

REMARKS REGARDING GBT MEMO 67

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In Memo 67, S. Srikanth suggested a method of **Beam-Switching with two Mirrors**, an ellipsoidal one close over the offset feed and a flat one over the secondary focus, parallel to the center of the former. Beam-switching is achieved by "tilting the ellipsoidal reflector about an axis...perpendicular to the normal at the center of the ellipsoid". This looks basically as a very good method, but it seems to need some changes, unless I misinterpret some of the given explanations.

Let me try to understand the setup. If F2 was the original secondary focus, this is transferred sideways to a new location F3 by the flat mirror. An ellipsoid has two foci, called F4 and F5, and we call F6 the phase center of the feed. Without the two mirrors, F2 and F6 must coincide with F4, and F5 with F6. Only then is the feed at the telescope's focus.

If we now want to move the beam, F5 and F6 must stay together, which means we must rotate the ellipsoid about an axis going through F6, the phase center of the feed but not through F3. (This axis is not the one described in Memo 67.) The direction of this axis will depend on whether we want the beam to move in azimuth or elevation or both, and the distance between F4 and F3 is the focal offset (equivalent to an off-axis feed without the two new mirrors). For an azimuth movement in scheme A of the Memo, the best rotation axis would point in z-direction, coinciding with the feed axis.

Second, the Memo said: *By translating the flat reflector along AA', the beam can be moved in elevation.*" I would say that just a translation of the flat mirror, in any direction, will move F3 parallel to its normal in direction to F2 or opposite. Which, as seen from feed and ellipsoid, is not only lateral (elevation), but also axial (wrong focal length). But this kind of translation is needed in **addition** to the rotation of the ellipsoid, if the beam should move in elevation in scheme A, or if this must be prevented in scheme B. Because in these cases we need some rotation of the ellipsoid about an axis perpendicular to the center-plane of feed and both mirrors, which again introduces an axial offset.

Maybe the spillover could still be reduced by some small additional rotation of the flat mirror about its center.

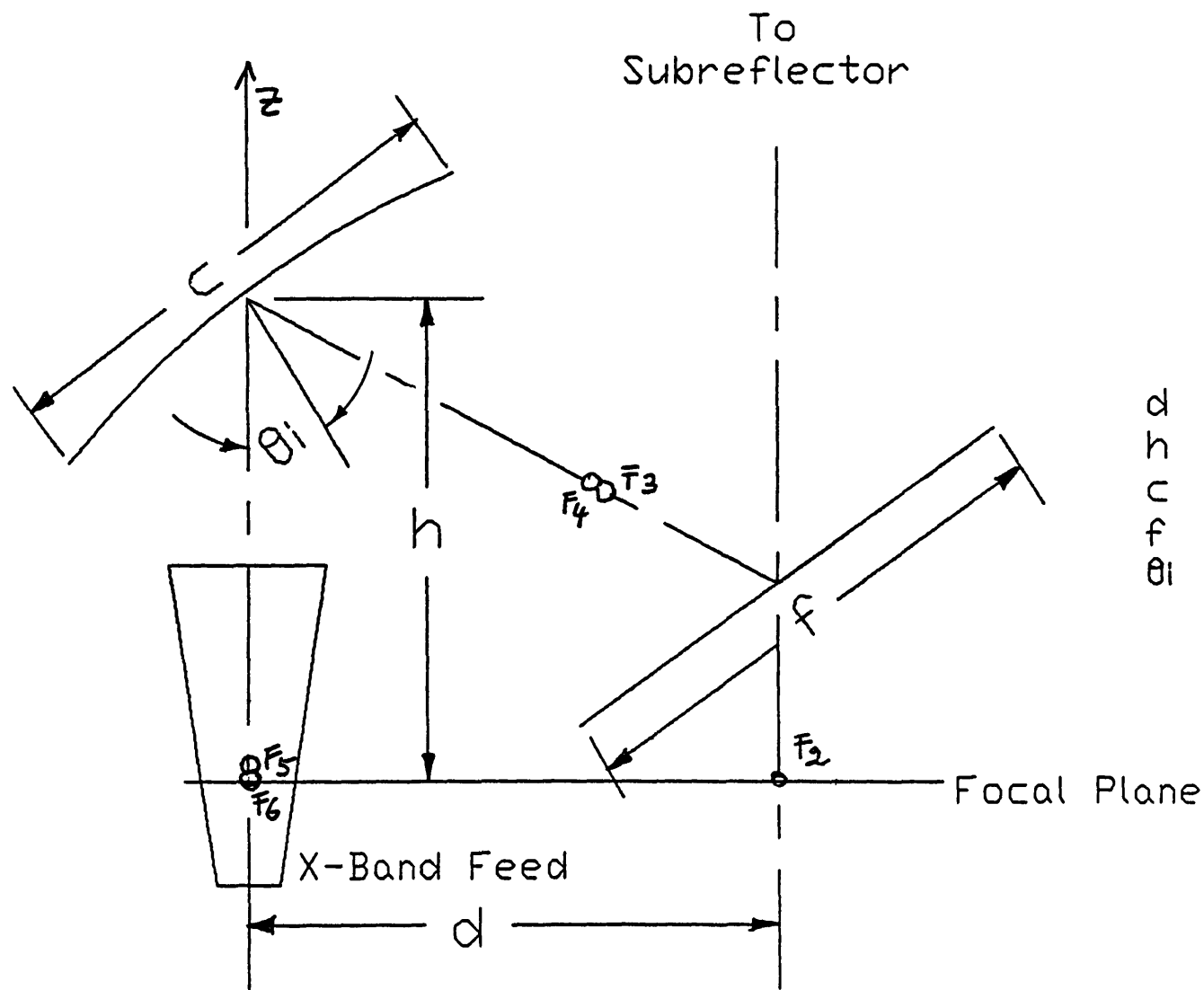


Figure 1.

From Memo #67