

5-8.2 Alternate corner reflectors

Corner reflectors with a larger spacing between the vertex and the dipole can either have larger gain than the normal corner reflector or a null on axis due to cancellation. These ideas are expressed in Kraus and Marhefka, *Antennas for all Applications 3rd edition*, McGraw-Hill, 2002, p. 359. We start with a corner reflector of the design given in Figure 5-22 where the antenna has a small flat central reflector for ease in mounting the antenna. When we space the dipole further from the vertex, the size of side plates have to be increased to return the spillover of the feed dipole radiation in the backlobe direction.

For reference we start with Figure 5-8-1 of a normal corner reflector pattern where the dipole is spaced 0.3λ above the small flat ground plane 0.2λ across with all plates 1λ wide in the E -plane. Each side plate is 1.2λ long. The antenna pattern shown in Figure 5-8-1 has 11.7-dB directivity.

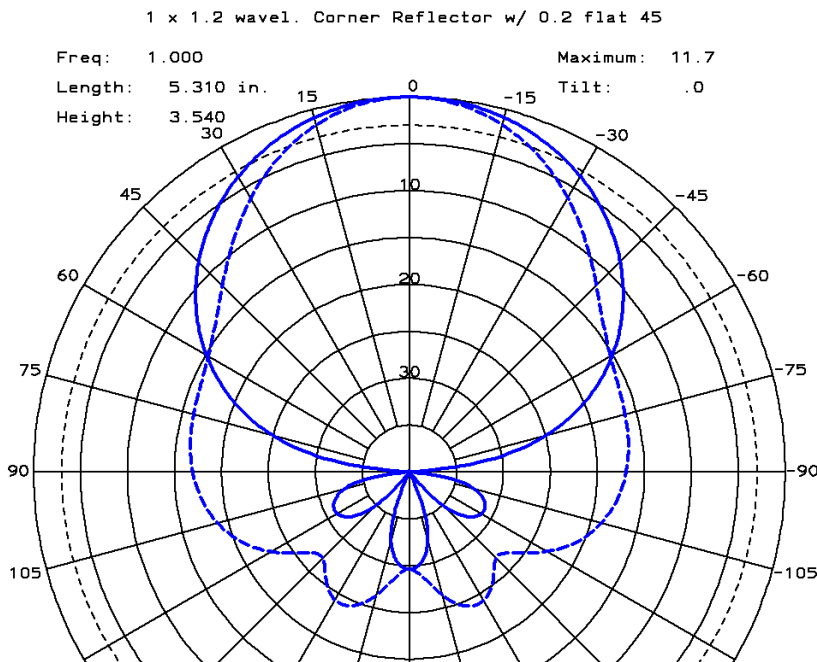


Figure 5-8-1 Corner reflector with geometry given by Figure 5-22 with a 0.2λ center plate and 1.2λ side plates each 1λ wide. The dipole is spaced 0.3λ above small plate. E -plane pattern has solid curve whereas the H -plane has a dashed curve.

When we increase the spacing of the dipole from the center plate to 1.44λ , the beamwidths narrow and directivity increases. Figure 5-8-2 plots the pattern for this spacing when the corner reflector plates have been increased to a width of 2.5λ and the side plates are 2λ long along the diagonal. The beamwidth narrows in both E - and H -planes. Directivity has increased to 15.3 dB. Figure 5-8-3 shows that decreasing the space between the dipole and the small ground plane slightly has little effect on directivity but reduces the second sidelobe in the H -plane. When we reduce the length of the side plates to 1.7λ , the beam broadens in both planes and the H -plane sidelobes increase as shown in Figure 5-8-4. The directivity decreases by 2 dB. More than half the advantage of increasing the dipole spacing has been lost due to excessive spillover. Figure 5-8-5 illustrates the directivity lost (1 dB) when the dipole spacing is raised to 1.5λ . This pattern has higher H -plane sidelobes. Figure 5-8-6 shows what happens to the pattern if the corner reflector plates are reduced to the same size as in Figure 5-8-1. The spillover reduces the directivity significantly, although the beamwidths have been reduced slightly due to the 1.44λ spacing.

A pattern null on boresight is introduced if the dipole is spaced approximately 1λ above the small ground plane as shown in Figure 5-8-7. Reducing the ground plane to the original size of Figure 5-8-1 reduces directivity and the depth of the null as shown in Figure 5-8-8.

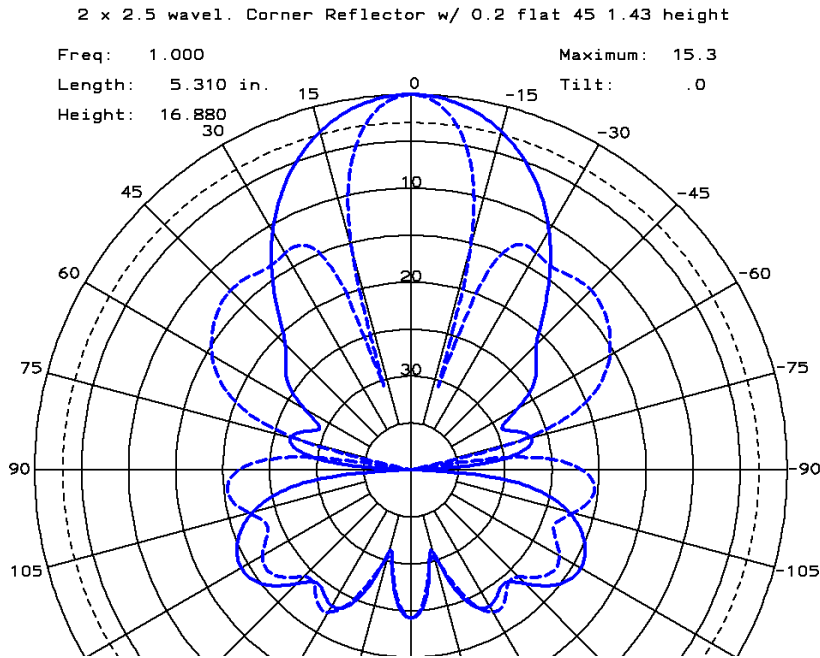


Figure 5-8-2 Corner reflector with the dipole space 1.44λ from center plate 0.2λ across in the H -plane. The side plates are 2.5λ long along the diagonal and all plates are 2λ wide in the E -plane. E -plane pattern has solid curve whereas the H -plane has a dashed curve.

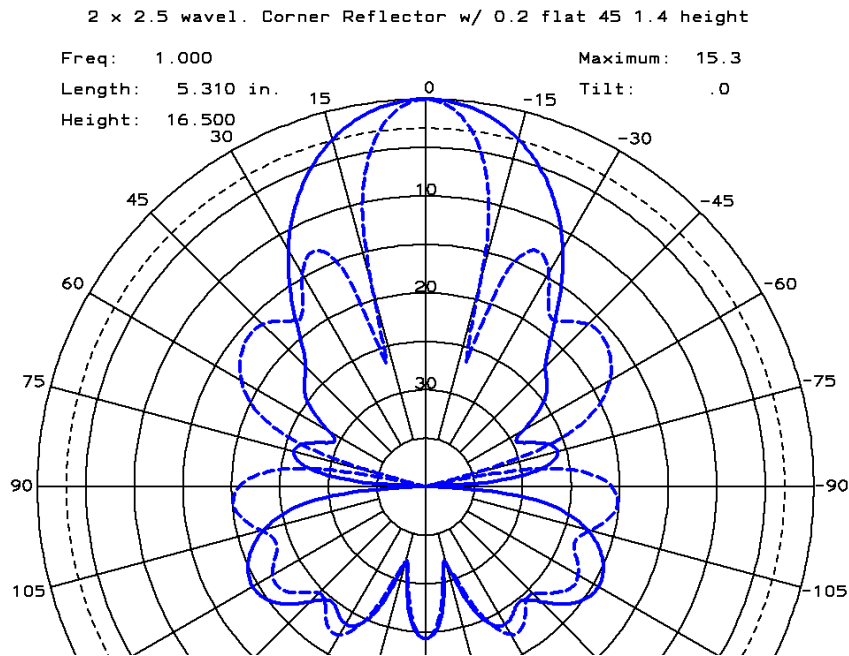


Figure 5-8-3 Corner reflector with the dipole space 1.4λ from center plate 0.2λ across in the H -plane. The side plates are 2.5λ long along the diagonal and all plates are 2λ wide in the E -plane. E -plane pattern has solid curve whereas the H -plane has a dashed curve.

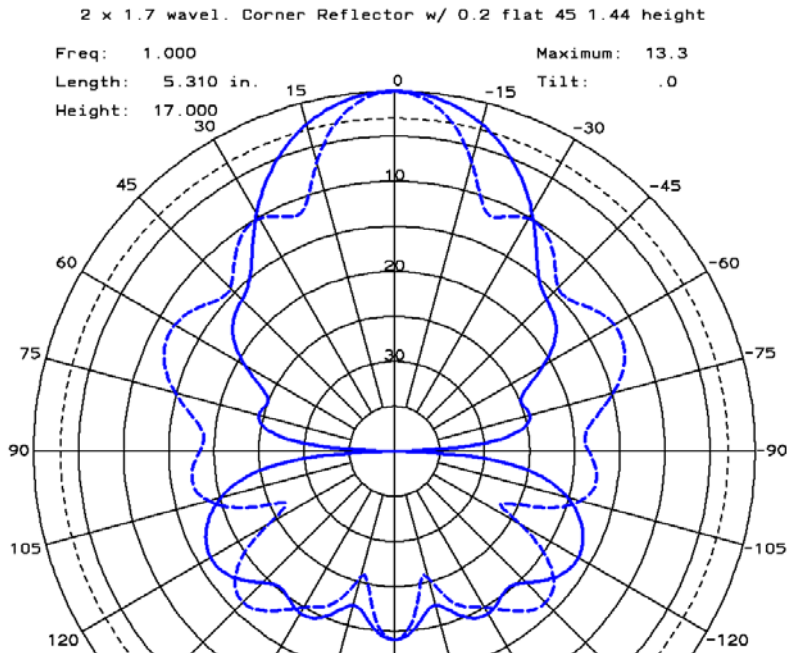


Figure 5-8-4 Corner reflector with the dipole space 1.44λ from center plate 0.2λ across in the H -plane. The side plates are 1.7λ long along the diagonal and all plates are 2.5λ wide in the E -plane. E -plane pattern has solid curve whereas the H -plane has a dashed curve.

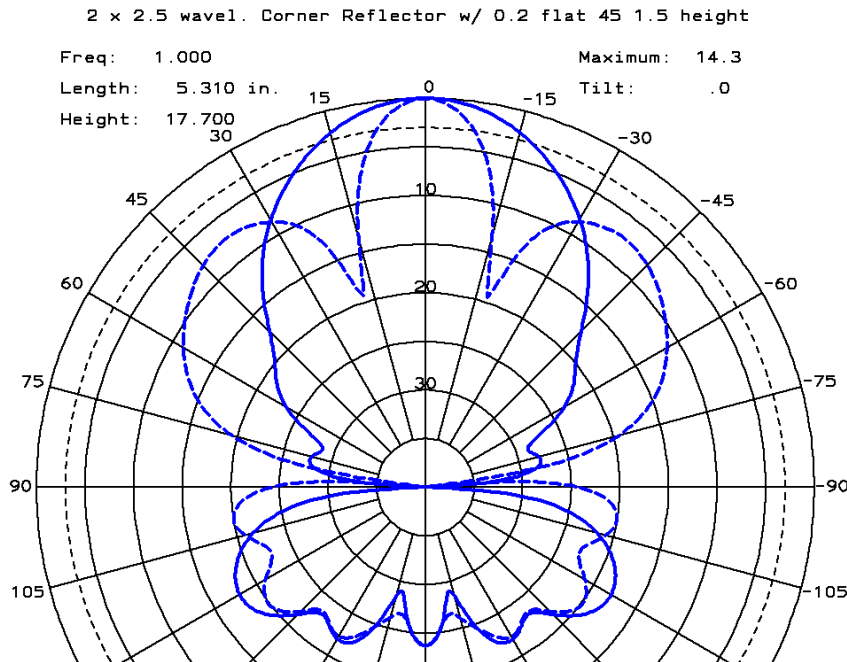


Figure 5-8-5 Corner reflector with the dipole space 1.5λ from center plate 0.2λ across in the H -plane. The side plates are 2λ long along the diagonal and all plates are 2.5λ wide in the E -plane. E -plane pattern has solid curve whereas the H -plane has a dashed curve.

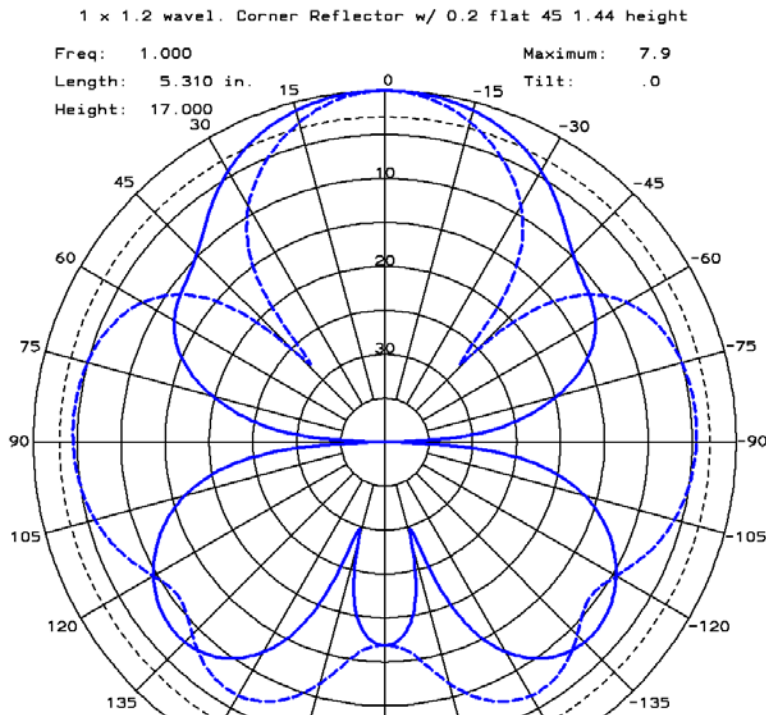


Figure 5-8-6 Corner reflector with the dipole space 1.44λ from center plate 0.2λ across in the H -plane. The side plates are 1.2λ long along the diagonal and all plates are 1λ wide in the E -plane. . E -plane pattern has solid curve whereas the H -plane has a dashed curve.

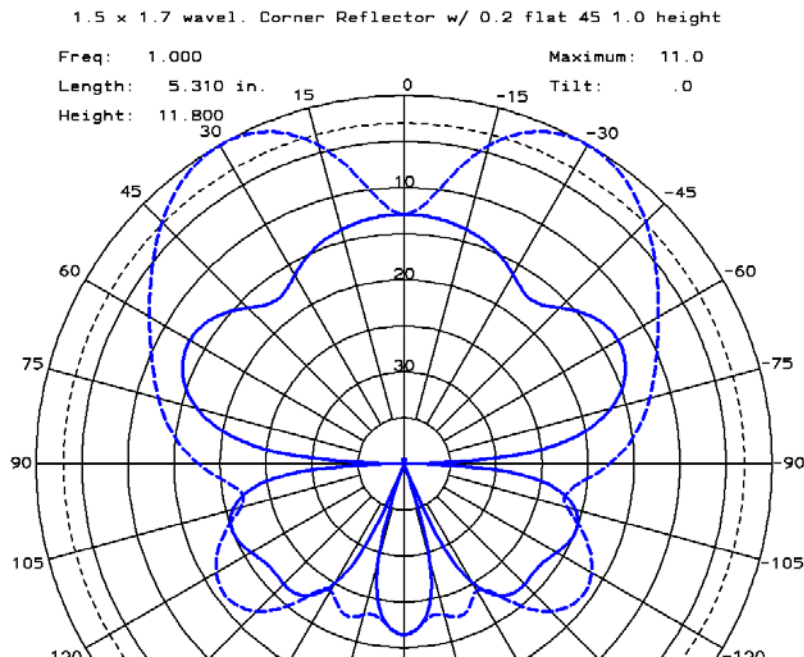


Figure 5-8-7 Corner reflector with the dipole space 1λ from center plate 0.2λ across in the H -plane. The side plates are 1.7λ long along the diagonal and all plates are 1.5λ wide in the E -plane. . E -plane pattern has solid curve whereas the H -plane has a dashed curve.

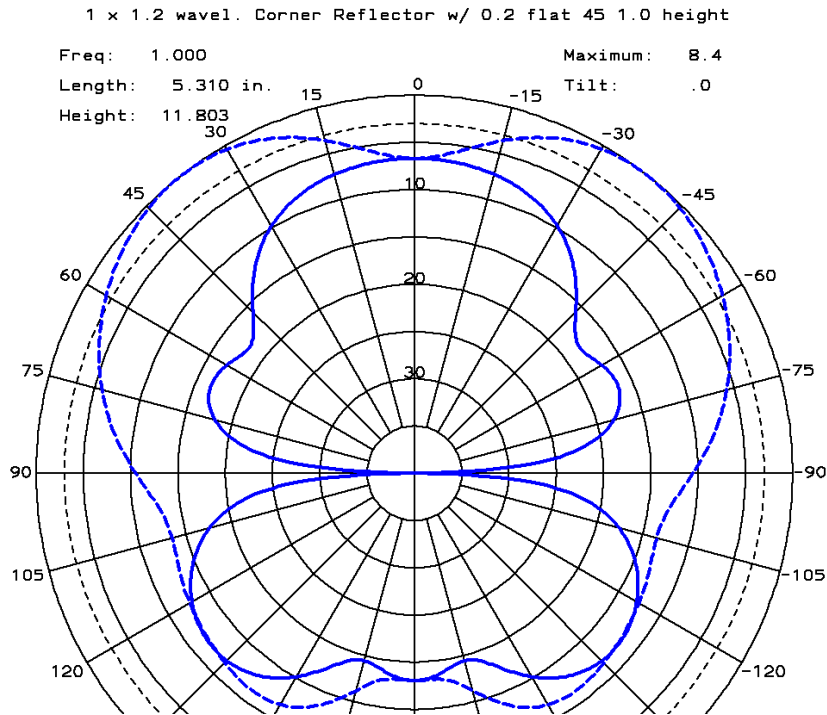


Figure 5-8-8 Corner reflector with the dipole space 1λ from center plate 0.2λ across in the H -plane. The side plates are 1.2λ long along the diagonal and all plates are 1λ wide in the E -plane. . E -plane pattern has solid curve whereas the H -plane has a dashed curve.