COR-1A pre- and post-vibe measurements on SCIP bench, November–December 2004

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This report covers the COR-1A internal alignment measurements made before and after the vibration of the SCIP-A bench. The pre-vibration measurements were made on November 18, 2004, and the post-vibration measurements were made on December 9, 2004.

The measurements are made by illuminating the diffuser window in the COR-1 door, and imaging the shadow of the occulter and focal plane mask. Figure 1 is representative of the data.

The region within the occulter penumbra is fitted to extrapolate the positions of the inner and outer penumbral edges. Figure 2 shows the radial distances of the two edges as a function of position angle, relative to the center of a circle fitted to each. There is no discernable difference in Figure 2 between the measurements pre- or post-vibration. This means that the focal plane mask and the occulter did not shift position relative to each other enough to bring the occulter shadow out from behind the focal plane mask shadow.

However, there is a shift in the origin of the shadow on the detector by about 2 pixels (27 μm) along the i axis. This is demonstrated in Table 1. It had been established earlier that the i axis on the FPA is equivalent to the vertical direction (i. e. perpendicular to the SCIP bench).

To test the possibility that the 2 pixel shift seen in Table 1 is caused by a movement of the CCD detector itself, the same analysis was applied to the visible parts of the outer circular field aperture. The results are shown in Table 2. These data also show a shift in the i direction, but only by $\sim$0.5 pixels. Thus, one cannot say that the CCD alone shifted.

The focal plane mask has an alignment margin of 250 μm. This 2 pixel shift is only 10% of the available margin. Since the shape of the focal plane mask shadow does not change, the instrument boresight did not change within the measurement errors.

The conclusion is that COR-1A passed the internal alignment test.

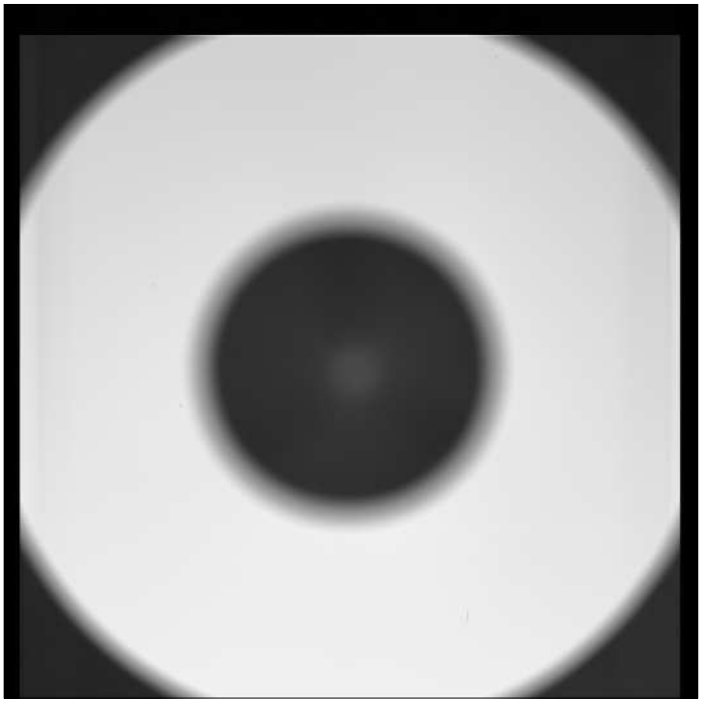

Figure 1: Instrument flat field.

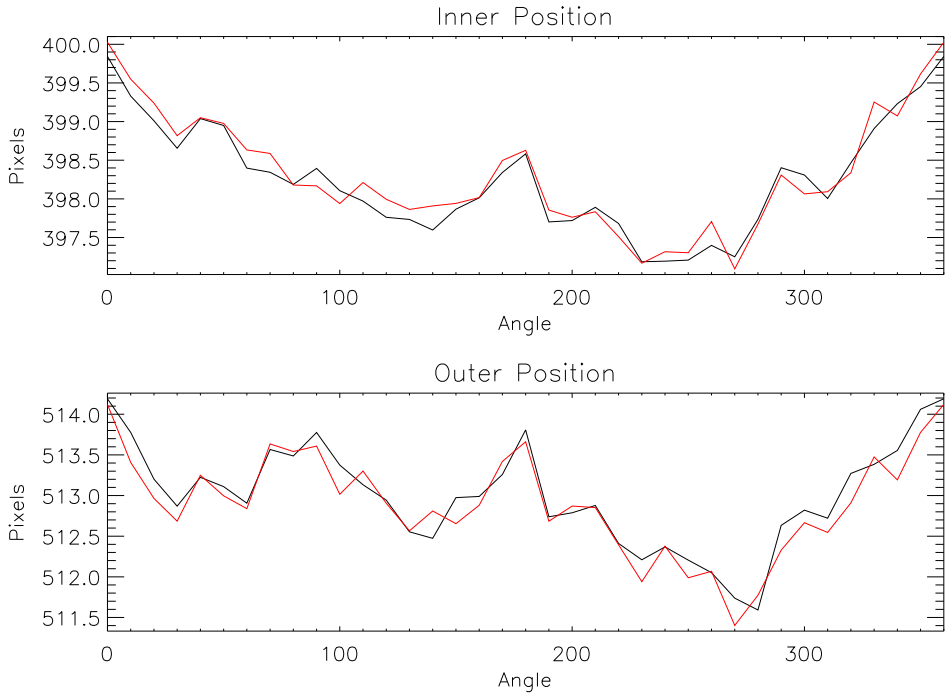

Figure 2: Radial distances of inner and outer penumbral edges. Black: pre-vibration, red: post-vibration.

Table 1: Origins and average radii of the inner and outer penumbral edges shown in Figure 2.

		i_0	j_0	radius
Pre-vibration	Inner	1020.70	1024.33	398.284
	Outer	1020.24	1024.49	512.875
Post-vibration	Inner	1018.69	1024.27	398.219
	Outer	1018.32	1024.44	512.974

Table 2: Origins and average radii of the inner and outer edges of the circular field aperture.

		i_0	j_0	radius
Pre-vibration	Inner	1021.87	1020.42	1098.64
	Outer	1021.97	1020.38	1173.46
Post-vibration	Inner	1022.36	1020.47	1098.54
	Outer	1022.56	1020.60	1173.36