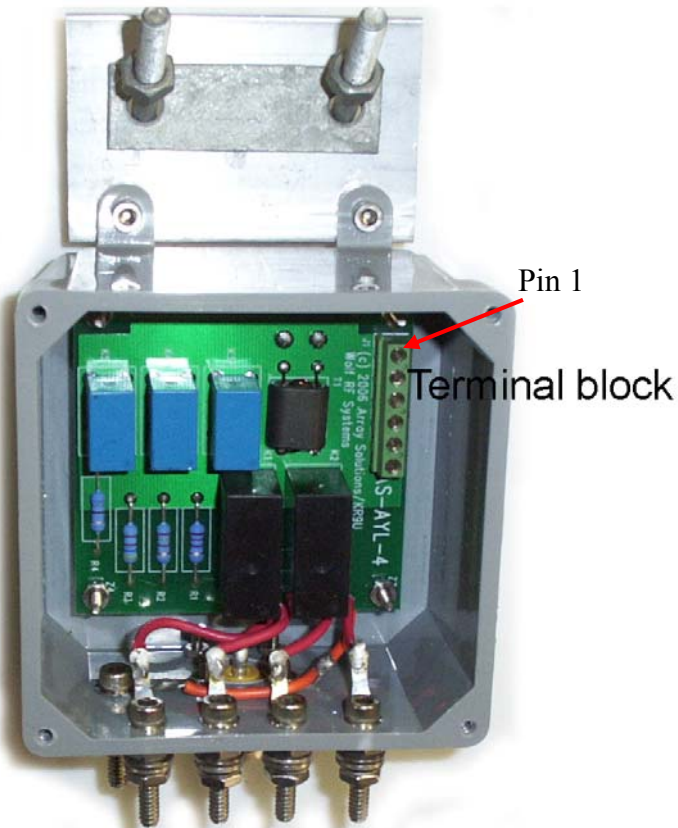
AS-AYL-4C control box with filter/preamp
AS-AYL-4R outdoor relay box
6-pin control cable connector
Mounting U-bolt for relay box.

You will also need:

- The K9AY Loop antenna wire, support and ground system. All materials are included in the AS-AYL-MW KIT, mast / wire and hardware kit (except ground rod), or you may choose to construct the loop from your own materials using the instructions in “How to Build the K9AY Loop Receiving Antenna” available in the “application notes” section of our web site www.arrayolutions.com
- 50 or 70 ohm Coax cable to run from the AS-AYL-4 control box to the AS-AYL-4 relay box, which is located at the antenna with a SO239 UHF connector on either end.
- 6-wire control cable to run from the AS-AYL-4 control box to the AS-AYL-4 relay box, which is located at the antenna. #20 AWG wire is recommended for runs up to 250 ft, and larger wire is recommended for longer runs.
- Source power of 12 - 15 volts DC. Typically, this will be from your station power supply or a wall wart supply. Make sure the wall wart is not over 15 VDC.

Connections to the Control Box:



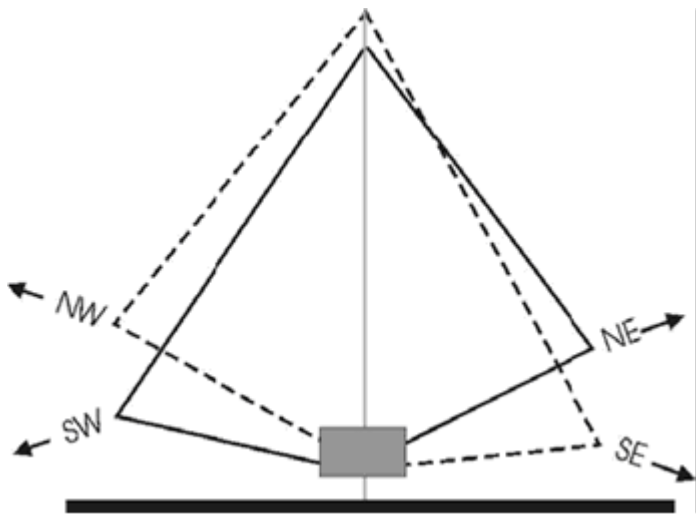


1. Connect the leads of a 6-wire control cable to pins 1 through 6 of the green connector provided. This cable plugs in to the back of the control box and will run to the AYL-4R relay box. Write down which wires are connected to each (e.g. blk = 1, Brown = 2, Red1 = 3 etc.)
2. Connect other end of cable to the terminal block in the relay box. Pin 1 is shown in the above photo.
3. Connect 12 – 15 volts DC (typically 13.6 VDC). Positive is connected to center pin.
4. Connect a coaxial cable to the SO239 “ANTENNA” connector. This cable will run to the AYL-4R relay box.
5. Connect a coaxial cable from the “RCVR” phono connector to the external antenna input of your receiver.

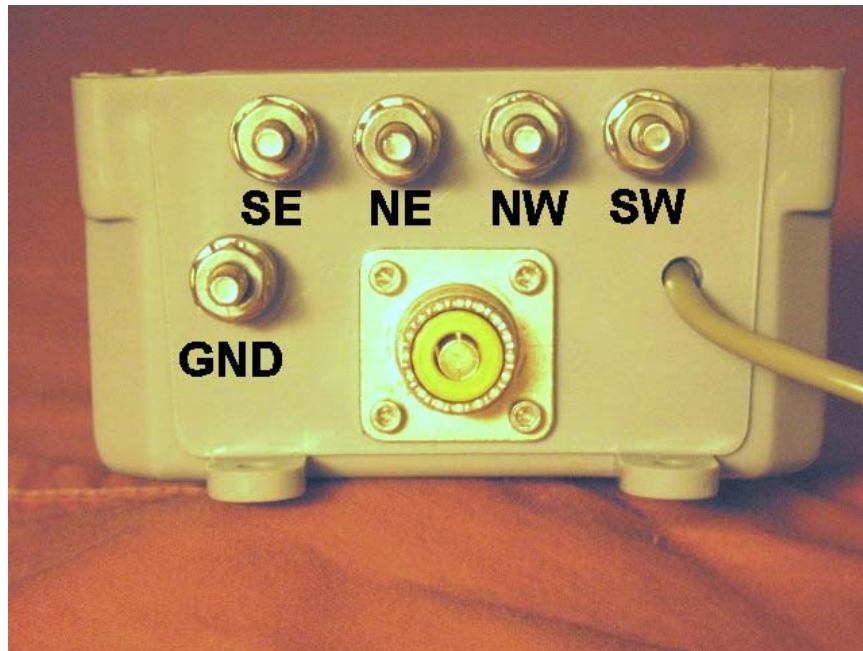
INSTALLATION SUGGESTION

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. 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. The Supplied connector will accept 12 to 28 ga. wire sizes. Home supply stores also sell buryable sprinkler cable that you can direct bury to the antenna and to the shack. But use small gauge stranded cable to go to the relay box and the other end that goes into the shack. Stranded wire will not break as easily either.

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 the supplied U-bolt or a may be used to attach the box to the antenna support or other mount.
2. Connect the ground (GND) post on the relay box to the ground rod with a short piece of wire. The antenna **MUST** be grounded to operate properly. See illustration for location. Or use the AS-AYL-MW kit.
3. Connect the coaxial cable and the 6-wire control cable. Open the relay box and connect the control wires to the terminal block. Terminals 1 through 6 are connected to the same wires that go to pins 1 through 6 on the connector at the control box. See illustration for connection information. Use the supplied tie wrap and tighten it around the control cable where it enters the relay box on the inside. This will provide a strain relief. If your control cable is larger than the hole, simply open the hole to accommodate your cable. You may want to seal the hole with a silicon adhesive.
4. Connect the antenna to the relay box using the diagrams as a guide. For instance, with the loop that is orientated in the NE / SW direction, connect the NE end of the loop to the NE post and the SW end of that same loop to the SW post.

**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 relay box ground post is connected to the antenna ground system (the ground rod, plus any radials)
3. Each loop is the proper size—24 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. The two Loops are connected to the relay box correctly.

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 of gain, with a filter that passes approximately 1.8 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. Some users have found that putting ground radials under the loop wires provides a more consistent front to back under varying ground conditions. The nominal resistance for each position is:

Position	Resistance
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 (preamp off), are also good, but remember that 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.

Thank you for your purchase of this fine antenna, if you have questions please call or email us.