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TO: Holographers

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SUBJECT: Unwanted reflections from subreflector

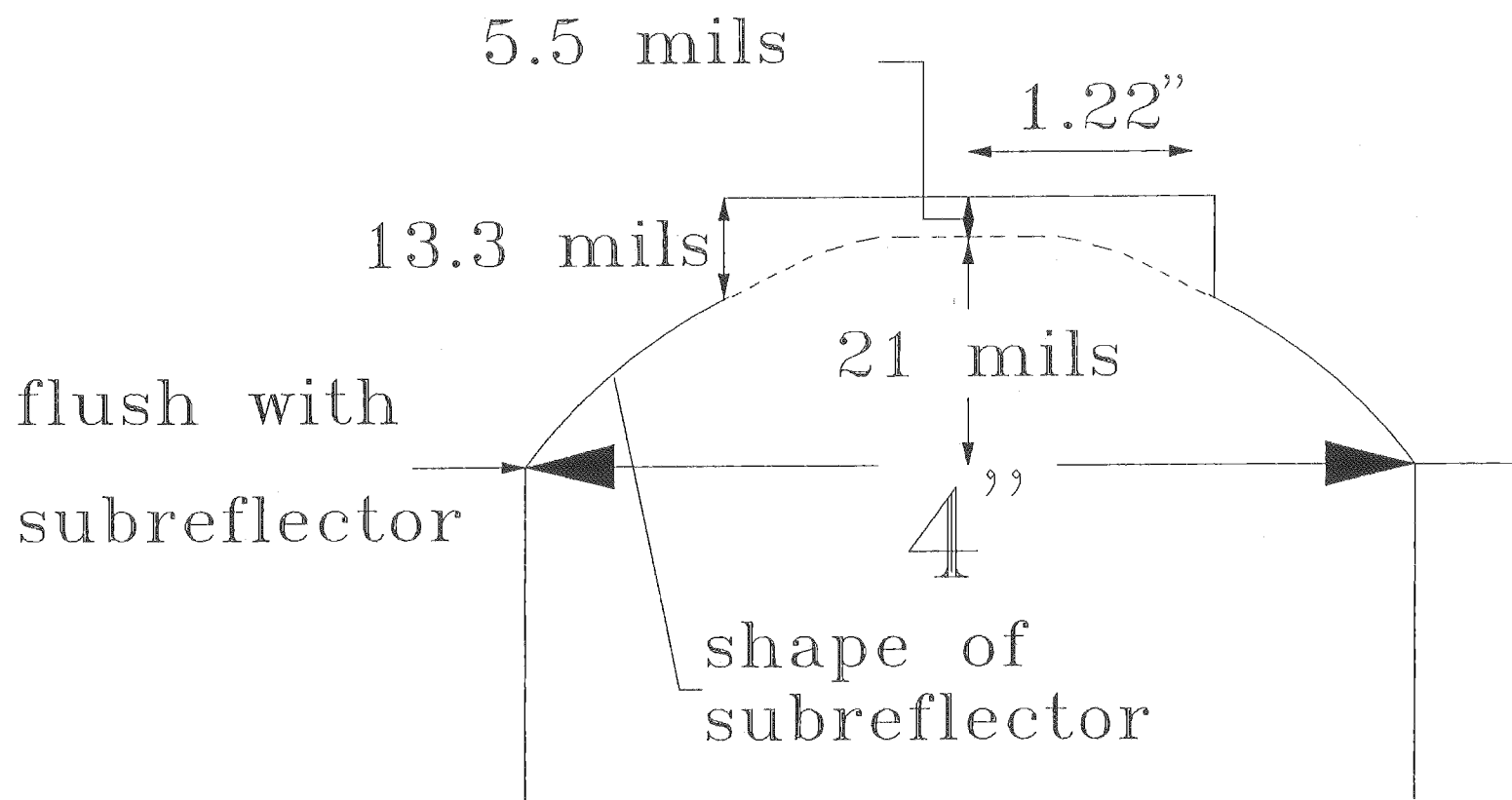
At present some of the energy from the subreflector illuminates the feed. This produces a baseline ripple in spectral line data with a period (typically about 12 MHz) equal to twice the path length from the front end to the center of the subreflector. Circular polarization should be less affected than linear because the reflection returned from the subreflector reverses the sense of circular. A method for reducing the reflection back to the feed has been described by Silver (Rad. Lab. Series #12, page 443). Silver's method is to use a flat "vertex-plate" in the center of the subreflector with diameter

$$\approx \left[\frac{4f\lambda}{3} \right]^{1/2} \approx 2.4'' (f=43'', \lambda = 3mm)$$

$$\text{raised by} \approx \lambda/4 - \frac{5\lambda}{24} \approx 5mils$$

The flat "vertex-plate" section in the center of the subreflector provides a reflection which cancels the reflection from the rest of the subreflector. This method looks attractive because vertex-plate is small enough to fit in the 4" diameter hole in place of the plug which is currently in the hole. Also, the vertex plate is so small that I am confident that it will have no significant effect on the holography.

Figure 1 shows the desired dimensions on a new plug incorporating the vertex-plate for the center of the subreflector. Figure 2 shows the calculated reflection with and without a vertex-plate on a relative scale. The actual VSWR depends on the match of the feed.



Note: surface curvature
is exaggerated for clarity

"Vertex-plate" to reduce reflections
from subreflector at 3 mm wavelength

Fig. 1

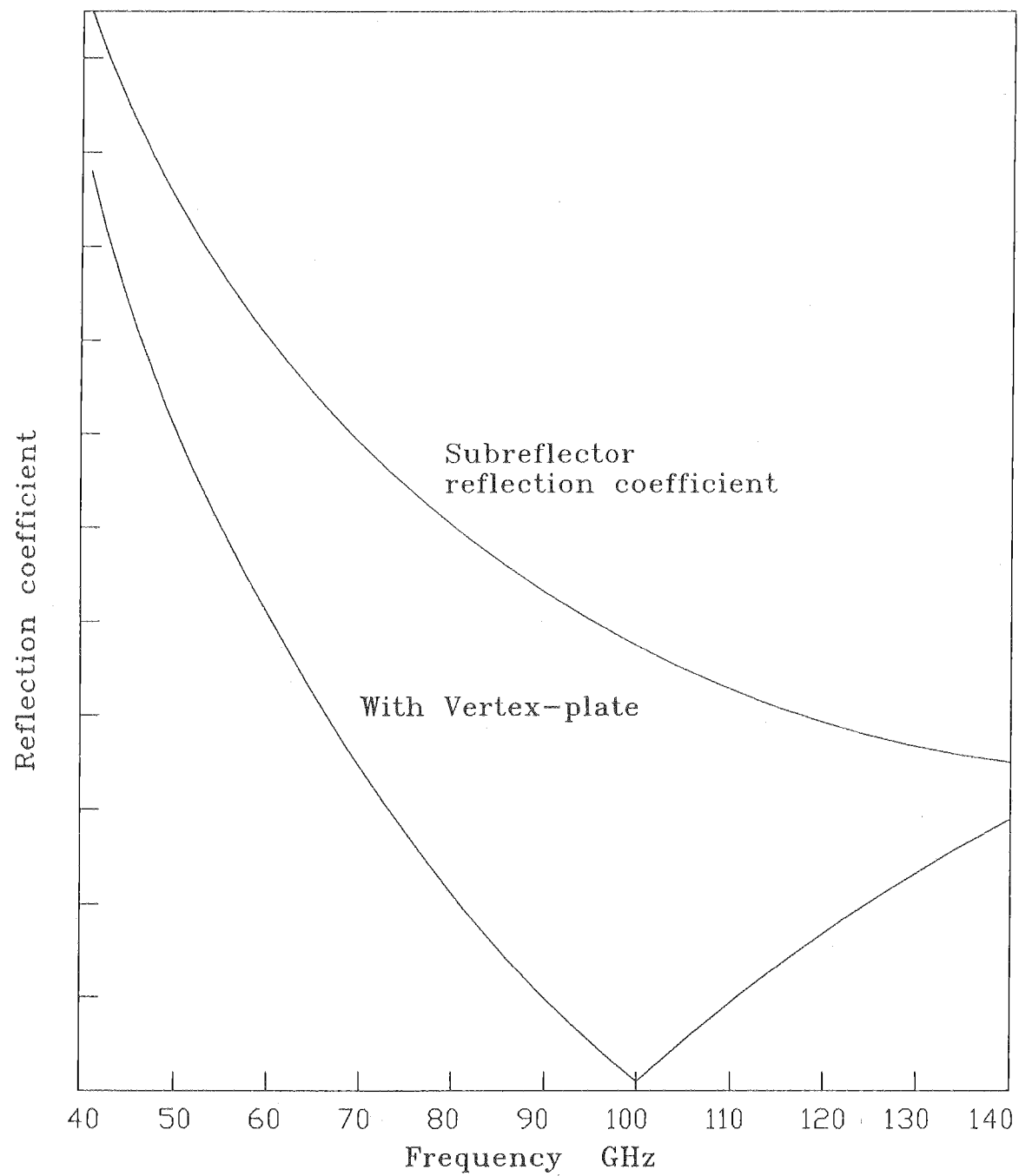


Fig. 2