GRAVITY PROBE B

PROCEDURE FOR

PAYLOAD VERIFICATION

(PTP) ECU BRACKET REMOVAL AND EXCHANGE PROCEDURE

September 16, 1999

Prepared by: *Haig Yengoyan*

Approvals:

Program Responsibility	Signature	Date
H. Yengoyan GP-B Mechanical Engineer		
M. R. Anderson GP-B Systems Engineer		
M. Taber GP-B Payload Test Director		
J. Janicki GP-B Safety Engineer		
D. Ross GP-B Quality Assurance		
S. Buchman GP-B Hardware Manager		

NOTES:

Level of QA required during performance of this procedure:

__4__ Stanford QA Representative

All redlines must be approved by QA

1. SCOPE

This procedure provides authority to exchange the non-flight titanium ECU brackets previously installed on procedure P0539 with non-flight aluminum brackets onto the neck of the Science Mission Dewar to be used during payload integration testing.

NOTE

Flight hardware, protect parts and assemblies to prevent magnetic contamination and physical damage.

2. REFERENCE DOCUMENTS

2.1. Procedures

Not applicable

2.2. Drawings

8A01961GSE - FWD Electronics Mounting GSE Bracket, Rev. NC

5856126 – Bracket, Front, FWD Elec Mounting (GP-B), Rev. A

5856127 – Bracket, Rear, FWD Elec Mounting (GP-B), Rev. A

2.3. Figures

Not applicable

2.4. Supporting Documentation

GP-B Bolt Torque Specification, LMMS-5834972

GP-B Magnetic Control Plan, LMMS-5835031

GP-B (FIST) Preliminary Hazards Analysis, LMMS-F314446

GP-B (FIST) Safety Plan, LMMS- F314447

FIST Emergency Procedures SU/GP-B P0141

3. GENERAL REQUIREMENTS

3.1 Quality Assurance

Integration 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 her 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.

3.2 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.

3.3 Personnel

The following personnel are qualified to perform this procedure:

- Bob Ajitomi
- Haig Yengoyan
- Paul Ayres
- Tom Welsh
- Mike Taber
- Dave Murray
- Byron Oh

See section 3.1 for details on which Quality Assurance personnel are required to be notified and/or witness this procedure.

3.4 Safety

In case of any injuries obtain medical treatment: at:

Stanford University **Call 9-911**

3.4.1 The GP-B (FIST) Safety Plan, LMSC-F314447, discusses safety design, operating and maintenance requirements which the R&DD program office has adhered to. These requirements should be reviewed for applicability at any facility outside of R&DD (e.g. Stanford University) where FIST hardware is operated.

3.5 Hazards Analysis

The GP-B (FIST) Preliminary Hazards Analysis, LMSC-F314446, discusses hazards inherent in R&DD-developed FIST hardware in greater detail.

4. CONFIGURATION REQUIREMENTS:

4.1 SMD mounted in SMD test stand with work platforms and scaffolding attached.

5. HARDWARE REQUIREMENTS

The Dewar and accompanying build hardware are very delicate. Be sure to handle them with care so that they do not become damaged.

NOTE

Take all necessary precautions not to let anything physically damage the Science Mission Dewar or particulate onto its surfaces.

5.1 Hardware Required:

Qt. 1	ECU EU Unit
Qt. 1	8A01961GSE-102 ECU Bracket Assembly
Qt. 1	5856126-101 Front Bracket Assembly
Qt. 1	5856127-101 Rear Bracket Assembly
Qt. 1	5856146-101 Assembly Tool, Box Mounting Template
Qt. 2	5856139-101 Shim
Qt. 1	Torque wrench 10-120 in-lbs.
Qt. AR	Fasteners for attaching support rods and bracket
Qt. AR	Hand tools (Alan wrenches, screw drivers, etc.)

6. OPERATIONS:

Operator _____.

Date Initiated _____.

Time Initiated _____.

6.1 Configuration Requirements:

SMD mounted in SMD test stand with work platforms and scaffolding attached.

7. NOTIFICATION

7.1 Safety Notification

Safety shall be notified 24 hours in advance prior to the start of any work performed. Record who was contacted, the date, and time below.

Contact: _____
Date and Time: _____

7.2 Quality Assurance Notification

PTD to notify the Quality Engineer 24 hours in advance prior to the start of any work performed. Record who was contacted, the date, and time below.

Contact: _____
Date and Time: _____

7.3 ONR Notification

Quality Engineer to notify ONR 24 hours in advance prior to the start of any work performed. Record who was contacted, the date, and time below.

Contact: _____

Date and Time: _____

8. EXCHANGING the ECU brackets

8.1 Removing and Replacing the ECU Brackets

CAUTION

The ECU Unit is ESD Sensitive. Use appropriate ESD protection when handling the unit or installing associated cables.

8.1.1 Begin by unscrewing the two –110 L brackets from the fully assembled 8A01961GSE-102 ECU Bracket Assembly. Save all the fasteners for reuse.

8.1.2 After the brackets are unscrewed, lift the ECU box approximately 1 inch off the –109 ECU Base Plate and unscrew the 8 each 10-32 x 1/2" long 100° flat head screws. Save the screws for reuse.

8.1.3 Once the –109 ECU Base Plate is removed, it will expose the two non-flight titanium brackets. Unbolt and remove these two brackets from the rib of the dewar. Save all fasteners for reuse.

8.1.4 Position the new forward aluminum bracket on the rib with a piece of laminated shim stock. Use a feeler gage to adjust shim thickness to minimize the movement of the bracket per engineer's direction. Laminated shim thickness can be adjusted by "peeling" the laminates using an X-acto knife. Each laminate is .003" thick. Secure the bracket finger tight to the rib with three bolts and nuts and nine washers which were saved in section 8.1.3 for reuse.

8.1.5 Position an aluminum rear bracket on the rib with a piece of laminated shim stock. Adjust shim thickness as described in step 8.1.4. Secure the bracket finger tight to the rib with the three bolts and nuts and nine washers.

8.1.6 Hold the Box mounting template (5856146-101) up to the forward and rear brackets to align the shims and brackets properly before torquing. Shims may be placed above or below the rib as needed for alignment.

8.1.7 Torque all the bolts to 35-45 inch-pounds. Record data below:

Torque Wrench Asset Number _____
Calibration Due Date _____
Final Torque Value _____

8.1.8 Product Assurance or Second Party to witness torque.

Witness _____

8.1.9 After the two aluminum brackets are installed on the dewar, install the –109 ECU Base Plate using the 8 each 10-32 x 1/2" long 100° flat head screws which were saved in step 8.1.2.

8.1.10 Torque the eight 10-32 screws per Note 7 to 25 ± 2 in-lbs. per the 5834972 GP-B Bolt Torque Specification.

Torque Wrench Asset Number _____
Calibration Due Date _____
Final Torque Value _____

8.1.11 Product Assurance or Second Party to witness torque.

Witness _____

8.1.12 Hold the ECU unit onto the base plate oriented in the correct position and hold it against the base plate.

8.1.13 While one person is holding the ECU in place, the other person will attach the 8 each 10-32 x .75" long socket head cap screws, 8 each #10 flat washers, 8 each #10 lock washers, and 8 each 10-32 hex nuts. Tighten the screws hand tight.

8.1.14 Verify that there is one flat washer and one lock washer on each screw and nut.

8.1.15 After all the fasteners are installed on the bracket, torque the eight 10-32 screws per Note 7 to 25 ± 2 in-lbs. per the 5834972 GP-B Bolt Torque Specification.

Torque Wrench Asset Number _____
Calibration Due Date _____
Final Torque Value _____

8.1.16 Product Assurance or Second Party to witness torque.

Witness _____

8.1.17 Verify that all screws were torqued and the ECU unit is correctly oriented.

8.1.18 After the ECU unit is installed, measure the electrical resistance between the ECU unit and the 5856126 & 5856127 mounting brackets. The resistance is to be less than 0.0025 Ohms. Record data below.

Ohm Meter Asset Number _____
Calibration Due Date _____
ECU unit to mounting bracket_____ OHMS

8.1.19 Product Assurance to witness measurement.

QA Witness _____

9. PROCEDURE COMPLETED

The results obtained in the performance of this procedure are acceptable:

Test Engineer _____ Date _____

PTD _____ Date _____

Discrepancies if any:

The information obtained under this assembly and test procedure is as represented and the documentation is complete and correct:

Integration Manager _____ Date _____

QA Representative _____ Date _____

Quality Assurance _____ Date _____