# NATIONAL RADIO ASTRONOMY OBSERVATORY
## Charlottesville, Virginia

March 6, 1991

<u>MEMORANDUM</u>:

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SUBJECT:  Pointing Coefficients for Single Subreflector Optics

An earlier memorandum on the subject of pointing coefficients listed the coefficients applicable to either of the two subreflector optics. This memo lists in the attached table pointing coefficients applicable to the present single subreflector (M1) optics.

Figure 1 shows the coordinate system used in the calculations. The X axis is out of the plane of the paper in the upper row and the Y axis is into the plane of the paper in the lower row of Figure 1. For the rotation of the main reflector or the subreflector as well as the beam rotation, the right-hand rule applies. When the thumb of the right hand points along a positive axis, the fingers indicate the positive rotation about that axis. Positive rotations in the YZ and XZ planes are indicated in Figure 1(b).
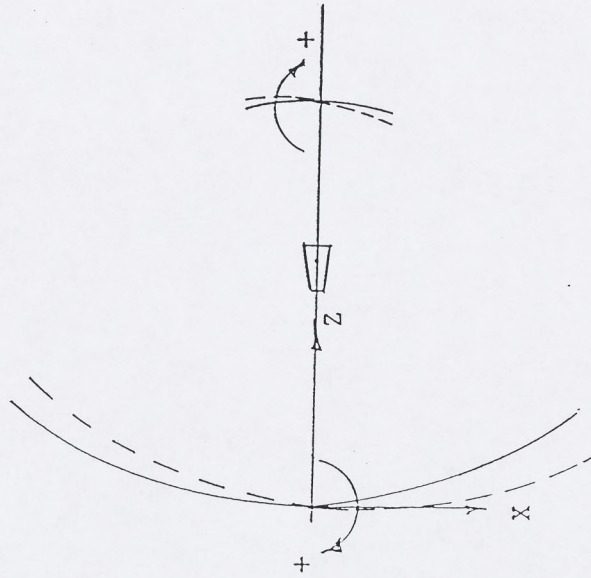
Attachments
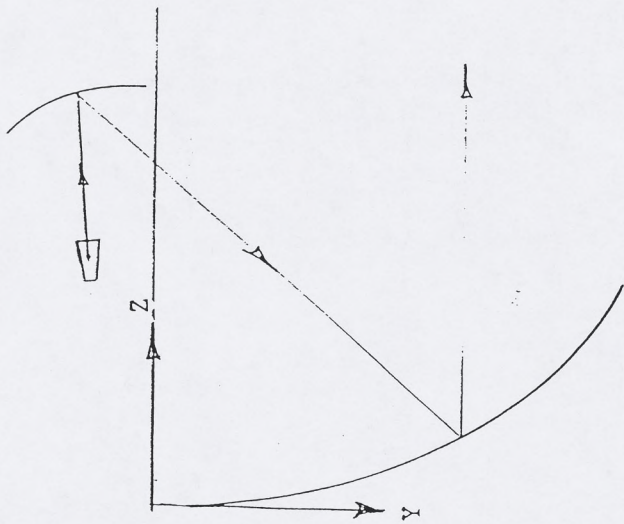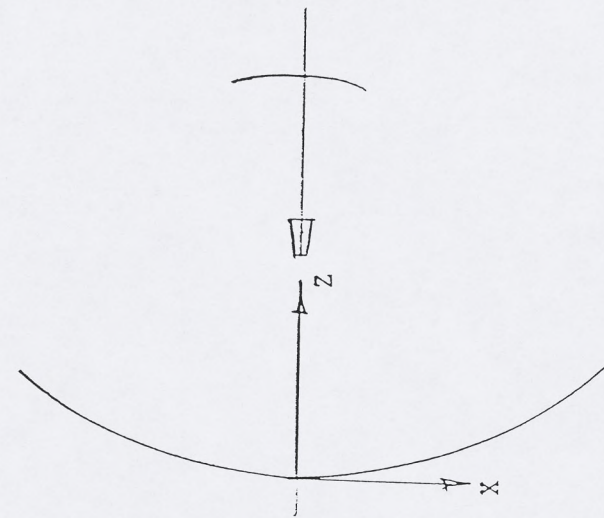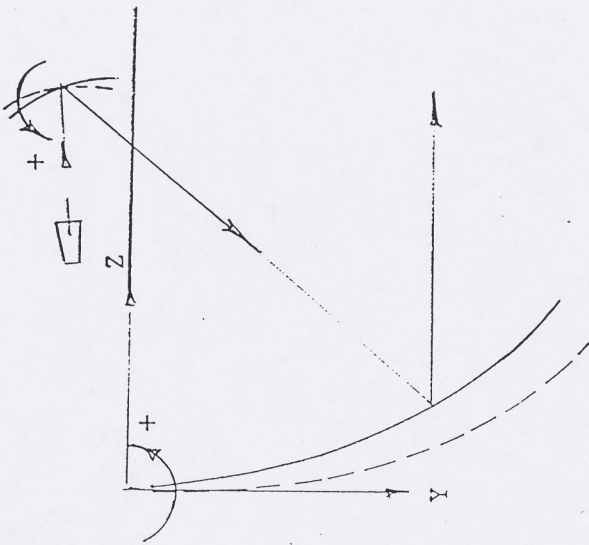
a) Translations

b) Rotations

Figure 1

| Translation/Rotation | Pointing Coeff. | JPL Coeff. | $\dfrac{arcsec}{mm}$ | $\dfrac{ar}{\iota}$ |
|---|---|---|---|---|
| Subreflector Rotation about X axis radians/radian | 0.1504 | 0.0657 | | |
| Subreflector +Y shift radians/m | 0.0141 | 0.0120 | 2.908 | 73. |
| Subreflector +Z shift radians/m | 0.0103 | 0.0089 | 2.125 | 53. |
| Feed +Y shift radians/m | -0.0051 | -0.0031 | -1.052 | -26. |
| Feed +Z shift radians/m | -0.0012 | -0.0005 | -0.248 | -6. |
| Parabola Rotation about X axis radians/radian | 1.5490 | 1.5453 | | |
| Parabola +Y shift radians/m | -0.0091 | -0.0090 | -1.877 | -47. |
| Parabola +Z shift radians/m | -0.0092 | -0.0087 | -1.898 | -48. |
| Beam Deviation Factor in YZ plane - Prime Focus | 0.9280 | | | |
| Subreflector Rotation about Y axis radians/radian *azimuth* | 0.1336 | | | |
| Subreflector +X shift radians/m | -0.0183 | | -3.775 | -95.8 |
| Feed +X shift radians/m | 0.0051 | | 1.052 | 26. |
| Parabola Rotaion about Y axis radians/radian | 1.7710 | | | |
| Parabola +X shift radians/m | 0.0130 | | 2.681 | 68.1 |
| PARABOLA Δ FOCAL LEN (+ → Longer) | -0.00924 | | -1.906 | -48.4 |
| Beam Deviation Factor in XZ plane - Prime Focus | 0.9400 | | | |

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$$206.3 \cdot \frac{rad}{m} \Rightarrow \frac{arcsec}{mm}$$

$$5239.13 \cdot \frac{rad}{m} \Rightarrow \frac{arcsec}{in}$$