

**Alignment Measurement Summary**  
for  
**FS PLW BDA**  
**10209800-1 SN018**

**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)

$$(x,y,z) = (24.537, -33.803, 36.654) \quad (\text{all distances in mm})$$

Nominal x,y position:

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

x-y shift from nominal:

$$(dx, dy) = (-0.150, 0.176)$$

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

Measured z dimension:

$$34.197 \text{ mm}$$

Z shift from nominal

$$-0.003 \text{ mm}$$

***Rotation:***

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

$$0.055^\circ \text{ clockwise}$$

Normal vector to feedhorn entrance plane:

$$(-0.00393, 0.003868, 0.99998)$$

which is  $0.316^\circ$  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):

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

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

$$\theta \sim 0.04^\circ \text{ (not repeatable, values scattered below this limit)}$$

The suspended portion of the BDA shifted approximately 0.05 mm down in the z axis on cooling, moving closer to the mounting flange. The rotation about the x-axis on cooling was measured as  $\sim 0.10^\circ$  (+y end moving down toward mounting plate), but with only partial recovery on warmup. We have no information about rotation in the y axis on cooling.

These shifts are not accurate to better than  $\pm 40$  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:

$$(x, y) = (24.40, -33.66)$$

Rotation of feedhorn relative to xy axes (top view) is nominally  $0.06^\circ$  cw.

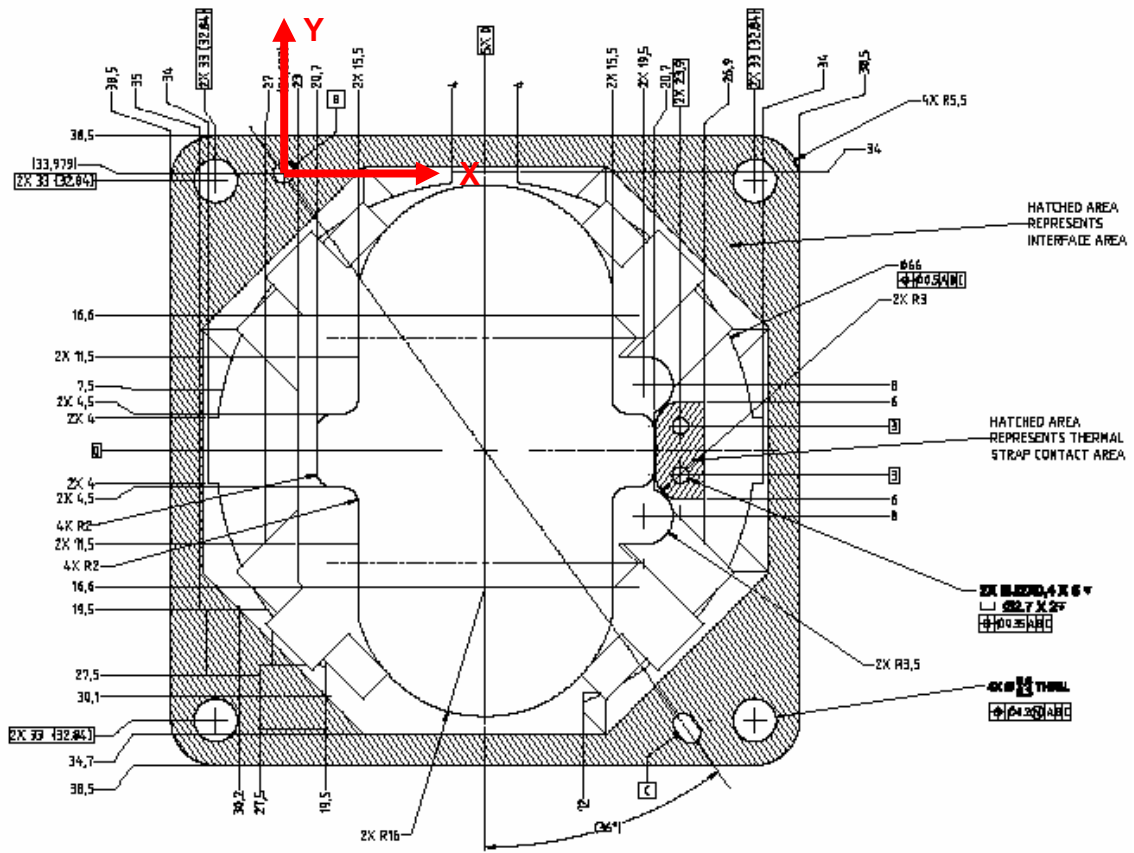


Figure 1 (excerpt from ICD dwg 10209721, with coordinate axes shown)