

MOBILE BEAM SETUP

STRAIGHT STICKS

First step is to determine if the second antenna is going to be a passive element, much like that of a base station beam, or will both antennas be active. For an active system where coax will be strung to both antennas and the rf fed to both, the minimum spacing will be 1/8 wavelength. That will be about 54.5 inches at 27.105 mc. That is the easy part. The hard part is to decide if you want the main antenna fed in phase or out of phase. If out of phase, then by how much?

For Antennas spaced at 1/8 wavelength apart: ~ 54 inches in phase 0.3 dB gain omni pattern, 45 degrees 0.9 dB gain somewhat less omni , 90 degrees 2.3 dB gain more pronounced lobe in the line of the antennas, 135 degrees 4.2 dB gain diamond pattern, 180 degrees 3.8 dB gain bi directional, figure 8 pattern.

For antennas spaced 1/4 wavelength: ~ 108 inches, in phase 1.1 dB gain somewhat flatten pattern perpendicular to the array. 45 degrees 1.6 dB gain still perpendicular to the array with some energy off the front. 90 degrees 3.1 dB gain again a diamond pattern in line with the array. 135 degrees 4.5 dB gain again the pattern generated looks more like a mushroom 180 degrees 3.6 dB gain bi directional in the line of the two antennas.

There are patterns for 3/8 wavelength spacing. If you have a vehicle bigger than a compact car, then those will yield similar patterns and gain. Now how do you accomplish the phasing. The easiest is to use lengths of coax that are carefully measured and cut to the desired lengths. For 0 degrees both coaxes are the same length, for 45 degrees one coax will be 1/8 wavelength longer. For 90 degrees one coax will be 1/4 wavelength longer. For 135 degrees one coax will be 3/8 wavelength longer. For 180 degrees one coax will be 1/2 wavelength longer, both coaxes will be 50 ohm. It is best to make the coaxes 1/2 wavelength long. The longer cable or the one that will phase shift will be longer by the lengths above.

The above method may not yield the gains or patterns listed due to phase errors in the antenna currents. This is due to the phase shifts of the voltage and the currents in the coax which will vary with length and load. This method while the easiest generally yield the widest variation from the listed patterns and gains.

The best method is feed both antennas with 1/4 wavelength coax. At the junction where the main feed tees in, place a series inductor and a shunt capacitor in one of the feed lines to one of the antennas. By making the inductor or the capacitor variable or both, the phase of the current in one antenna can be adjusted to a pattern and gain that you wish. This method requires more construction techniques and some means of monitoring the phase adjustments, such as a Stargun RF Monitor 27.

It is possible to get as much as 4.5 db gain by phasing two or more antennas on a vehicle. With the first method you get what you get. It depends on how well you measure the coax and the antennas themselves. Also a word of caution, use the same type coax for both legs of the phasing harness to each antenna. You must also account for the velocity factor of the coax. This also adds a variable that is not adjustable in the first method.

When choosing spacing in general with Stargun antennas spacing at 88.25" center to center, a very common spacing is 72", I've seen 48" and up to 400 watts very impressive.

However, if you use a Stargun beam, rather than sticks, all of the above don't apply!