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GP-B Telescope
"Calibration of the Beam Tipping Plates in the Optical Instrument Design 7" Autocollimator"
P0443 Rev -

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Prepared: _____ Date _____
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Approved: _____ Date _____
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Approved: _____ Date _____
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CALIBRATION OF THE 7" AUTOCOLLIMATOR

- for any flight qualification procedures to be conducted using the 7" autocollimator.

- also use *GP-B Telescope Image Divider Assembly (IDA) General Alignment and Bonding Procedures* (SUGP-B P0282) for procedures concerning safety; personnel; work area requirements; fixture cleaning and acceptance; flight part inspection, handling, storage, and cleaning; and sign-off and recording requirements.
- This operation is to be completed by personnel familiar with the operation of the 7" autocollimator. At present, these personnel are: Ken Bower, Jason Gwo, Lynn Huff, and Don Davidson.
- Ken Bower may redline this procedure.
- During operation, no ESD protection is required.
- Monitor the room temperature during steps 5 through 11 and record the minimum and maximum observed on the data sheet. Any variation of more than five degrees Farenheit during these steps will invalidate this calibration.

1) Set up the Optical Instrument Design (OID) 7" autocollimator (AC) in a vertical configuration as shown in OID dwg#800-0049C. Secure all hardware firmly to the tabletop to ensure it's own safety.

2) Install a light source into the AC and verify proper function with a retroreflector (Melles Griot 02CCH015). If desired, mark the AC monitor to record the position of the return image.

3) Place a flat working surface (SPI #50-407-6, 12"x8"x2" black granite, 0.00005" flatness) under the beam of the autocollimator and secure in place. The surface must not move during testing and can be monitored by coarse aligning the AC with a mirror placed on top of the granite plate (mark location on monitor if desired).

4) Place two similar stacks of calibrated gauge blocks (DoAll Grade A+, s/n 34-S-2517) on top of the surface plate spaced 10" apart and roughly aligned with the axis of the AC parallel to the direction of the camera assembly (designated as "v" axis). Place an inspection sine bar (SPI #30-091-3) with one contact point on each stack.

5) Secure a mirror to the top of the sine bar and align the AC such that the return image is visible near the center of the monitor. Experiment with different positions and stacks as required. Record the stack heights on the data sheet (spaces 1 & 2).

6) Finely adjust the tipping plate controls such that the image from the mirror on the sine bar is at a recognizable location (i.e. camera crosshairs). Move the sine bar to test for repeatability and record the estimated noise error on the data sheet (space 3).

7) Record the settings on the tipping plate controls on the data sheet (spaces 4 & 5).

8) Remove the sine bar and change the height of one stack (experiment to determine an appropriate amount of change). Replace the sine bar. Record the new stack height on the data sheet (space 6).

9) Adjust each tipping plate control as required to return the mirror image to the starting location. Record the settings on the tipping plate controls on the data sheet (spaces 7 & 8).

10) Repeat steps 8 and 9 with varying height changes to test over the range of the tipping plate controls.

11) Repeat steps 4 through 10 with the sine bar rotated 90 degrees (designated as “h” axis).

12) Using the data from spaces 1, 2, and 6, calculate the angle change of the mirror on the sine bar. Using that and the data from spaces 4, 5, 7, and 8, calculate the calibration factors for each axis of the AC. Attach notes and calculations.

Attachments: OID dwg#800-0049C, gauge block set calibration certificate, data sheet.