W. W. Hansen Experimental Physics Laboratory

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Gravity Probe B Relativity Mission

PROCEDURE FOR

Science Telescope Room Temperature Perpendicularity of Readout Axes

GP-B P0232 Rev -

January 16, 1998

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Prepared by: Suwen Wang Date
Engineer

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Approved by: John Lipa Date
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Quality Assurance

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Approved by: J. Turneaure Date
Hardware Manager

GP-B Procedure Document 232

Science Telescope Room Temperature Perpendicularity of Readout Axes

RE: Suwen Wang
ESTIMATED DURATION: 1 day.

Objective:

Measure the perpendicularity of readout axes of the telescope at room temperature by analyzing the data collected from P0230.

Success Criteria:

The perpendicularity of the readout axes be within 1 degree and be measured to the best effort accuracy.

Requirements:

- Procedure to be performed by certified personnel only.
- Certified personnel include:
  Suwen Wang

Authority to redline this procedure:

Suwen Wang

Precautions:

- No special precautions required.

Calibration:

- The scan data related to verifying the telescope performance specifications is in a format of relative numbers. Therefore, no calibration is required for the procedure.

Ground Support Equipment required:

- Centris 650 computer.
- IgorPro version 2.0.2 software.

Expendable Materials required:

- None.

Initial Configuration:

- Telescope under test:
  Dwg No: 25091-201 Rev - _____.
  Telescope Serial No. _____.

- Procedure Start Date: _____.

1. Procedure for measuring the perpendicularity of readout axes:

1.1. Make a back up of the original data. Loss of original data would cause the need of reacquision of the data which might have schedule impact.

1.2. Select a data set from an X axis scan. Do a least squares fit to the Y axis readout in the range of X axis scans from 0 to 10 arc sec. Determine the signal levels at angular position 0 arc sec (S (0)) and 10 arc sec (S(10)).

1.3. Find a corresponding Y axis scan. Locate the angular positions of the signal levels S(0) and S(10). The angular difference between these two signal levels is denoted as $\Delta\theta_{y.}$

1.4. The angle between the scanning X axis and readout X axis is thus: $\theta_{s\text{-}rx} = \arctan(\Delta\theta_y/10)$.

1.5. Repeat the process of 1.2 through 1.4 for Y axis scan to obtain $\theta_{s\text{-}ry}$.

1.6. The difference $\theta_{s\text{-}rx} - \theta_{s\text{-}rx}$ is the deviation of the readout axes from perpendicularity.

The number is: _____

Signed: _____ Date: _____

1.7. Since the perpendicularity requirement is fairly loose (1 degree) and in general the readout axis is aligned with the scan axis to within a few degrees, an iterative process was not used in determining values of $\theta_{s\text{-}rx}$ and $\theta_{s\text{-}ry}$.

1.8. Procedure 1 complete.

Signed: _____ Date: _____

2. Completion status:

Success: _____

Fail: _____