

Alignment Measurement Summary
for
FS PSW BDA
10209800-3 SN017

WARM ALIGNMENT MEASUREMENTS:

Position:

Center of feed horn entrance plane with respect to the alignment pin hole, mounting face and alignment slot as defined in the ICD drawing 10209721 sht. 3 (see Figure 1 below)

$$(x,y,z) = (24.737, -33.887, 25.147) \quad (\text{all distances in mm})$$

Nominal x,y position:

$$(x_{\text{nom}}, y_{\text{nom}}) = (24.687, -33.979)$$

x-y shift from nominal:

$$(dx, dy) = (0.050, 0.092)$$

The z position of the suspended part referenced to the 34.2 mm nominal dimension on ICD pg 2, zone G9:

Measured z dimension:

$$34.322 \text{ mm}$$

Z shift from nominal

$$0.122 \text{ mm}$$

Rotation:

Feed horn rotation in xy plane (top view, as in ICD, sht. 3)

$$0.384^\circ \text{ counterclockwise}$$

Normal vector to feedhorn entrance plane:

$$(-0.00561, 0.00452, 0.99997)$$

which is 0.413° from the z direction.

COLD ALIGNMENT MEASUREMENTS:

(BDA cooled from RmT to approximately 7-8 K)

Shifts on Cooling:

XY Shift of center of 300 mK stage on cooling (with respect to flange alignment pin hole):

$$(dx, dy) = (-0.140, 0.120)$$

300 mK stage rotation in xy plane on cooling (top view):

$\theta < \sim 0.06^\circ$ (magnitude and direction not repeatable, values scattered below this limit)

The suspended portion of the BDA shifted approximately 0.08 mm down in the z axis on cooling, moving closer to the mounting flange. The maximum rotation about the x-axis during thermal cycling was measured as $\sim 0.08^\circ$, with various values of different signs seen below this limit. The rotations are taken as zero to within the uncertainty. We have no information about rotation in the y axis on cooling.

These shifts are not accurate to better than ± 40 microns, and the repeatability over multiple cooldowns is not well known.

Net Result:

xy cold position of the feedhorn center relative to alignment pin hole:

$$(x, y) = (24.60, -33.77)$$

Rotation of feedhorn relative to xy axes (top view) is nominally 0.38° ccw. (not using cold shifts.)

