GRAVITY PROBE B

PROCEDURE FOR

PAYLOAD VERIFICATION

(PTP) SQUID Bracket ID Procedure Using GSE

P0839 Rev. -

May 17, 2001

Prepared by: Bruce Clarke

Approvals:

Program Responsibility	Signature	Date
B. Clarke SRE RE		
B. Muhlfelder SQUID Engineer		
R. Whelan GP-B System Engineering		
D. Ross GP-B Quality Assurance		
R. Brumley 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
-	May 17, 2001	NA	Original issue

Acronyms and Abbreviations:

Acronym / Abbreviation	**Meaning**
SRE	SQUID Readout Electronics
GSE	Ground Support Equipment
PTD	Payload Test Director

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1. Scope

This procedure measures the temperature response of the SQUID brackets to step input voltages on the SQUID bracket heaters. All four of the SQUID bracket thermometers will be monitored and recorded as a voltage step sequence is applied to each of the four SQUID bracket heaters, one at a time.

2. Configuration Requirements

2.1 Probe is installed in the dewar. Probe pressure <1E-5 torr and the PPMS is monitoring the probe pressure (PMG-1).

2.2 No cables are mated to top hat connectors I3, XS1, XS3, X5R, X6R.

3. Success Criteria

The test is deemed successful after completion of section 15 of this Pdoc.

4. Hardware Required

4.1 Commercial test equipment

Manufacturer	Model	Serial Number	Calibr. Exp. Date
HP DC Power Supply	E3620A		
BTi Current Source	CCS		
Keithly DMM	196		

4.2 Mechanical/Electrical Special test equipment

Description	Part No.	Rev. no.	Serial No.	Certification Date
Breakout box for Probe C I3 top hat connector				
Breakout boxes for SQUID bracket GRTs. One for each of the following connectors: XS1, XS3, X5R, X6R				

4.3 Tools

4.4 Custom

Description	Model number	No. Req'd
N/A		

5. Software Required

5.1 Test Support Software

Test Software Name	Version No.	QA Verification
Strawberry Tree Data Acquisition		

5.2 Flight Software

Flight Software Name	Version No.
N/A	

5.3 CSTOL Scripts

CSTOL Script Name		Version No.
N/A		

5.4 SPC Scripts

SPC Script Name	Version No.
N/A	

5.5 Test Support Software

Test Software Name	Version No.
N/A	

6. Procedures Required

Procedure Name	Procedure No.
N/A	

7. Procedures Required

Procedure Name	Procedure No.
N/A	

8. Equipment Pretest Requirements

None.

9. Personnel Requirements

This test to be conducted only by certified personnel. Among those are Barry Muhlfelder, Jim Lockhart and Bruce Clarke.

10. Quality Assurance

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, will certify 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.

11. Red-line Authority

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.

12. Safety Requirements

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

12.2 Connector savers are to be used on the top hat 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.

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

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

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

13. References and Applicable Documents

None.

14. Operations

14.1 Notify ONR and Stanford QA 24 hours prior to beginning step 3.2.

Date:_____

Time:_____

ONR:_____

Stanford QA:_____

Notified by:_____

14.2 Begin test. Date: _____

Time: _____

14.3 Connect breakout boxes to the following top hat connectors: I3, XS1, XS3, X5R, and X6R.

14.4 Connect the sense lines of the four SQUID bracket GRTs in series using banana plugs by making the following connections:

XS1: pin 5 → XS3: pin 4
XS3: pin 5 → X5R: pin 4
X5R: pin 5 → X6R: pin 4

14.5 Connect cabling so that the voltage across the GRTs may be read out with the Data Acquisition ADC using the following pin pairs.

GRT	low side (V -)	high side (V +)	A/D Channel
(-Y) side of (-X) bracket	XS1: pin 1	XS1: pin2	1
(+Y) side of (-X) bracket	XS3: pin 1	XS3: pin 2	2
(+Y) side of (+X) bracket	X5R: pin 1	X5R: pin 2	3
(-Y) side of (+X) bracket	X6R: pin 1	X6R: pin 2	4

14.6 Adjust the BTi current source to output +4.0 μA. Verify this output current to +/- 0.002 μA using the Keithly DMM.

14.7 Connect the BTi current source to the GRTs as follows:
X6R: pin 5 → +I
XS1: pin 4 → -I

14.8 Connect the HP DC power supply such that a DC voltage may be applied to the –Y heater of the –X SQUID bracket (designate this HEATER –Y, -X). Do this by connecting the following:

V+ to I3: pin 19
V- to I3: pin20

Monitor this voltage on channel 5 of the data acquisition system. Turn the dial all the way CCW and power on the unit. This should apply 0 VDC to the heater.

14.9 Start the data acquisition routine and set the sampling rate to 20 Hz. Set the A/D input range such that 0.050 mV can be resolved. The 5 columns of data recorded should be relative time (s), the four GRT voltages (V) and the applied heater voltage (V). Adjust the data-logging interval to 10 seconds. Record the data file name in table 1. Update Table 1 every 5 minutes and at any heater voltage change for the remainder of the procedure.

14.10 Continue to collect data with the data acquisition system for 10 minutes.

14.11 Adjust the data-logging interval to 0.1 seconds. Increase the voltage on the heater to 0.25 VDC. Update Table 1. After 10 seconds has passed, adjust the logging interval to 10 seconds.

14.12 Continue to collect data for 20 minutes or until the GRT voltages are stable to 0.10 mV over 5 minutes.

14.13 Adjust the data-logging interval to 0.1 seconds. Increase the voltage on the heater to 0.5 VDC. Update Table 1. After 10 seconds has passed, adjust the logging interval to 10 seconds.

14.14 Continue to collect data for 20 minutes or until the GRT voltages are stable to 0.10 mV over 5 minutes.

14.15 Adjust the data-logging interval to 0.1 seconds. Decrease the voltage on the heater to 0.25 VDC. Update Table 1. After 10 seconds has passed, adjust the logging interval to 10 seconds.

14.16 Continue to collect data for 20 minutes or until the GRT voltages are stable to 0.10 mV over 5 minutes.

14.17 Adjust the data-logging interval to 0.1 seconds. Decrease the voltage on the heater to 0.0 VDC. Update Table 1. After 10 seconds has passed, adjust the logging interval to 10 seconds.

14.18 Continue to collect data for 30 minutes or until the GRT voltages are stable to 0.10 mV over 5 minutes.

14.19 Move the heater power to the +Y heater of the –X SQUID bracket (designate this HEATER +Y, -X) by connecting:

V+ to I3: pin 21
V- to I3: pin22

Repeat steps 14.4 through 14.12 for this heater.

14.20 Move the heater power to the +Y heater of the +X SQUID bracket (designate this HEATER +Y, +X) by connecting:

V+ to I3: pin 23
V- to I3: pin24

Repeat steps 14.4 through 14.12 for this heater.

14.21 Move the heater power to the -Y heater of the +X SQUID bracket (designate this HEATER -Y, +X) by connecting:

V+ to I3: pin 26
V- to I3: pin27

Repeat steps 14.4 through 14.12 for this heater.

14.22 Stop the data acquisition routine. Power down the HP DC power supply and the BTi current source. Remove breakout boxes from the following top hat connectors: I3, XS1, XS3, X5R, and X6R.

14.23 Archive the data file on the Payload Server. Record the path and filename below.

Archived Data File:_____

15. Test completed.

Completed by: _____
QA Witnessed by: _____
Date: _____
Time: _____

PTD_____ Date _____

Quality
Manager_____ Date _____

TABLE 1. SQUID BRACKET ID DATA

Data filename:______________________________

Time started:_______________________________

Probe pressure (PMG-1):_____________________ Torr

time	heater used	heater voltage (V)	heater current (mA)	GRT drive current (μA)	-Y, -X GRT voltage (mV)	+Y, -X GRT voltage (mV)	+Y, +X GRT voltage (mV)	-Y, +X GRT voltage (mV)	comment
	-Y, -X	0	0	4.000					start logging data

time	heater used	heater voltage (V)	heater current (mA)	GRT drive current (µA)	-Y, -X GRT voltage (mV)	+Y, -X GRT voltage (mV)	+Y, +X GRT voltage (mV)	-Y, +X GRT voltage (mV)	comment

time	heater used	heater voltage (V)	heater current (mA)	GRT drive current (µA)	-Y, -X GRT voltage (mV)	+Y, -X GRT voltage (mV)	+Y, +X GRT voltage (mV)	-Y, +X GRT voltage (mV)	comment

time	heater used	heater voltage (V)	heater current (mA)	GRT drive current (µA)	-Y, -X GRT voltage (mV)	+Y, -X GRT voltage (mV)	+Y, +X GRT voltage (mV)	-Y, +X GRT voltage (mV)	comment