Stanford University
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Gravity Probe B Relativity Mission
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Gravity Probe B

Procedure for sanity check of the ST field-of-view

P0439 Rev A
Eco 1143

May 16, 2000

Prepared: _____ Date _____
Lynn Huff, Telescope Responsible Engineer

Approved: _____ Date _____
Bob Farley TRE REE

Approved: _____ Date _____
Barry Muhlfelder, Payload Technical Manager

Approved: _____ Date _____
Dorrene Ross, Quality Assurance

Revision History

Rev	Date	Authorization for Change ECO #	Page	Paragraph	Change Description
-	5/2/99	NC			
A	5/16/00	ECO 1143	all		Incorporate redlines

Overview:

This test is not a verification of any requirement. Instead it is a "sanity check" of the science-telescope optical alignment to increase confidence before proceeding with probe insertion into the dewar. This equipment under test is the flight probe assembly - record drw #, REV, and SN here.

Drawing #_____ Rev. _____ S/N _____

An autocollimator is used to illuminate the telescope while observing the output of the ST. The autocollimator is then tilted until we observe loss of signal in both directions - then repeat for the other axis. All observations are only approximate, but consistency between primary and redundant channels will yield enough data to accomplish the "sanity check".

The notes below will be followed:

- This operation will take place in the class 10 clean room.
- The temp will br between 0 and 30 C. Humidity between 0 and 80%.
- CAUTION: This procedure is to be performed on flight hardware at a very advanced stage of production. Great care should be taken to ensure that the safety and performance of the SIA/Probe Assembly are in no way compromised.
- ESD precautions are required. Comply with P0357 as required.
- Discrepancies and test anomalies will be recorded in a D-log, or DR if required, Quality Plan P0108
- Redline authority for this procedure is granted to the individuals listed under qualified test leads.
- Record ST outputs to 2 or more significant digits (note this is not an accuracy requirement, but simply instructions for how to record the output of this indicator).
- Record angles in to +/- 10 arcsec minimum (note this is not an accuracy requirement, but simply an instruction for recording).
- Record command values as shown in hex on the display for the GSE rack.
- QA must witness the procedure.

Qualified Personnel:

The following are qualified to participate in the test: Bob Farley, Barry Mulfelder, Ken Bower, Lynn Huff, and John Goebel. The following are qualified to be the test leader: Ken Bower, Lynn Huff, or Bob Farley.

Equipment List:

Note that only the autocollimator requires calibration.

Autocollimator record SN and cal date here SN_____ Cal due _____

Cables between top-hat and TRE Fwd Elect.
Cables between TRE Fwd Elect and TRE GSE rack.
TRE GSE rack.
Light source record SN _____
TRE Fwd Elect Flight Units.

Indicate A-side or B-side cable for each flight unit

TRE S/N _____ Cable to _____Side.

TRE S/N _____ Cable to _____Side.

PROCEDURE:

1) Assemble the TRE GSE as follows: a) attach cable I8 to TRE Fwd Elect Engr Unit designated as side A, and cable I9 to TRE Fwd Elect Engr Unit designated as side B; b) cable the two TRE's to the TRE GSE Rack.

2) Use grounding strap and remove shorting plugs from I8 and I9 - immediately connect the cables from the TRE Fwd Electronics.

3) Power the test rack computers, and run sqd362.exe. Another version may be used at the test director's discretion. If another version used then record here_____

4) Power on the TRE Fwd Electronics. Balance the TRE detectors. Record Offset and Clamp values here:

Offsets	A-X_____	A-Y_____	B-X_____	B-Y_____
Clamps	A-X_____	A-Y_____	B-X_____	B-Y_____
Gain code:	A-X_____	A-Y_____	B-X_____	B-Y_____

5) Start a data sheet, noting the time, date, and personnel present in the clean room.

6) Turn on the fiber optic light source and insert the fiber into the autocollimator.

7) Orient the autocollimator so that the output beam from the autocollimator points down the Probe and into the Telescope. Look down the Probe to ensure that light from the autocollimator is incident on the Telescope's Reticle. Note the clocking of the SIA/Probe Assembly on the data sheet

8) Tip and tilt the autocollimator until the return signal from the Telescope's Reticle is seen and centered on the autocollimator's crosshair.

9) Record the angular position of the input beam (in seconds of arc) and the output levels from the detectors on the data sheet.

10) Tip/tilt the autocollimator in the +X axis until the signal from A-side detectors falls off, indicating the light from the autocollimator is well outside the system's field of view (about 90 seconds of arc on a radius) in the +X axis. Record the angle and output from the detectors on the data sheet.

11) Repeat above for B-side.

12) Tip/tilt the autocollimator in the -X direction until the return beam from the Telescope Reticle is approximately 10 - 30 seconds of arc closer to the center of the field. Record the angle and the output of the detectors (both A side and B side) on the data sheet.

13) Continue moving the spot in approximately 10-30 second increments, taking data after each step, until the signal from the detectors drops off, indicating the light from the autocollimator is outside the system's field of view on the other (-X) side. Smaller steps may be taken if the data indicates any interesting or anomalous behavior.

14) Repeat steps 10 - 13 for the Y axis. This concludes the measurement. Note that the number of observations is not critical and will be at the discretion of the Test Leader.

Measurement Completed By: _____ Date _____

Measurement Completed By: _____ Date _____

17) Inspect the data and determine if there's any indication that the field of view has changed since it was first measured (results from that measurement are documented in S0364).

Certify that the current field of view is acceptable:

Bob Farley, TRE REE _____ Date _____

Lynn Huff, Telescope RE _____ Date _____

Dorrene Ross, QA _____ Date _____

DATA SHEET

Data Scan changing X Axis.

Record Reference indication of Y-Axis: _____ Indicate Probe Orientation _____

Angle (seconds)	Axis	ChA X+	ChA X-	ChA Y+	ChA Y-	ChBX+	ChB X-	ChB Y+	ChB Y-

TEST LEAD : _____

QUALITY ASSURANCE: _____

TEST LEAD : _____

QUALITY ASSURANCE: _____

DATA SHEET

Data Scan changing Y Axis.

Record Reference indication of X-Axis: _____ Indicate Probe Orientation _____

Angle (seconds)	Axis	ChA X+	ChA X-	ChA Y+	ChA Y-	ChBX+	ChB X-	ChB Y+	ChB Y-

TEST LEAD : _____

QUALITY ASSURANCE: _____

TEST LEAD : _____

QUALITY ASSURANCE: _____