GRAVITY PROBE B

PROCEDURE FOR

PAYLOAD VERIFICATION

(PTP) Procedure for TRE Random Noise Data Collection

P0490 Rev. A

July 12, 2000

Prepared by: Bob Farley

Approvals:

Program Responsibility	Signature	Date
Bob Farley TRE REE		
M. Taber Payload Test Director		
GP-B System Engineering		
D. Ross GP-B Quality Assurance		
Barry Muhlfelder GP-B Payload Technical Manager		

NOTES:

Level of QA required during performance of this procedure:

_4_ Stanford QA Representative

All redlines must be approved by QA

Revision Record:

Rev	Rev Date	ECO #	Summary Description
-	August 11, 1999	na	Original issue
A	July 12, 2000	1184	Incorporated redlines

Acronyms and Abbreviations:

Acronym / Abbreviation	**Meaning**
DMA	Detector Mount Assembly
GSE	Ground Support Equipment
TRE	Telescope Readout Electronics
AS3	Artificial Star #3

Notify ONR 24 hours prior to beginning testing.

Person Contacted: _____ Date and Time: _____

Table of Contents

1. Scope

This procedure collects data for verifying the noise level of the DMAs and readout electronics,.

2. Configuration Requirements

2.1 Probe is installed in the dewar. Probe pressure <1E-5 torr. TRE mounted on dewar, with cables connected to tophat and GSE test support rack.

2.2 Dewar is cooled with liquid helium.

2.3 Artificial Star #3 (AS3) installed on probe (likely, but not required).

2.4 If AS3 is not installed, then the Telescope aperture blocked with light tight cover. A transparent cover must be available and will be installed during the procedure.

3. Hardware Required

3.1 Commercial test equipment

Manufacturer	Model	Serial Number	Calibr. Exp. Date
Systron-Donner (if AS3 not installed)	TL8-3	any	n/r

3.2 Mechanical/Electrical Special test equipment

Description	Part No.	Rev. no.	Serial No.	Certification Date
TRE Ground Support Equipment Rack	na		Unit #1	5/26/99
AS3	na			na

3.3 Tools

3.4 Custom

Description	No. Req'd
Small Incandescent light bulb with socket and long cable to connect to a DC power supply. (if AS3 is not installed)	1

4. Software Required

4.1 Test Support Software

Test Software Name	Version No.	QA Verification
SQD362.exe. (supports two TREs).	V3.62	

5. Procedures Required

Procedure Name	Procedure No.
Procedure for TRE Aliveness Test Following Payload Insertion	P0487
Procedure for TRE / DMA Temperature Control Verification	P0488
Procedure for TRE Nominal Function Test	P0489

6. Equipment Pretest Requirements

Procedure P0489 shall have been completed prior to this procedure.

7. Personnel Requirements

7.1 This test to be conducted only by certified personnel. Among those are Howard Demroff, Paul Ehrensberger, John Goebel, and Bob Farley.

8. Quality Assurance

8.1 Testing shall be conducted on a formal basis to approved and released procedures. The QA program office shall be notified of the start of this procedure. A Quality Assurance Representative, designated by D. Ross shall be present during the procedure and shall review any discrepancies noted and approve their disposition. Upon completion of this procedure, the QA Program Engineer, D. Ross or her designate, nominally R. Leese, will certify his concurrence that the effort was performed and accomplished in accordance with the prescribed instructions by signing and dating in the designated place(s) in this document. Discrepancies will be recorded in a D-log or as a DR per Quality Plan P0108.

9. Red-line Authority

9.1 Authority to red-line (make minor changes during execution) this procedure is given solely to the PTD or his designate and shall be approved by the QA Representative. Additionally, approval by the

Hardware Manager shall be required if, in the judgment of the PTD or QA Representative, experiment functionality may be affected.

10. Safety Requirements

10.1 Connection and disconnection shall be performed only when the equipment involved is in a powered-down state.

10.2 Connector savers are to be used on the TRE and tophat connectors.

> **Note: The mating and demating of all flight connectors must be recorded in a log. This procedure does not require removal or replacement of connector savers onto the flight connectors--they should already be in place.**

10.3 Connectors shall be inspected for contamination and for bent, damaged, or recessed pins prior to mating.

10.4 Grounded wrist straps are to be worn prior to removal of connector caps or covers and during mating/demating operations.

10.5 ESD-protective caps or covers are to be immediately installed after demating of connectors.

11. References and Applicable Documents

12. Operations

12.1 This procedure should ideally be performed immediately following P0489.

12.1.1 If the indicated platform temperature is less than 75 K, heat each platform to 80 K using the following commands.

12.1.1.1 Set DTEMP to 0832h.

12.1.1.2 Set HEAT to 0007h.

12.1.1.3 Set CONTROL to 0080h.

12.1.1.4 Wait a few minutes or until the servo error voltage is within one-quarter volt of zero volts.

12.2 Preliminary Setup

12.2.1 If AS3 is installed on the probe, all of its internal light sources should be powered off for the dark (noise) data collection. Also, **no electrical connections** from the TRE GSE test rack to AS3 electronics shall be connected during this procedure in order to minimize potential ground loops.

12.2.2 If AS3 is not installed, assure that the telescope aperture is covered with an opaque plate.

12.2.3 If the TRE has not been active following P0489, except for CLAMP commands, copy the values from the table of section 11.12.1 of P0489 into the unspecified boxes below and set the command registers for both axes according to the values in this table. When the rest of the settings have been completed, adjust the clamp levels to achieve the high level of the output signals between 2 and 6 volts.

Axis	A-side, X-Axis	A-side, Y-Axis	B-side, X-Axis	B-side, Y Axis
CONTROL	1000h	1000h	1000h	1000h
DTEMP	h	h	h	h
HEAT	0000h	0000h	0000h	0000h
CLAMP	h	h	h	h
BIAS	h	h	h	h
OFFSET	h	h	h	h
Initials & date				

QA Witness _____ Date:_____

12.2.4 Copy the temperatures recorded in the table of section 11.12.14 of P0489 into the second column of the table below.

Axis	Temperature from 11.12.14 of P0489	Current Temperature	Time	Initials and Date
A-side, X-Axis	K	K		
A-side, Y-Axis	K	K		
B-side, X-Axis	K	K		
B-side, Y-Axis	K	K		

QA Witness _____ Date:_____

12.2.5 Navigate using the main menu and commands menu to read the platform temperatures and record them in the third column of the table above. Record times, initial and date.

12.2.5.1 Compare the platform temperatures in the table. If the current temperatures are within 2 K of the previous values, continue with the control words set to 1000h for each of the four platforms, relying on detector self heating to maintain the operating temperature.

12.2.6 If the current temperatures are more than 2K lower than the previous temperatures, set the DTEMP value to command a temperature approximately 0.5K lower than the column 2 temperature, set the TEMP register for that axis to 0007h and set the CONTROL register to 1080h. Do this for each axis that is too low.

12.2.7 When the servo error signal becomes within 0.05 volts of zero, set the HEAT register to 000h and the CONTROL register to 1000h for each axis that was changed previously. Readjust the bias and clamp levels for the current operating temperature, if necessary, as indicated in section 12.11 of P0487.

12.3 Data Collection

12.3.1 Navigate to the main menu and select MON A.

12.3.2 In the Disk menu, set the program to record 2 minute files CONTINUOUSLY.

12.3.3 Verify that the telescope aperture is blocked with a light tight cover, or assure that all internal light sources in the AS3 optical area ore powered off.

12.3.4 Check the signal levels for each of the A-side X-and Y-Axes detector outputs by monitoring X high+, X low+, X high -, X low-, Y high+, Y low+ Y high-, and Y low- on the screen. Each signal should be within 6 volts of zero. If a signal is not in the desired range, adjust the CLAMP of the appropriate axis until it is.

12.3.5 Navigate to the Disk menu and ENABLE recording. Record the filename as shown on the screen

in dull red characters: _____. Start time: _____.

QA Witness _____ Date:_____

12.3.6 Wait at least five minutes, then DISABLE the recording.

12.3.7 Navigate to the main menu and select MON B

12.3.8 Check the signal levels for each of the B-side X- and Y-Axes detector outputs by monitoring X high+, X low+, X high -, X low-, Y high+, Y low+ Y high-, and Y low- on the screen. Each signal should be within 6 volts of zero. If a signal is not in the desired range, adjust the CLAMP of the appropriate axis until it is.

12.3.9 Navigate to the Disk menu and ENABLE recording. Record the filename as shown on the screen

in dull red characters: _____. Start time: _____.

QA Witness _____ Date:_____

12.3.10 Wait at least five minutes, then DISABLE the recording.

12.3.11 If AS3 is installed, use its internal incandescent lamps to provide a small amount of light on the detectors. Turn on the dc power that powers the lamps. Slowly increase its voltage until the TRE detector photocurrents displayed on the screen are approximately 10 fA.

12.3.12 If AS3 is not installed, do the following:

12.3.12.1 Replace the opaque telescope cover with a transparent one.

12.3.12.2 Install a small incandescent light source on the cover and secure with Kapton tape or equivalent. Power it from a dc power supply.

12.3.12.3 Adjust the intensity of the light source to provide a small photocurrent (≈10 fA) in the detectors.

12.3.13 Navigate to the main menu and select MON A.

12.3.14 Check the signal levels for each of the A-side X-and Y-Axes detector outputs by monitoring X high+, X low+, X high -, X low-, Y high+, Y low+ Y high-, and Y low- on the screen. Each signal should be within 8 volts of zero. If a signal is not in the desired range, adjust the CLAMP of the appropriate axis until it is.

12.3.15 Navigate to the Disk menu and ENABLE recording. Record the filename as shown on the

screen in dull red characters: _____. Start time: _____.

QA Witness _____ Date:_____

12.3.16 Wait at least five minutes, then DISABLE the recording.

12.3.17 Navigate to the main menu and select MON B

12.3.18 Check the signal levels for each of the B-side X- and Y-Axes detector outputs by monitoring X high+, X low+, X high -, X low-, Y high+, Y low+ Y high-, and Y low- on the screen. Each signal should be within 8 volts of zero. If a signal is not in the desired range, adjust the CLAMP of the appropriate axis until it is.

12.3.19 Navigate to the Disk menu and ENABLE recording. Record the filename as shown on the

screen in dull red characters: _____. Start time: _____.

QA Witness _____ Date:_____

12.3.20 Wait at least five minutes, then DISABLE the recording.

12.3.21 Remove the incandescent source if installed in step 12.3.12.2, or turn off the AS3 internal illuminatiion.

12.3.22 Record the final command settings of the four axes in the table below.

Axis	A-side, X-Axis	A-side, Y-Axis	B-side, X-Axis	B-side, Y Axis
CONTROL	h	h	h	h
DTEMP	h	h	h	h
HEAT	h	h	h	h
CLAMP	h	h	h	h
BIAS	h	h	h	h
OFFSET	h	h	h	h
Initials & date				

QA Witness _____ Date:_____

12.4 Completion of testing

12.4.1 If no further testing of the TRE / DPA is needed, return the CONTROL registers to 0000h for all of the axes..

Axis	A-side, X-Axis	A-side, Y-Axis	B-side, X-Axis	B-side, Y Axis
CONTROL	0000h	0000h	0000h	0000h
Initial & date				

Turn off the TRE power supplies in the test rack.

QA Witness _____ Date:_____

12.4.2 If other tests are to be performed using the TRE / DPA units, consider this as a good starting point and proceed with the requirements of that test procedure without turning the power off.

12.4.2.1 Set up the system for AS3 data collection. The system should be in low gain mode, with local temperature control, minimum gain. Do not change the Offset register, but note its setting.

Axis	**A-side, X-Axis**	**A-side, Y-Axis**	**B-side, X-Axis**	**B-side, Y Axis**
CONTROL	10C0h	10C0h	10C0h	10C0h
DTEMP	0832h	0832h	0832h	0832h
HEAT	0003h	0003h	0003h	0003h
CLAMP	0000h	0000h	0000h	0000h
BIAS	0000h	0000h	0000h	0000h
Record OFFSET				
Initials & date				

When these settings have been made, continue with the following steps, and then restart SQD362.exe.

QA Witness _____ Date:_____

12.4.3 Navigate to the main menu and choose SAVE/QUIT. Save the parameters before quitting the program.

12.4.4 Copy the data files made in this procedure to a JAZ™ cartridge, and deliver the data cartridge to Bob Farley with a copy of this annotated procedure.

13. Test completed.

Completed by: _____

QA Witnessed by: _____

Date: _____

Time: _____

PTD_____ Date _____

Quality Manager_____ Date _____