Figure 5.3, shows the front view of the array indicating pixel nomenclature and location. $D_{0,}$ and $D_{1,}$ in the Figure indicate the feed aperture diameter and the feed center-to-center distance for the array respectively.
We assumed a wall thickness of Δt=4mm, for the feed horns analyzed, therefore, $D_1 = D_0 + 2_x\Delta t$.

Due to the mirror symmetry of the optics of the Arecibo Gregorian System, only Feed #0, Feed #1, Feed #2 and Feed #3 need to be analyzed, from which the performance of Feed #4, #5 and #6 can be inferred.

5.3 Field of View and Scanning Losses

The scanning losses in the focal plane of the Arecibo Gregorian System at 1.375 GHz. are shown in Figure 5.4. This graph was obtained by displacing an ideal Gaussian feed, with an edge taper of 14.0 dB at 60° for the highest antenna efficiency, along the x-axis and y-axis on the focal plane. From the figure it is clear the high scanning losses inherent in a shape system, but also the lack of symmetry of scanning losses along the x-axis.

With the range of feed horn apertures under consideration, we expected a minimum scanning gain loss of the order of 0.6 dB for the 15.3 cm diameter feeds, and up to 1.5 dB for the 26.0 cm TE_{11} mode horns for the peripheral pixels around the center. In addition, for array rotations, the pixel-to-pixel variations are of the order of 0.2 dB for the 15.3 cm feed horns and of 0.6 dB for the 26.0 cm horn.

Figure 5.5 shows the Beam deviation vs. feed displacement at the same frequency. From this data we obtained the image scales in the focal plane, which are also asymmetric along the x-axis (see Table 5.1).

Table 5.1 Image Scales

Scanning Axis		Image Scale [arcsec/mm]
x	0 > x	1.842
x	0 < x	1.662
y	0< |y|	1.460

This asymmetry will cause the footprint of the array pixels to move in ellipses in the sky when the array is rotated around the center.

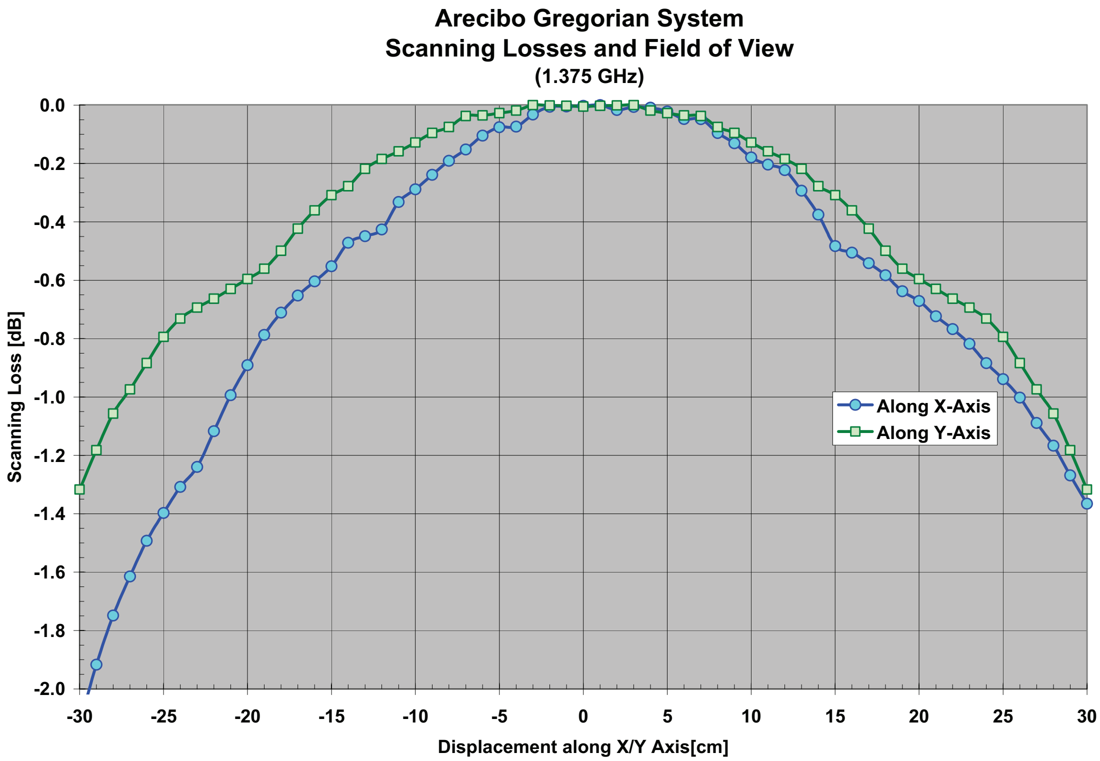

Figure 5.4 Scanning Losses at the Focal Plane of Arecibo Gregorian System (1.375GHz)

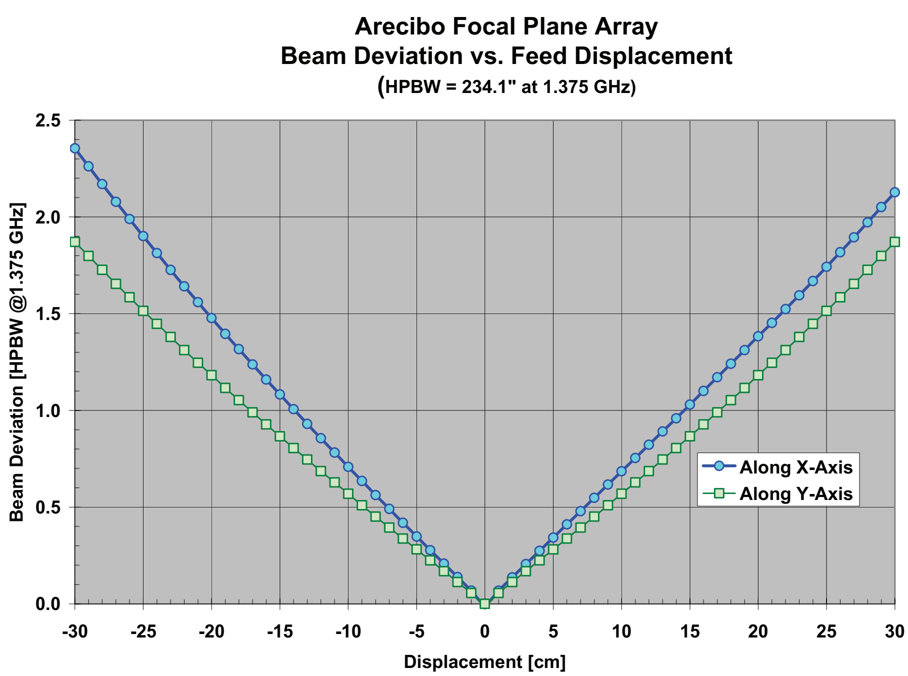

Figure 5.5 Beam deviation vs. Feed displacement (1.375GHz)