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To: VSRT Group  
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 Subject: Satellite TV dish offset geometry

The Ku band TV dishes are offset parabolas with the following parameters:

Direct TV dish with 3 LNBFs	
Focal distance	13"
Offset angle	18°
Height	18"
Width	21"
$f/D$	0.65
Effective aperture	18"
Winegard DS-4047	
Focal distance	10.6"
Offset angle	24°
Height	20.9"
Width	19.2"
$f/D$	0.59
Effective aperture	18.1"

For both these dishes the bottom of the dish is close to the vertex of the parabola as illustrated in figure 1. Typical feeds have a diameter of 1.5 wavelengths which illuminates the reflector with about 10 dB taper at the edge as illustrated in figure 2. With a focal length to effective diameter ( $f/D$  ratios) of about 0.60 to 0.65 the aperture efficiency is about 60-70%. The offset illumination eliminates the feed blockage present in a symmetric illumination of a parabolic dish. For the ozone observations the performance could be improved by reducing the "spillover" to improve the beam efficiency at the cost of reduced aperture efficiency. This Winegard dish is "deeper" with a lower  $f/D$  ratio than the Direct TV dish and is expected to lower the noise temperature by reducing the spillover. Overall performance on the ozone line is expected to be about 1 dB by using the Winegard dish instead of the Direct TV dish.

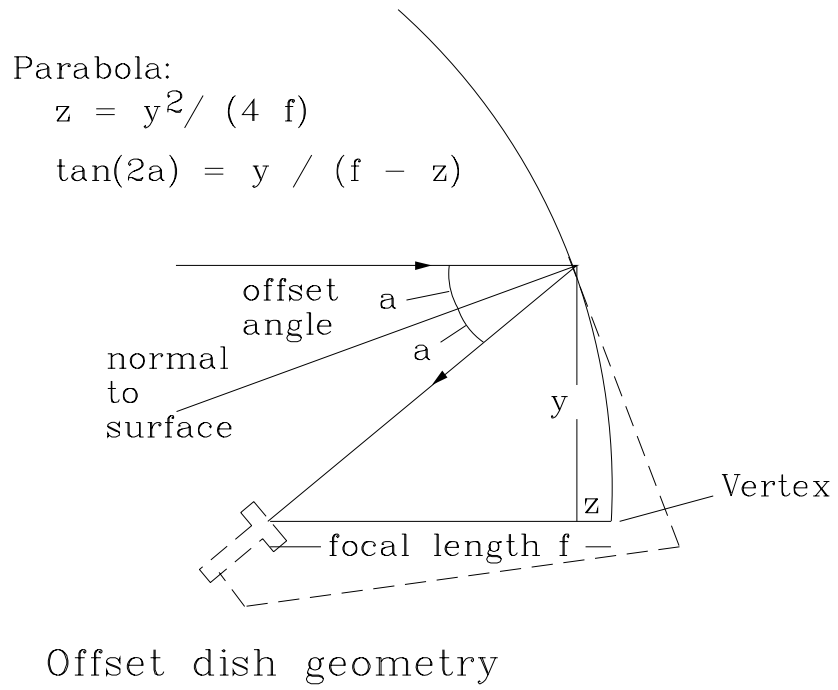


Figure 1.

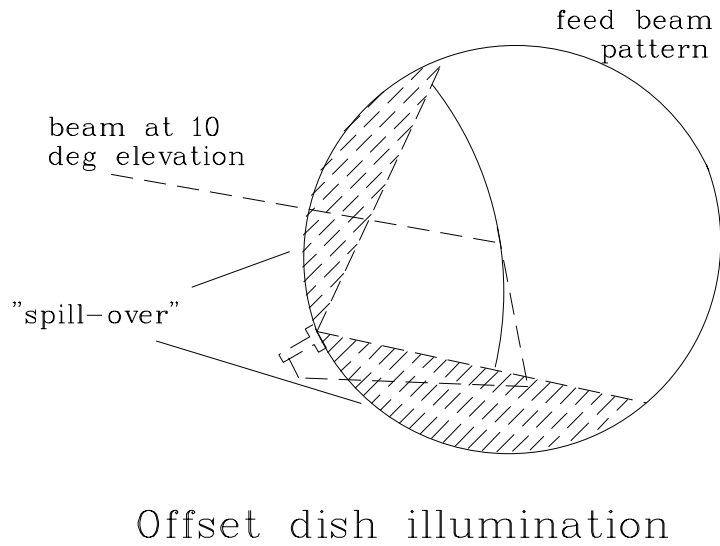


Figure 2.