

Materials and Installation notes for Scorpion HF Antenna in Arizona

Version 7 (February 3, 2020)

Order the **Scorpion mobile antenna model SA-680** from <https://www.scorpionantennas.com/>

Powder coat color: Desert Sand (this color blends in well with Arizona landscapes)

Coil Cover: Clear (black cover is an option, but you won't be able to see the coil)

You will want these options from Scorpion Antennas:

- 1) Mounting adaptor for 1" water pipe
- 2) Cover for matching coil (the supplied matching coil #9 version seems to work best)
- 3) 6 Snap-on common mode Mix-31 chokes – used for control cable (both ends)

Balun (1:1 choke): Balun Designs model #1115u, \$66.95

<https://www.balundesigns.com/model-1115-1-1-balun-1-5-54-mhz-3-5kw/>

Motor tuning Controller: (2 Choices)

TuneMatic TM-1 with optional Amplifier relay Option \$310 – specify the model of your transceiver. You need to call in your order since the amplifier option requires a telephone order.
<http://www.tunematic.us/> 352-236-0744.

MFJ units (2) that reportedly work well: MFJ-1924 \$160 or MFJ-1927 \$190 (specify Icom, Kenwood, or Yaesu with order). Order direct from MFJ, or DX Engineering, HRO, Gigaparts, etc.

Coaxial Cable: Measure for your cable run length and add 20 more feet (to be used to make up to 4 or 5 coax jumpers) to your total length coax order. RG-213 or equivalent (DX Engineering or HRO).

The Wireman has 103A-Davis RF "Bury-Flex" RG8 which is also direct buriable like RG-213.

<https://thewireman.com/product/davis-rf-bury-flex-rg8/> RG-8 (not RG-8X) can work as well.

Coax PL-259 connectors: **10** (DX Engineering) 8U PL-259 Next Generation Crimp/Solder
[Note: change quantity to **12** if installing 2nd lightning arrestor & ground rod near house entrance].

1- Right angle PL-259 cable adaptor (used at antenna) (DX Engineering, HRO, Gigaparts, etc.)

Control cable: 4-conductor audio wire, **16 gauge**, 100' **Home Depot** (\$36.95) or **Amazon:** (Cable Matters 16 AWG CL2 in Wall Rated Oxygen-Free Bare Copper 4 Conductor Speaker Wire 100 Feet)

Split-loom tubing: **Home Depot** (electrical dept.) or **Amazon.** Make sure to order enough to cover the total cable run from the outside of the shack to the antenna. Splice 25' sections together with tape. **AMAZON:** Electriduct 3/4" Split Wire Loom Tubing Polyethylene Flexible Conduit (0.75 Inch ID) – multiple colors to choose from.

Radial Plate: **DX Engineering:** DXE-RADP-3 \$74.99 <https://www.dxengineering.com/parts/dxe-radp-3>

Lightning Arrestor: **DX Engineering** Surge Arrestor DXE-ISBH1-UF2K \$69.99 **[Note:** order 2 if installing a 2nd ground rod and lightning arrestor at the house cable entrance]

<https://www.dxengineering.com/parts/dxe-isbh1-uf2k>

Four-foot threaded water pipe: Home Depot. Also buy a pipe cap to protect the pipe threads until ready to mount antenna. Dig a 3-1/2 foot hole, leave 6 inches of pipe protruding above ground level.

[Optional] 12 inch diameter cardboard CONCRETE form tube 3' long available from **HOME DEPOT** for less than \$10.00. (The cardboard tube works great for pouring concrete. It has about 3/16" Walls and is very rigid).

Quick-mix concrete: 2-50 lbs. bags quick mix concrete (**Home Depot**) [**Note:** Also get a large bucket to mix the concrete in]

Ground rod: 4' or 6' gets installed next to the radial plate. 8' length is probably too long to successfully pound in unless you have a special hammer tool. **Home Depot** (if you can find a 6' there) or **Amazon** (4') [**Note** order 2 ground rods if following the note below]:

It is probably wise to install a second ground rod & lightning arrestor near the cable entrance into the home. Make certain that there are no sharp bends on the cables as they enter the house.

Wire Mesh hardware cloth: 1/4" x 24" x 50' roll – **Home Depot** (cut into four equal pieces)

Optional: 16 or 18 gauge wire for additional radials: 10- 10' radials = 100' Home Depot

Miscellaneous:

- Electrical Tape
- Extra SS Bolts, nuts and lock washers for radial plate (ACE or True Value Hardware)
- #10 Grounding wires from antenna to radial plate (3 or 4) – easily made with 3' of #10 wire
- #8 or #10 conductor to ground rod from radial plate – approximately 2' – or use 1/2" wide braid.
- Ground lug for ground rod

INSTALLATION:

1) Get someone (landscaper, yourself, young person, etc.) to dig 3-foot-deep hole, about 1 foot in diameter. Put the concrete form tube in the hole, back fill around the tube and add some water once assured that the tube is perfectly vertical. Wait one hour for water to be absorbed by ground. You can gently pound in the pipe to get the last 6" in the ground (protect with pipe cap). Mix concrete and install 4' water pipe assuring that it is perfectly vertical. Pipe should extend 6" above ground level. Wait a minimum of 24 hours before installing the Scorpion antenna.

[CAUTION: If you damage the pipe threads by pounding too hard while driving the in the last 6" into the ground, you will **NOT** be able to attach the Scorpion antenna – but there is a solution if this should happen by installing a smaller 1/2" water pipe inside the damaged pipe, then attach an adaptor]

- 2) Install SS Bolts, nuts, on radial plate -double nutted – minimum 4 per side. Bolt head goes on the bottom side, 1st locking nut & washer on top. 2nd nut & washer goes over wire mesh, wire radials.
- 3) Install and clamp radial plate on water pipe.
- 4) Install lightning arrestor in the hole in the radial plate
- 5) Drive in the ground rod within 1' or less from the radial plate
- 6) Run ground wire #8 or #10 size from ground rod to radial plate. You can use braided strap as an option.
- 7) Rake away the gravel for the paths that the wire mesh will lay in. 2' wide in 4 directions.
- 8) Cut wire mesh into 4- 10' or 12' lengths – lay the wire mesh ends 1" over the top of the radial plate sides, use additional nuts & washers to secure mesh to plate. Optionally run additional radial

wires on the ground in areas not covered by the wire mesh, attach to same bolts used to secure mesh. Recover the mesh and radial wires with rock/gravel when complete.

- 9) Install 3 or 4 #10 ground wires from base of antenna to radial plate
- 10) Install matching coil and its cover on side of Scorpion.
- 11) Dig (or hire a landscaper) a shallow trench for the cable run from antenna to shack entrance.
- 12) Run coax and control cable from shack entrance to antenna base inserting in the split loom tubing – which provides some protection for the cables.
- 13) Install a PL-259 connector on the coax and also make up 2 short coax jumpers (from lightning arrestor to antenna and from Balun to Lightning arrestor). Control cable will need extra 6-foot tails at antenna and at rig so that ferrite chokes can be installed.
- 14) Bolt the square balun box onto the radial plate using one of the tabs of the balun enclosure or you can affix it to the wire mesh with ty-wraps.
- 15) Splice 4 conductor audio cable to TuneMatic provided end connector. Connect this connector to the 4-pin plug on the Scorpion base. Make absolutely certain to make good notes about which colors of the audio cable are for the motor and which are for the sensor switch. Match the same colors in the ham shack to splice to TuneMatic control box. [incorrectly mixing up the motor and sensor leads can cause damage once power is applied]
- 16) Install Snap-on ferrite chokes on the control cable at the antenna using multiple loops, do the same in the ham shack.
- 17) Connect an inline fuse holder in one of the Scorpion motor leads in the shack, use 1-amp fuse
- 18) Attached PL-259 connector on coax in shack, connect to amplifier.
- 19) Make one short coax jumper from transceiver rig to TuneMatic and a 2nd coax jumper from TuneMatic to amp.
- 20) Splice in a single conductor RCA audio cable between the Rig and TuneMatic and between the TuneMatic and Amplifier. This will control your PTT and keep the amplifier from keying up while the TuneMatic is tuning the Scorpion. [skip if you're not using an amplifier]

RIG → TuneMatic & TuneMatic → Amplifier

- 21) Open the cover of the TuneMatic then:
 - a) Turn the small potentiometer fully clockwise
 - b) Set the DIP switches to limit motor current to 700 mA setting [0 0 1]
- 22) Connect 12V supply to TuneMatic and set up the TuneMatic initialization per factory instructions.

NOTE: If you need a Phoenix area contractor to run cables thru a wall, attic, etc. several folks have hired Chad Every, **First In Line Home Services**. You can reach him by phone at 909-263-3989 or by email Every@FirstInLineHome.com.

INSTALLATION PHOTOS:



