



User Guide
for the
Alpha S9v31 Antenna

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User Guide Version 2.0

July 27, 2018

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Introduction

Thank you for purchasing the Alpha S9v31 Antenna hereinafter referred to as the S9. We believe the S9 to be the lightest, most efficient and safest full-size vertical antenna available and we sincerely hope that you enjoy your new S9.

Please read this guide in its entirety FIRST before installing your S9. The S9 is extremely easy to install and deploy, however, reading through this guide will make it a positive experience.

Product Overview

The S9 is a tapered, ultra-lightweight spun fiberglass antenna designed for fixed and portable Amateur Radio use. Friction-locking sections allow the antenna to be quickly and safely deployed in practically any environment without tools. You may alternately use screws from a local hardware store to secure the sections as provided for in the instructions in Appendix 1.

The S9 is shipped with all components you need to install the antenna. You will need to furnish coax cable, an antenna tuner, a balun/unun, a pipe or mast with associated hardware for your ground or elevated mount, some radials or counterpoise, weatherproofing material, and/or other items in Appendix 1 if a permanent installation is required.



Safety Tips

When installing or operating this antenna, please observe the following safety tips.

NOTE – High voltages are present when transmitting, no matter how much or little power is applied. Do not touch any part of the antenna while transmitting.

WARNING: INSTALLATION OR OPERATION OF THIS PRODUCT NEAR POWER LINES IS DANGEROUS! FOR YOUR SAFETY, FOLLOW THE ENCLOSED INSTALLATION DIRECTIONS. THOUGH THIS ANTENNA IS CONSTRUCTED WITH INSULATED MATERIALS, PROPER CARE MUST BE TAKEN DURING INSTALLATION. INSTALLER ASSUMES ALL LIABILITY FOR PROPERTY AND LIFE SAFETY.

YOU, YOUR ANTENNA, AND SAFETY

Each year, hundreds of people are killed, mutilated, or receive severe and permanent injuries when attempting to install an antenna. In many of these cases, the victim was aware of the danger of electrocution, but did not take adequate steps to avoid the hazard. For your safety, and to help you achieve a good installation, please **READ** and **FOLLOW** the safety precautions below. **THEY MAY SAVE YOUR LIFE!**

1. If you are installing an antenna for the first time, please, for your own safety as well as others, seek PROFESSIONAL ASSISTANCE.
2. Select your installation site with safety, as well as performance, in mind. **REMEMBER:** ELECTRIC POWER LINES AND PHONE LINES LOOK ALIKE. FOR YOUR SAFETY, ASSUME THAT ANY OVERHEAD LINES CAN KILL YOU.
3. Call your electric power company. Tell them your plans and ask them to come take a look at your proposed installation. This is a small inconvenience, considering **YOUR LIFE IS AT STAKE.**
4. Plan your installation procedure carefully and completely *before* you begin. Successful raising of a mast or tower is largely a matter of coordination. Each person should be assigned a specific task, and should know what to do and when to do it. One person should be designated as the leader/coordinator of the operation to call out instructions and watch for signs of trouble.
5. When installing your antenna, **REMEMBER: DO NOT USE A METAL LADDER. DO NOT WORK ON A WET OR WINDY DAY. DO DRESS PROPERLY:** shoes with rubber soles and heels, rubber gloves, long sleeved shirt or jacket.
6. If the assembly starts to drop, get away from it and let it fall. Remember, the antenna, mast, cable and metal guy wires are all excellent conductors of electrical current. Even the slightest touch of any of these parts to a power line completes an electrical path through the antenna and the installer – **THAT'S YOU!**
7. If ANY PART of the antenna system should come in contact with a power line, **DON'T TOUCH IT OR TRY TO REMOVE IT YOURSELF. CALL YOUR LOCAL POWER COMPANY.** They will remove it safely. If an accident should occur with the power lines, call for qualified emergency help **IMMEDIATELY.**

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Coax Cable

For top performance, the S9 should be fed with a quality, low-loss 50-ohm coaxial feed line such as RG-213 or LMR400. RG-8x is perfectly adequate for short runs of 50 feet or less when 100 watts PEP CW or less is used.

Naturally Occuring Resonance

The natural resonant frequency of the S9 antenna is adjustable from 7 to 7.3MHz, as you can easily trim the 34 antenna element extruding from the “wire exit hole” (Reference page 12), which comes installed inside the 31 foot supporting telescopic mast. This length also enables the S9 antenna to also be used on 15 meters, because the third naturally occurring harmonic of 40 meters is 15 meters. Depending on the efficiency of your RF ground system and proximity to nearby objects, the S9 can exhibit an SWR well below 2:1 across the 40 and 15 meter bands without an antenna tuner.

So, if you operate a lot on 15 & 40 meters, you will likely be able to use the S9 on those bands without using an antenna tuner. In this configuration, the coax feed line can be directly connected to the S9. Radials and a 1:1 current choke balun are strongly recommended. As a 15 & 40 meter antenna, the S9 can be mounted on the ground or as an elevated ground plane antenna on a pole.

Multi-band Operations

If you operate a lot on multiple bands, you will likely be able to use the S9 on 10 to 80 meters.

15 & 40 Meter operations

Internal rig tuners will easily tune the S9 anywhere on 15 & 40 meters to a near perfect match once the 43 foot element is trimmed to resonance.

10-80 Meter operations

The natural resonant frequency of the S9 antenna 34 foot element is 6.88MHz, which is the same as traditional 34 foot aluminum multi-band verticals. This length enables the S9 antenna to be used with a manual or automatic antenna tuner, either in your shack or remotely located at the antenna feed point.

Option for an Antenna tuner at the radio:

If you want to use the S9 as a broadband antenna, you may benefit from a broadband antenna tuner that can match higher impedances. (Internal rig tuners typically do not have adequate range to match the higher impedances presented by the antenna on

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non-harmonic bands.) The optional Alpha S9 Match can also lower impedances (see more in the **Balun/Unun** section).

Option for an Antenna tuner at the feed-point:

Using a weatherproofed, remote antenna tuner at the antenna feed point ensures absolute lowest signal loss and best overall multi-band performance. When a remote tuner is used at the S9 feed point, a 4:1 unun is not required. A 1:1 current choke balun may be required between your transmitter and the antenna (outside of the radial field) if you experience RF current in your shack. (Burying your coax cable also helps minimize RF current from flowing back into your shack.)

Balun/Unun

For 10-80 Meter multi-band use, the Alpha S9 Match is recommended at the antenna feed point. The match lowers the higher impedances presented by the S9 on frequencies above 40 meters. This in turn can lower SWRs on all bands.

For 40 meter monoband use with the S9, a 1:1 current choke balun is recommended. It should be located outside of the radial field (between your transmitter and the antenna) to isolate RF currents from flowing back into your shack over the coax shield. There are several commercially-available 1:1 choke baluns (Balun Designs can be found on-line at www.balundesigns.com) or you can create a simple choke balun using your coax feed line.

To create a 1:1 choke balun using your coax feed line, simply wind 18 to 21 feet of your coax feed line evenly around a 4-inch round form such as a PVC pipe. You can use zip lock cable ties to secure the windings and to maintain the coil form. Additional information about constructing an inexpensive 1:1 choke balun using your coax feedline can be found on-line at: <http://www.hamuniverse.com/balun.html>.

Ground or Elevated Mount

A pipe or mast is required for the S9 to be mounted on the ground or in the air. **For standard ground-mount installations of the 40/15 Meter S9 Antenna**, use a 40-inch long (minimum recommended length), 1.5" MINIMUM to 1.7" OD MAXIMUM galvanized pipe. Hardware stores such as Home Depot™ and Lowes™ stock galvanized pipe in their plumbing departments and this type of pipe is ideal for the ground mount. Some hardware stores may have a pipe cutting machine to cut your pipe upon request.

The 40/15 Meter S9 Antenna base tube simply slips over the pipe and rests on the ground for an easy and elegant deployment. (A mechanical connection from the antenna base tube to the ground mount is neither required nor desired.) Do NOT use a pipe with an OD larger than 1.7" or it will be impossible to slip the upper tapered section of the S9 base tube over the pipe. An optional Pipe Mount Clamp from your local

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hardware store, shown below, lets you raise the S9 base off of the ground for a professional installation.



Pipe Mount Clamp

For portable ground-mount operations and DXpeditions, use an optional Ground Mount Stake available in various forms from hardware stores or online shops, which is similar to the one shown below, would provide you with a fast and easy for mounting.



Ground Mount Stake

For elevated installations of the S9 Antenna, mount the antenna on a mast. Do not use a mast with an OD larger than 1.7". To create a mount for the S9 on the mast, simply install a Pipe Mount Clamp 15" from the top of the pipe. The S9 will slip over the mast and rest on the flat portion of the clamp assembly. In this elevated configuration, the S9 functions as a ground plane (GP) antenna and four radials are required for each intended band of operation, as discussed in **Radials** below.

Radials

For optimum performance, the S9 should be used with an RF ground system consisting of radial wires.

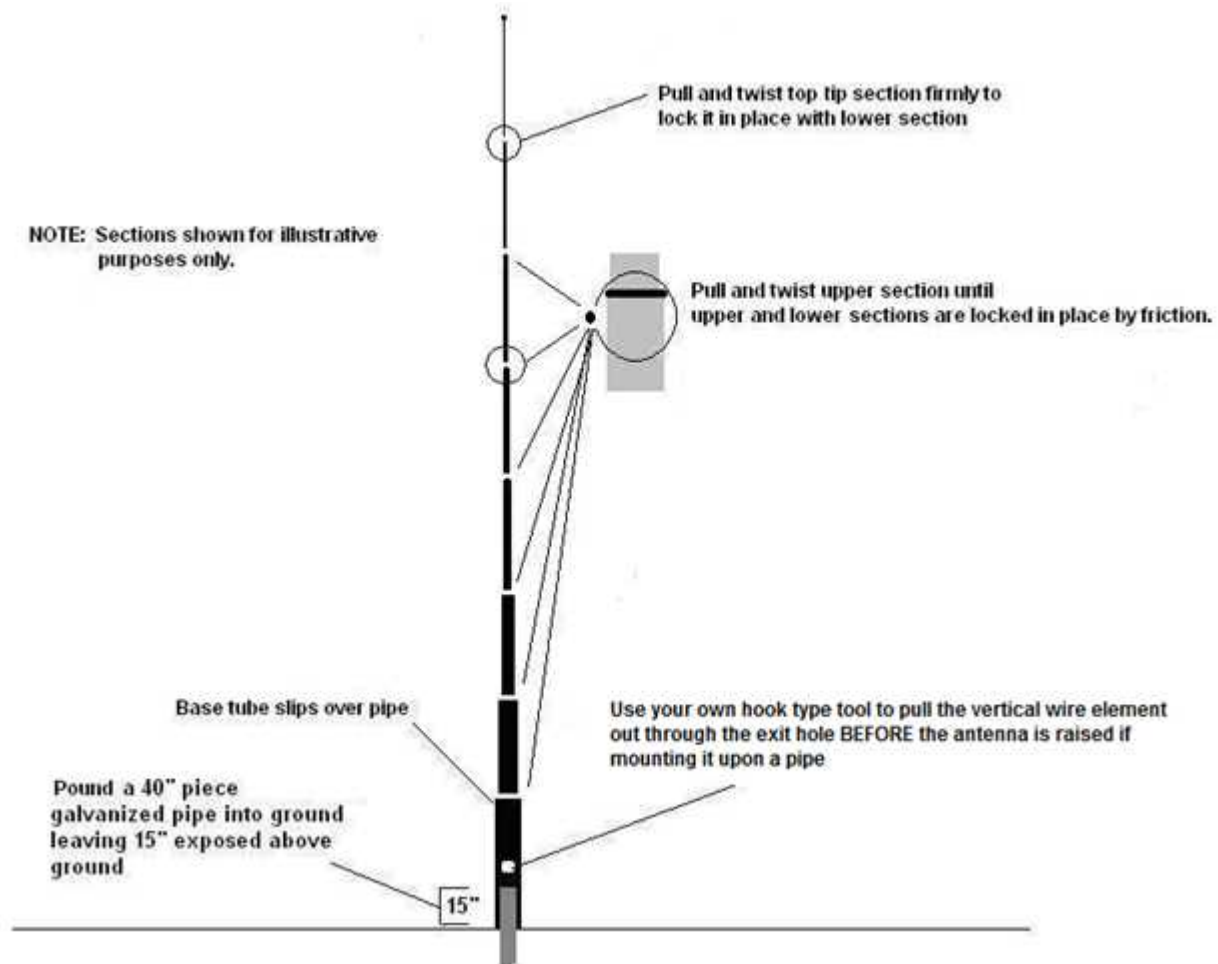
For ground-mounted installations, use at least 16 radials (32 preferred), with each radial at least 0.2 wavelength at the lowest operating frequency (7 MHz) which is 26.75 feet (26 feet, 9 inches long). A ground rod is not an effective RF ground. 14 – 16 AWG stranded insulated copper wire is recommended.

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There is no precise formula to calculate the length of ground-mounted radials because everyone has different soil and soil tends to change the electrical length of the radials. However, a general rule of thumb for radials is: “as many as possible” and “some are better than none”. Also, multiple short radials are better than a few long radials. If you have the time and resources, 32 or more radials at least 26 feet 9 inches in length (or longer) should be considered.

For elevated installations, use four, $\frac{1}{4}$ -wavelength radials for each intended band of operation. For example, you should have four $\frac{1}{4}$ -wavelength radials for 40 meters, four $\frac{1}{4}$ -wavelength radials for 20 meters, and so on. Attach the radials to the optional Pipe Mount Clamp below the base of the antenna and try to position the radials equidistantly around the S9 base. The radials may lie flat or droop up to a 45-degree angle down from the base of the antenna. Attach insulators to the ends of the radials. Connect your coax shield to the clamp and radials. Do NOT run a wire from the radials/clamp/coax shield to an earth ground.

Installation – Quick Reference



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Installation – Detailed Instructions

1. **Select Installation Site.** Try to use a clear and open area to deploy the S9. Even though the S9 is completely insulated, you absolutely MUST locate the antenna site at least 46' away from power lines. In fact, an ideal installation site would be a least 46' away from *any* other large object such as a house or trees.
2. **Install the Mount.** The S9 requires a mount. The elevated mount was discussed earlier. For ground-mount installations, you will need a large hammer, a spare piece of wood and a level.



IMPORTANT!

Place a piece of wood over the top of the pipe or Portable Mount to protect the top edges from becoming deformed. Hammer the piece of wood in a straight downward direction. Do NOT directly hammer the pipe or Portable Mount metal – hammer the wood to protect the pipe/mount.



15 inches
maximum from
ground to top of
pipe

NOTE: Use a level while you are installing the pipe or Portable Mount to ensure that it is as straight as possible in the vertical plane.

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Drive the pipe into the ground leaving 15 INCHES MAXIMUM above the ground. If you use an optional Pipe Mount Clamp, mount it on the pipe an inch or two above the ground.

If you are using an optional Portable Mount, drive the stake into the ground until the bottom of the mount is flush with the ground.

3. Assemble the S9.

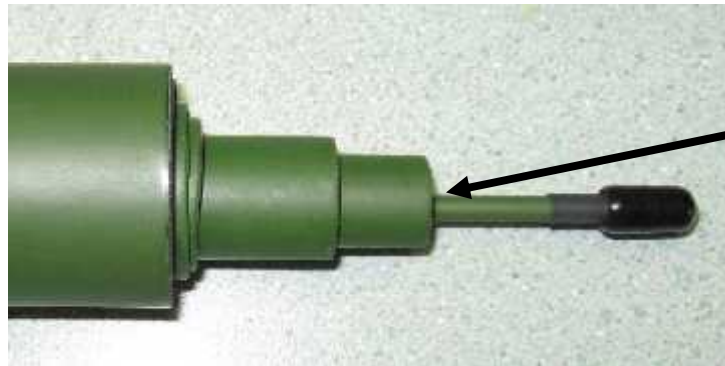
- a. Lay the S9 on the ground near the ground mount and unwind the vertical element wire from the base tube. Now, “walk the wire” away from the antenna base tube in a straight line. Don’t pull unnecessarily on the wire – the idea is to un-roll the wire to its full length. Once the wire is completely unrolled, pull small sections of the wire through your hands to straighten the wire. **NOTE: The wire does NOT have to be perfectly straight, so don’t spend a lot of time trying to straighten the wire!**



Pull wire straight out from base tube until it is fully extended along the ground

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- b. Next, remove the TOP rubber plug. Do NOT remove the BOTTOM end cap where the wire exits. Put the top rubber plug in your pocket so that it will not be lost in the grass.
- c. Now we are ready to extend the antenna sections. The S9 should still be laying flat on the ground. To extend the antenna, grab a section of the wire near the bottom end cap and push the wire into the base tube. This action should cause the top, thinnest section of the antenna (it has a cap on its tip) to pop out of the top of the base tube. (If this doesn't work, pick-up the base tube and shake it slightly while pointing the top part of the tube downward.)



Grab top section here (not the cap) and pull straight out to retrieve the next section. Repeat until all sections are extended from the base tube.

- d. Gently pull the top, thinnest section straight out of the base tube (pull the section, not the cap) until it catches and pulls the next, lower section out. Gently twist the top section to lock it into the lower section. Now, pull the lower section straight out until the next section appears. Repeat this until you have extended all the sections from the base tube. Pull and twist the sections to friction-lock them but do not overdo it as it may be difficult to collapse the sections later on if they are over-extended.
- e. Slide the ring down the tube toward the lower, larger tube section. All tube diameters are tapered, so the goal is to have each section fit tightly against the top of the adjoining lower tube section. Use sense of touch to determine when each adjoining section has enough friction to keep the associated tube from collapsing.
- f. To secure the top section, hold the section below it with one hand and firmly twist and pull the tip section with your other hand until it is firmly friction-locked in place.

NOTE: The antenna should now be fully extended and laying on the ground.

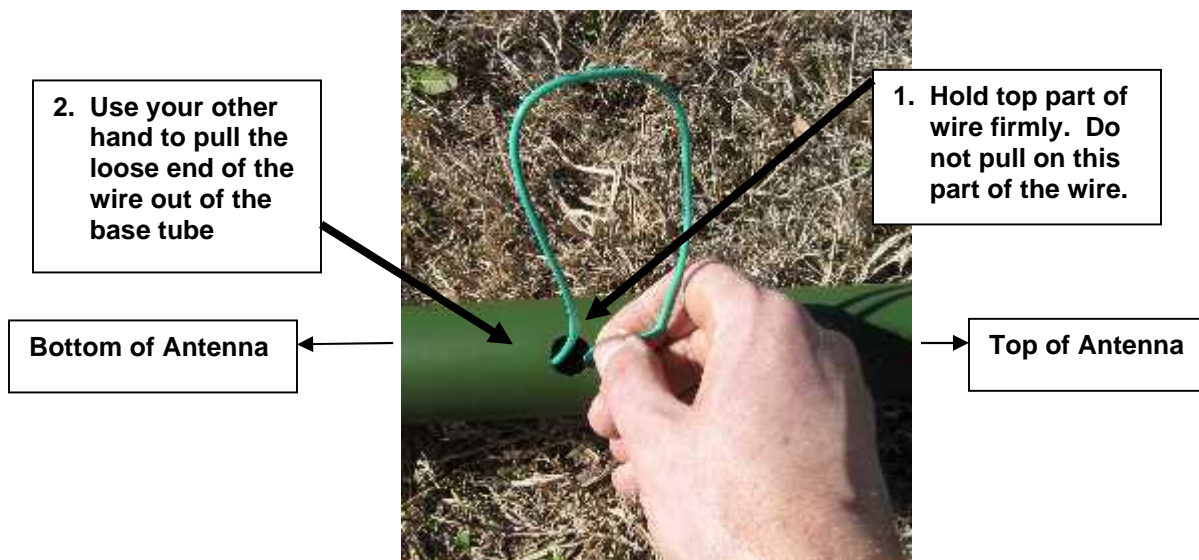
- g. Now, let's retrieve the vertical element wire from the base tube. Rotate the base tube until you see the wire exit hole.

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- h. Using your own hook make from a wire that you have laying around or other such tool you may have, grab the wire and pull a small U-shaped portion of the wire through the exit hole, as shown in the next image.



Once you get a small U-shaped portion of the wire out of the wire exit hole, you can gently twist it, if needed, to help retrieve the wire. Now STOP and carefully remove the wire from your hook. Next, hold the top part of the wire firmly in one hand while you use your other hand to pull the lower, loose end of the wire out through the hole. Do not pull on the top part of the wire – just pull on the lower, loose end! **Note – You may need to perform a slight u-shaped bend to the ring connector to allow it to exit the hole.**



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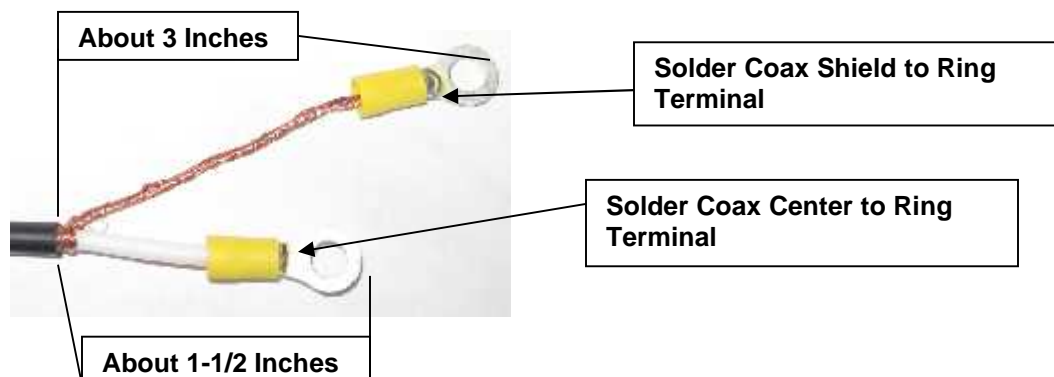


- i. Before we raise the antenna, remove the bottom end cap. Remove the cap and put it in your pocket.
4. **Raise the S9.** This is the fun part! To raise the S9, simply grab the base tube with one hand and the next section with your other hand and raise the antenna. Next, center the antenna directly over the pipe or Portable Mount and then gently lower the S9 down until the bottom of the base tube rests on the ground or pipe mount clamp.
5. **Connect Coax Feed Line to Antenna.**

If you are using the S9 as a 40 meter mono-band vertical, proceed with step “a”, below.

If you are using the S9 as a multi-band antenna, skip to step “b”.

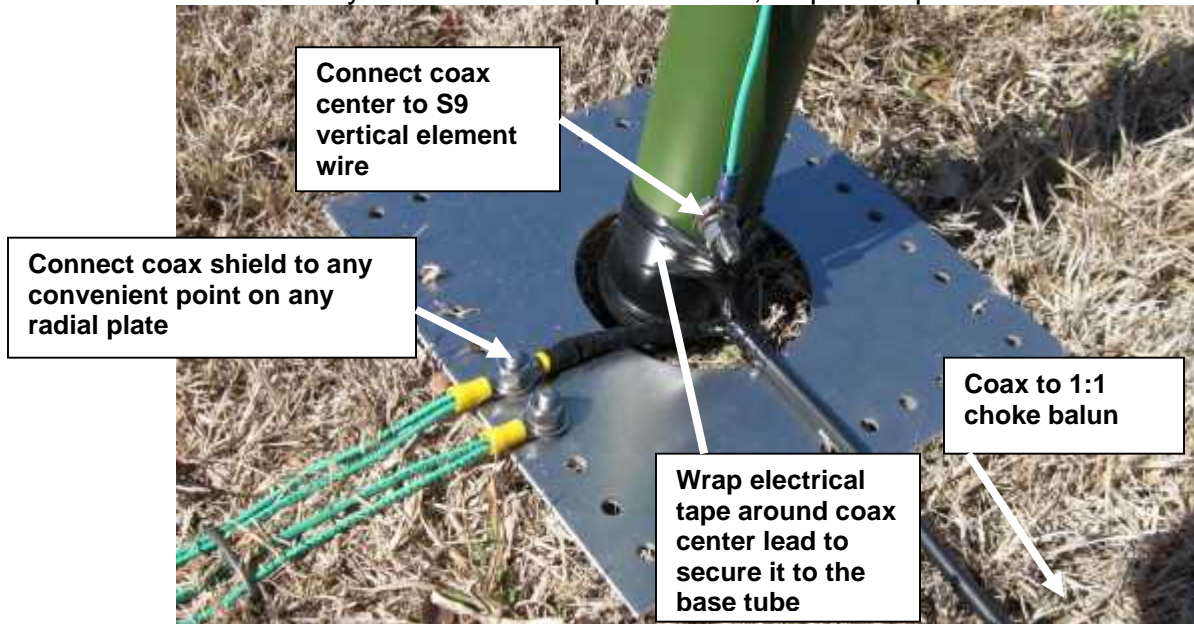
- a. **If you are using the S9 as a 40 meter monoband vertical**, position a 1:1 choke balun in-line with your coax feedline, outside of the radial field. Then, solder two ring terminal connectors to the antenna end of your coax feed line. To prepare the coax, remove about 3 inches of the coax outer jacket. Leave the braid 3 inches long and trim back the center connection to around 1-1/2 inches long. Then, solder the center and shield coax connections to your ring terminals.



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Refer to the picture below. Wrap some electrical tape around the coax center and shield. Then, using stainless steel hardware, connect the coax center connector to the S9 vertical element wire. (The bolt head should face the base tube, as shown below.) Secure the coax center lead to the bottom of the base tube with electrical tape.

Next, connect the coax shield to a convenient hole on a homemade or commercially available radial plate. Now, skip to step “c”.



- b. **If you are using the S9 as a multi-band vertical**, position an optionally available Alpha Match at the base of the S9 and connect the S9 vertical element wire ring terminal connector to the active element connector on the TOP of the match (or to the remote antenna tuner connector marked **Antenna**).

Next, solder two ring terminal connectors to a short piece of radial wire or copper braid and connect it to the BOTTOM of the Alpha Match (or remote antenna tuner **Ground** connector) to the nearest hole on a radial plate. Finally, connect your coax feed line PL-259 male connector to the Alpha Match (or remote antenna tuner) SO-239 female connector.

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- c. You can use electrical tape or zip ties to secure the vertical element wire below the base tube exit hole. If there is any slack in the vertical element wire, it should be left ABOVE the electrical tape or ties. This way, there will be some slack wire available to move with the fiberglass sections in the event of very strong wind.



Leave wire slack
above tape or
ties

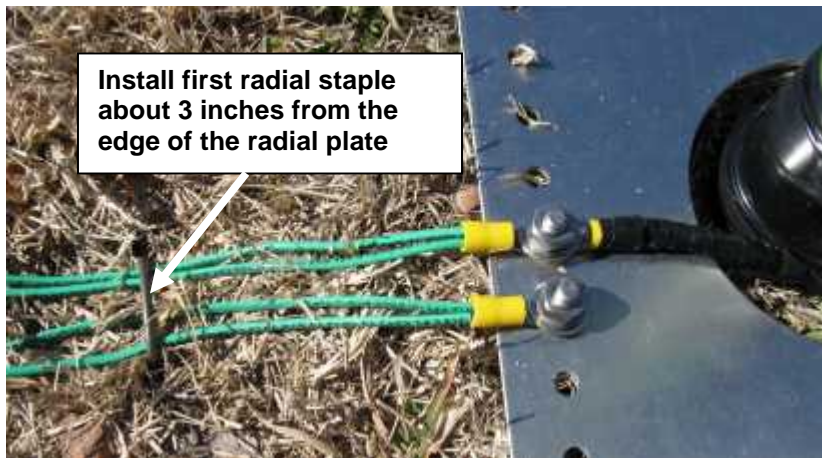
- d. COMPLETELY weatherproof the vertical element wire connection and all coax feed line and unun connections using the sealant of your choice such as coax seal, silicon RTV, etc.

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NOTE: It is not necessary to weatherproof the ring terminal connections on your radial plate.

6. **Install Ground Radials.** For ground-mount installations, we suggest a minimum of 16 radials, each at least 26 feet, 9 inches long spaced as evenly as possible around the S9 base – like wheel spokes. For best performance, use 32 (or more) radials. It is suggested that you use 14 – 16 AWG insulated stranded copper wire (available at Home Depot™ and sold in 500-ft rolls). Your hardware store will also sell ring terminal connectors to facilitate connecting the radial wires to the radial plate.

Use lawn and garden fabric staples (sold at Home Depot™ or Lowes™) to secure the radials to your yard. Install the first staple about 3 inches or so from the edge of the radial plate. Grass will eventually grow over the radials and cover them. In the meantime, be sure to set your lawn mower blade a little higher than normal to ensure that the radials do not get caught in the mower blade. It is best to use *at least* 8 staples per radial to ensure the radials are held firmly against the ground.



Lowering the S9

The antenna should perform in winds up to around 40 MPH. Ice is definitely a concern for any antenna. If winds above 40 MPH and/or ice are expected, you should lower the antenna to protect it from becoming damaged.

To lower the S9, simply disconnect the vertical element wire from the coax center connection (or unun/remote antenna tuner) and carefully lift the antenna straight up off of the mount. Then, gently lower the antenna to the ground.

NOTE: If the wind is strong, it is easier to lower the antenna with the wind at your back.

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Disassembling the S9

To disassemble the S9:

1. Disconnect the wire element from the coax center connection or Alpha Match.
2. Carefully lift the antenna off of the ground mount and gently lower it to the ground.
3. Insert the rubber center piece back onto the antenna.
4. Carefully bend and push the connector end of the vertical element wire back through the exit hole and into the base tube.
5. Now, collapse the antenna sections. Hold the base tube firmly in one hand and grab and twist the section above the base tube while pushing it toward the base tube until the tube collapses into the base tube.
6. Before collapsing any other sections, pull the vertical element wire out of the bottom of the base tube.
7. Stay at the base tube and collapse the remaining antenna sections one-by-one by twisting and pushing them into the base tube.
NOTE: Be sure to keep an eye on the vertical element wire to ensure that it does not get caught in any of the collapsing sections.
10. When all of the sections are in the base tube, push the rubber end cap into the top of the base tube.
11. You may use a Velcro™ strap to secure the vertical element wire to the base tube and you're ready to go!

Maintenance

The S9 features an enhanced, durable painted surface. If you notice surface oxidation (color becomes lighter), use a soft cloth and Armor All™ to restore the finish. Automotive spray wax is also an excellent product to seal and protect the finish. The S9 may also be repainted, if desired, using a quality exterior spray paint such as Krylon™ or Rustoleum™. It is suggested that you lightly dull the finish and then prime it with a quality primer before you paint it.

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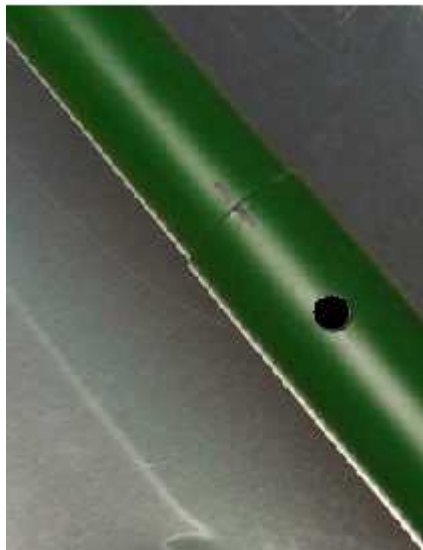
APPENDIX 1 – Permanent installations secured by screws

You will need “course thread” stainless steel screws that are either 1/4 or 1/2 inch long that are approximately 1/8 inch wide. Before you begin, gently pull the top thinnest section straight out of the base tube (pull the section, not the cap) until it catches and pulls the next, lower section out. Gently twist the top section to lock it into the lower section. Now, pull the lower section straight out until the next section appears. Repeat this until you have extended all the sections from the base tube. Pull and twist the sections to friction-lock them all.

The bottom section will have four screws, the middle sections have two screws and the rest of the top sections have one screw each.

The top tip section does not require a screw. To secure the top section, hold the section below it with one hand and firmly twist and pull the tip section with your other hand until it is firmly friction-locked in place.

As the picture below depicts, make black marks with an indelible black marker that will align the screw holes you are marking. Now, start by drilling with a smaller bit than what you require and step your drill bits up while making holes to support each section. **Be careful not to drill through both outer tube walls!**



As mentioned, each tube section (except the top, tip section) requires screws for permanent base mounting to prevent the tubes from collapsing down into the larger diameter tubes immediately below it. Your antenna is now prepared to have the screws affixed, into each of the holes you have pre-drilled, as the following image of the base section shows.

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Continue with securing each section with their appropriate screws until all sections have been secured. Again, the bottom section has four screws, the middle sections have two screws and the top three sections have one screw.

The antenna should now be fully extended and laying on the ground and all sections (except the top section) should be secured with screws. Now, return to Step 3 to continue installation.



Support

If you have questions about your antenna, please feel free to email us at alphaantenna@gmail.com