

Problem Solvers for Wire Antenna Installations

Of the many questions we get concerning wire dipoles and slopers here at the Alpha Delta antenna facility, many deal with the same common issues of antenna installations and performance problems. Indeed, many of the “problems” turn out not to be problems at all when provided with additional information about the situation and installation site.

Fundamental antenna theory, and installation experience that we have gained over many, many years of dealing with these antennas may provide the answers you are seeking.

No engineering formulas and complex theory here, just practical information gained from customers themselves, in addition to our own test results and operator knowledge as hams.

We have formal engineering educations, but that isn't what you're looking for here. You're looking for how, why and what to do! Some of the following points will be very basic for some of you, but in talking to our customers of all levels of experience, we hope you will find them useful and time saving.

A. Slopers (quarter wave) have a unique set of installation requirements compared to the typical half wave dipole. Basically, they require operation on a support/tower (35 feet or higher) with an HF size beam on top to act as a “capacity hat”, sort of like an upside down vertical where the beam elements are like the radials of a ground mounted vertical. Also, there needs to be a good ground return path down the tower. Metal guy wires that are not “broken” with insulators and other wire antennas on or near the tower can cause serious problems (SWR). We get many questions like “can I mount a quarter wave sloper on the peak of my roof, or on a wood or metal pole or on a tree, with no HF beam on top?” Simply put, the answer is “no”. They just won't tune that way.

Refer to our web site home page on sloper installation instructions. Slopers mounted on towers or supports with no HF size beam on top will not tune or perform properly. Even when installed properly, a wide range (10:1) should be employed to reduce SWR and broaden out the bandwidth.

B. Dipoles are a relatively simple design and usually easy to install and tune with good SWR, but they too require some thought for proper operation. Dipoles operating on 20 through 10 meters should be at 30 feet, or more, in the air. Dipoles operating on 160/80/40 meters should be at least 40 feet in the air for good SWR and at least average performance.

Higher heights on the low bands significantly improve performance. We have many customer reports of good operation at lower heights, but that depends on how high the “site” is electrically above ground and what's under the antenna. We can't predict

that. Even at decent heights, both slopers and dipoles need to be in a clear “site”, electrically uncluttered. See “Site Location” below.

Monoband dipoles, like a single band 40 meter dipole, cannot be operated on “even” harmonic related bands like 20 and 10 meters. However, they can be operated on “odd” harmonics, like a 40 meter dipole on 15 meters. Bands that are “even” harmonics have high SWR and excessive coax cable losses. Even though a wide range antenna tuner might show a low SWR on “even” harmonic related bands, the performance will suffer and not work out well.

C. Site Location. These antennas need to be as far as possible from any surrounding metal objects. Our tests, and those of customers, show that any antenna wire should be at least 15 feet from gutters and metal house siding or fascia. Metal guy wires should be “broken” with insulators at non-resonant lengths. Odd as it may seem, attics have a certain capacity characteristic and antenna wires should be no closer than 10 feet from any roof top, even if it’s a non-conductive roof material. Antenna wires should be at least 20 feet from other similar frequency HF antennas, even verticals. Power lines must be avoided at all costs, and any antenna that may fall as a result of a storm or support failure must be positioned to NEVER fall across a power line. To reduce power line noise pick up, the antenna must be as far as possible from a line run. 30 feet, or more, is preferable.

A low frequency dipole (80/40 meters) can be put up to within 10 feet or so under a higher frequency (20/15/10 meters) beam with little if any problems. In an inverted-V configuration, the end of the wires should be about 10 feet, or higher, from the ground. The center feedpoint of an inverted-V should be offset from a metal support or tower leg by about 18 inches, on a non-conductive arm, to minimize coupling and thus higher minimum SWR. It is also important to note that antenna wires should not touch, or come closer than about 6 feet from any tree branch/limb or leaves. This may not be readily known but they can really upset resonant frequency or SWR.

If a dipole is fed with balanced line, the balanced line itself should be at least 6 feet from any metal objects, throughout the length of its run. It should never touch any metal, like window or door frames, as it enters the property. Close coupling of any metal to balanced line will significantly upset the system. Also, balanced line running down along side a metal tower leg or mast will cause serious coupling problems. If the balanced line is feeding a tower mounted dipole, it should come away from the tower at about a 45 degree angle and not near any guy wires or other wire antennas.

D. Attic installations. We have many successful customer reports of attic installations, particularly with the Model DX-EE, 40 foot long, 40 meter thru 10 meter dipole. HOWEVER--and this is a BIGGIE! Attic installations and performances (SWR) are unpredictable due to the fact that antennas in attics are upset by attic wiring and HVAC heat/air ducting being nearby. Also, metal gutters and roof/wall material can be a factor. The height above ground (single story, multi-story) is also an important consideration as with any site conditions.

Depending upon your residence, RFI coupling into stereos, TVs, burglar alarms and even garage door openers can be a problem. Due to the coupling effect of attic installations, an external wide range (10:1) tuner is usually required for proper SWR operation. The antenna wire must **NEVER** touch any roof truss or roof material and should be at least 3 ft. from such material, and at least 4 ft. from any metal device, attic wiring or HVAC object. Also, power should be limited to 100 watts or less for attic installations.

E. Notes regarding the Model DX-DD, DX-CC on 80 meters and DX-LB on 160/80 meters. We get many questions regarding resonance, bandwidth and SWR on these bands with these models. It should be noted that on these bands, these antenna models are physically shortened from full size antennas operating on these bands. As a result, they are high-Q, narrow bandwidth designs and do not cover the full bandwidth on these bands. Actually, full size antennas don't either, but do have a broader SWR bandwidth.

They operate extremely efficiently in their ranges, but must be adjusted (trimmed) for other ranges (add lengths to lower resonant freq., shorten to raise freq., several inches at a time using an SWR meter.) and a tuner (10:1) should be used to "broaden" out a range once it has been set. The DX-DD/DX-CC have 2:1 SWR bandwidths approx. 65 kHz on 80 meters. The DX-LB is about 40 kHz wide on 80 and about 20 kHz on 160 meters, depending on site location and height above ground. "Clear site" locations and proper height above ground are a must for proper tuning and performance. Odd configurations are unique to the site and we cannot predict the success of such configurations.

Before calling the factory, **BE SURE** to do an SWR "run" across each band. Do about 10 kHz at a time on 160 meters and 20 kHz at a time on 80 meters, turning the dial slowly, with the tuner bypassed, to develop a resonance/SWR curve for each band. Without this data we cannot find clues or help with suggestions as to what might be going on. Comments like "my antenna won't tune", or "my antenna has high SWR" do not help us find solutions. Do a "run" as above, and provide us the data.

Of course, there are exceptions to all antenna "advice" and installation suggestions, but the above points are the ones we get the most often and cover nearly all our customer calls over the last several years. We hope you will find this information helpful and useful in order to maximize your antenna performance.

Alpha Delta Communications, inc.

Please phone for proper address information based on product category.

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Web site www.alphadeltacom.com

Additional notes on inverted-V type antennas: The "included angle" across the feed point between the two halves of the antenna must be 90 degrees, or more, for proper tuning. Sharp angles between the wires will cause severe coupling and upset the minimum SWR and tuning.