

ScorpionAntennas.com

*Scorpion*

Installation  
Manual





Thank you for selecting *Scorpion* as your antenna!

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All Scorpion antennas, SA- 680, SA-680S “shorty” and the SA6- 6160, come with both 6 and 2 foot whips, allowing efficient operation through 6 meters. In addition, all antennas are shipped with 20 feet of antenna control cable, control box with a ferrite split bead for the control cable, cigarette lighter plug with built in fuse holder, and a shunt tuning coil.

The antenna body is constructed of .065 inch wall, 304 stainless steel providing high strength and durability for a long, trouble-free life. The finger stock and coil support housing is CNC machined and hand polished 6061-T6 aluminum. All of the attachment fittings are standard 3/8 X 24.

We use Delrin® for the base insulator, the motor support, the ball bearing support, and for the upper coil cap which supports the whip. Our finger stock is special ordered, tin plated beryllium copper, and maintains 37 pounds of combined pressure on the coil at all times.

We use a Pittman, industrial-grade motor that has steel gears in its planetary gear box. We install capacitors on the motor leads so tuning the antenna by ear is static free. And, we’re the only antenna manufacture using two, double-sealed ball bearings for our coil support.

We use a 3/8 by 16 Stainless leadscrew in conjunction with an oilite bronze nut that is ¾ of an inch in length. This assembly moves the coil in and out of the stainless steel tube when rotated by the motor. The leadscrew is lubricated with DuPont Krytox Teflon® grease which will withstand -30 to a plus 475 degrees Fahrenheit.

For all of our coil forms, we use a 1/4 inch wall, industrial-grade, 3 inch diameter, phenolic tube. Its heavy resin base formula is specially manufactured to our specs assuring superior strength, and long life.

Our 380-Q coil in the SA-680S and SA6-160 coils are wound with #14 gauge tinned wire, at 10 threads per inch. Our 410-Q coil in the SA-680 coil is wound with #10 gauge tinned wire, at 6 threads per inch.

We use the thickest coil cover in the industry. Our coil cover is made from 1/8 inch wall Lexan®, the same material that is used for bullet proof windows on armored trucks.

All of our antennas come equipped with an antenna position reed switch, providing two pulses per revolution for better antenna positioning.

## Unpacking and Installing the Scorpion Antenna

Please read these instruction sheets completely before opening the shipping tube!

Your *Scorpion* antenna was carefully packaged to prevent damage during shipping. Failure to follow the directions could damage your antenna. Damage thus caused is not covered under warranty.

1). Remove the packing tape from both ends of the shipping tube.



2). Depending on the model, there are up to 24 Phillips-headed screws holding in the shipping tubes end caps. Remove all of these screws.

3). Using two of the removed screws, partly thread them into the end caps. These screws can then be used to pull out the end caps.

5). Remove the end caps carefully!

6). **AT THIS POINT DO NOT TRY TO REMOVE THE WHIPS, THEY WILL NOT SLIDE OUT!**

7). Remove all the contents at each end of the tube. This includes Antenna Controller, Shunt Coil, and hookup wire.

8). At this point, you should see the 3/4 inch leadscrew, washer and nut at the bottom end of the tube. The whip is at the top end of the tube.

9). Place the shipping tube in the upright position. Note the arrows and the word Top printed on the tube.

10). The antenna will be stuck in the shipping tube from the indents of the wood screws on two more wood supports that hold the antenna inside the shipping tube. Slightly bump the tube on the floor. This should release the antenna from the tube.

11). Lay the tube on the floor, and pull the antenna out of the tube leadscrew end first!

12). The whips can now be removed.

## Pre-installation Maintenance

Before the antenna can be installed on any vehicle mount, a few maintenance chores must be performed. Please read the complete list before proceeding.

A). At the bottom of the antenna are 8 button head screws, one of them is **RED** in color. This screw keeps the antenna from rotating when mounted on your vehicle, and it also grounds the bottom of the antenna to the Stud. Make sure it is snug.

B). Hold the wood support with one hand and remove the ¾ inch nut from the leadscrew.

C). Once you have removed the wood support, turn the **RED** button head screw counter clockwise 4 turns, and remove the antenna quick connect mounting stud.

D). On the top of the antenna, there is a 3/8x24 shipping bolt and washer holding a wood support. Under the wood support is a 1 inch long stainless steel coupling nut. Use a backup wrench on this stainless steel coupling nut, carefully remove the shipping bolt and washer.

**Warning: Do not try to remove the 3/8 X 24 leadscrew stud at the top of the antenna! Doing so will damage the antenna, and will not be covered under warranty.** This stud keeps the Lexan® cover held in place by the large stainless steel coupling nut, and is permanently attached to the Delrin® coil end cap with a locking set screw. The wire from the coil is also attached to the stud on the other side of the Delrin® end cap.

Note: The stainless steel coupling nut should not turn. If the coupling nut becomes loose, hold the clear Lexan coil cover and retighten it. When removing any whip or capacitance hat from the antenna, always use a backup wrench on this coupling nut to prevent loosening.

Advisory: There is a bead of clear silicon sealer that has been applied under the Lexan® coil cover to keep out water. If the Lexan® coil cover needs to be removed and/or replaced, please call our Customer Service department for detailed instructions.

## Antenna Installing Tips

Your *Scorpion* antenna is manufactured to an exacting standard, utilizing top-quality components. Its inherent high Q means you'll get the best performance money can buy. However, any HF mobile antenna is only as good as its installation. What follows are a few things to keep in mind when choosing where, and how to mount your *Scorpion* antenna.

The larger *Scorpion* antenna models weigh nearly 18 pounds, and requires a very sturdy mounting structure. This eliminates magnet mounts, trunk lip mounts, and similar mounting schemes.

Even the largest of vehicles present a marginal image plane for any HF mobile antenna. To maximize the image plane, it's important to remember this basic fact; it is the mass under the antenna, not along side, that counts. While a large number of amateurs use variations of a trailer hitch mount, it is the least advantageous location. If you drive a pickup truck, stake pocket mounts are available from a variety of sources. They work quite well if the bed of the truck is properly bonded (strapped) to the frame.

If you drive a van, front mounting is preferred. This assures that the loading coil will not be shielded by the body of the van which improves performance. **Contrary to popular belief, this mounting location does not increase the level of ignition noise.**

Install the Shunt Coil only after you have installed the antenna on your vehicle. This will keep the coil from being damaged when mounting the antenna. If you forget to install the shunt coil you will see a high SWR when trying to tune the antenna to a low SWR on 40 or 80 meters.

A ground strap will have to be installed between the bottom of the antenna (using one of the 8 button head bolts at the bottom), and the body/frame structure. At a minimum, this should be tinned copper braid, 3/4 inches wide, try to keep it less than 18 inches long. The use of solid copper flat stock that is .010 to .030 inch thick and 1

inch wide will actually work better due to RF skin effects. Remember, an ohm meter continuity check is not a guarantee that you have a good RF GROUND!

One of the best things you can do is bond all of the body parts, doors, hood, and trunk to the main body and increase the size of the bonding strap from the engine to the frame or body. Bond the muffler system by using two or three bonding straps to the frame. Bonding of the vehicle parts and muffler system will help to get rid of engine noise, and other types of interference.

DX Engineering carries bonding straps and muffler clamps! If you still have bad radio interference from your vehicle, check with your dealer, as they have vehicle interference information for communication radio installs.

It isn't necessary to sand off all paint and primer when installing bonding straps. Doing so may damage the zinc undercoat which can cause connections to rust. The best way to assure a good connection is the liberal use of star washers. They're available from most hardware stores. It isn't necessary to seal these connections in most cases. If you feel you must, then use NoOx® or similar anti-oxidizing agent.

## Winding the Choke

The motor of all remotely controlled HF mobile antennas, including the *Scorpion*, operates above RF ground. This means that any time you transmit, there will be RF imposed on the control leads. These leads must have the RF choked off from them. This is accomplished by winding the control cable through the supplied split bead using at least 3 turns as seen in photo. The choke should be installed as close to the antenna base as possible.



In cases where the antenna is improperly mounted (rear of a van for example), it might become necessary to use two separate chokes. In extreme cases, the coax cable feed must also be choked. This is another reason to properly install your *Scorpion* antenna.

## Antenna Wiring Color Code

With the yellow wire positive and the green wire the antenna coil will travel down going to a higher band such as 10 meters.

With the green wire positive and the yellow wire negative the antenna coil will travel up or will be going to a lower band such as 80 meters.

If the antenna goes the opposite direction then the connection of the yellow and green wire must be reversed.

**Warning: Do not apply power across the brown and white wires. You will have a DEAD SHORT; it will damage the reed switch!**

During operation, the reed switch opens and closes two times per revolution of the Pittman Industrial grade motor, and is compatible with all current, counting-style, antenna controllers.

## Tuning the Antenna Matching Coil

Your *Scorpion* antenna comes supplied with a base matching coil, sometimes referred to as a shunt coil. The inductance of this coil, and a little capacitance borrowed from the antenna (the antenna tuned slightly above operating frequency), form an LC network. This network transforms the input impedance to 50 ohms to match

that of the transceiver. Since the input impedance varies with each installation, the inductance of the coil has to be adjusted. This is done by changing its overall length.

## Adjusting the Antenna with the SWR meter

With the shunt coil as is...the Micro Henry value will be at its maximum. This will give you a lower SWR on the low bands such as 75/80 meters.

**Do a test with the shunt coil as is on the 40 and 80 meter bands before adjusting the coil.**

If you have high SWR on 40 meters and your 80 meter band has a low SWR...try spreading the shunt coil apart a little "VERY LITTLE" then retest. You will notice that the SWR at 40 meters will **decrease** a small amount or a lot depending on how much you spread the shunt coil, and the 80 meter SWR will **increase** a small amount. If your SWR is high on 80 meters and it goes higher when you spread the coil then you need a coil with one more turn for a higher Micro Henry value.

It's a balance of the SWR between the bands and this takes a few minutes of adjusting to find that sweet spot. If it is under 1.5:1, you're done. If it isn't, you may have to compromise between the 40, 80 and 160 meter settings depending on the model of antenna.

## Controlling the Antenna

The supplied wiring harness comes equipped with an accessory plug already attached. However, for permanent installations, this **1 amp fused** connection should be made to a power source other than the accessory socket.



Connect the fused power plug to the 12 volt accessory outlet in your vehicle. The L.E.D. light on the plug lets you know if you have power going to the controller.

Move the antenna coil all the way down (collapsed) by pushing the bottom (cable end) of the rocker switch. Tune your radio to 20 or 40 meters. Push the top of the rocker

switch; this will cause the antenna coil to start going up. Listen closely to your radio. As the coil is going up the white noise will start increasing. It will get louder as the coil becomes resonant on the band you are on so watch your S meter and adjust the antenna up and down for maximum signal. If you are tuned to where you can hear a conversation the receiver will get louder faster because of signal strength. Once you tune by ear you will be surprised as to how close you are after you check the SWR with the radio.



With the coil all the way down in the Stainless tube you are positioned for 6 meters with the 18 inch whip, or 10 meters with the 6 ft whip.

With the coil all the way up you will be at the bottom of the 80 meter band with the six ft whip.

With the 6 ft whip you will have continuous tuning from 10 to 80 meters!

The antenna is most efficient with a 102 inch whip. Note: the 10 and 12 meter bands cannot be used with the 102 inch whip; the six foot whip will be needed.

Any screwdriver antenna will perform better on the 40, 80 or 160 meter bands with a 102 inch whip!  
Most people do not like a whip that tall so we recommend using a capacitance hat of at least 24 inches in diameter. The capacitance hat has to be installed a minimum of 24 inches above these large coils, 36 inches is better still.

The antennas efficiency and performance will be increased when the least amount of coil is exposed.  
Capacitance hats are designed to work there best on the 40, 80 and especially on the 160 meter band.

The best site we have found that is loaded with HF mobile install info is [www.KOBG.com](http://www.KOBG.com). Alan Applegate is the king of mobile install info. He will reply if you have a question about anything on his site. I would read everything on his site before doing any mobile install...YES it is that good!

Also, go to Tom Rauch [www.W8JJ.com](http://www.W8JJ.com). We have links for Alan's and Tom's site at the bottom of our home page under **Links**. Tom is the Engineer for DX-Engineering. Take a look at all of the mobile antenna testing he has done...he has a lot of good info to study and learn from. You will not be sorry you did!

If you are having issues with tuning, don't get discouraged,  
a lot of times its something simply over looked ... we know... we still do it!  
Please give us a call.

Thank You for purchasing our product!

73s

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