



STANFORD UNIVERSITY  
W.W. HANSEN EXPERIMENTAL PHYSICS LABORATORY  
GRAVITY PROBE B, RELATIVITY GYROSCOPE EXPERIMENT  
STANFORD, CALIFORNIA 94305-4085

## (PTP) GSS TEMPORARY INSTALLATION

### GP-B PAYLOAD VERIFICATION TEST II OPERATIONS ORDER

**P0836**  
8 June, 2001

PREPARED	_____	_____
	H. Yengoyan	Date
APPROVED	_____	_____
	K. Pearce, Systems Test Engr.	Date
APPROVED	_____	_____
	W. Bencze, Test Director	Date
APPROVED	_____	_____
	D. Ross, Quality Assurance	Date
APPROVED	_____	_____
	W. Bencze, Payload Electronics Mgr.	Date

### REVISION RECORD

REVISION	ECO	PAGES	DATE

## 1. SCOPE

This procedure provides authority to temporarily install the Gyro Suspension System (GSS) Assemblies onto the neck of the Science Mission Dewar and the installation of required flight cables to be used during Payload Verification II Phase B.

### **NOTE**

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

## 2. REFERENCE DOCUMENTS

### 2.1. Procedures

P0849 - Aft GSS temporary installation procedure.

### 2.2. Drawings

8A00631 – FWD Payload Electronics Install Drawing (GP-B), Rev. A

8A00846 – FSU Assy (GSS)

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

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

8A02105 – PL Cable Interconnection And Installation, Rev. NC

8A01473-101 W550 ACU To FSU GFAB (A) Cable Assy, Rev A

8A01471-101 W551 ACU To FSU Power Cable Assy, Rev B

8A01474-101 W558 ACU To FSU GFAB (B) Cable Assy, Rev A

8A01434-101 W414 SRE to ACU Timing Cable Assy, Rev NC

178-6005-36N (Reynolds Industries PN) W510 thru W516

FSU to Top Hat Hi-Voltage Cable Assy

### 2.3. FIGURES

Not applicable

### 2.4. SUPPORTING DOCUMENTATION

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. Safety, ONR and the QA program office shall be notified 24 hours before 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 Test Director or his designate and shall be approved by the QA Representative. Additionally, approval by the Payload Technical Manager shall be required, if in the judgment of the Test Director or QA Representative, experiment functionality may be affected.

#### 3.3 Personnel

The following personnel are qualified to perform this procedure:

- Haig Yengoyan
- Tom Welsh
- Mike Taber
- Dave Murray
- William Bencze
- Lou Yamanishi
- Larry Catanzano
- Bud Swihart

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**

#### 4. CONFIGURATION REQUIREMENTS:

4.1 SMD mounted vertically in the SMD test stand with the work platforms and scaffolding attached. The forward electrical mounting brackets are already installed on the neck of the SMD.

#### 5. HARDWARE REQUIREMENTS

The Dewar, GSS Units 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 GSS Units and Science Mission Dewar or particulate onto its surfaces.**

##### 5.1 Hardware Required:

Qt. 4	8A00846-101 GSS Assembly
Qt. 32	NAS1351N3-12 or equivalent, 10-32 SHCS, A-286, 3/4" long
Qt. 32	NAS620C10 or equivalent, #10 Flat Washer, CRES
Qt. 1	Torque wrench 10-120 in-lbs.
Qt. 1	Torque wrench 1-15 in-lbs
Qt. 1	Mili Ohm meter
Qt. AR	Hand tools (Allen wrenches, screw drivers, etc.)

#### 6. VERIFICATION REQUIREMENTS

No requirements are being verified during this procedure.

#### 7. OPERATIONS:

Operator \_\_\_\_\_  
Date Initiated \_\_\_\_\_  
Time Initiated \_\_\_\_\_

## 8. NOTIFICATION

### 8.1 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: \_\_\_\_\_

### 8.2 Quality Assurance Notification

The Test Director is 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: \_\_\_\_\_

### 8.3 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: \_\_\_\_\_

## 9. INSTALLING THE GSS UNIT

### 9.1 Mounting the GSS Units

#### **CAUTION**

**The GSS Units are ESD Sensitive. Use grounding wrist straps for ESD protection when handling the units or installing associated cables.**

**Note: Only one GSS unit will be installed during payload Verification II.  
Record below the SN of the unit installed and location on dewar neck:**

GSS FSU SN: \_\_\_\_\_

Installation location (circle one)   GSS1   GSS2   GSS3   GSS4

- 9.1.1 Locate the set of brackets on the Dewar neck that will hold the GSS Units. Refer to sheet 3 of the 8A00631 drawing for the locations. Wipe off the brackets and GSS mounting tabs with isopropyl alcohol.
- 9.1.2 Verify the orientation of the GSS units onto the Dewar brackets.
- 9.1.3 Lift one of the GSS units onto the Dewar brackets oriented in the correct position and hold it against the brackets.
- 9.1.4 While one person is holding the GSS in place, the other person will attach the 8 each 10-32 x .75" long socket head cap screws and 8 each #10 flat washers. Make sure to place the rolled edge of the washer against the GSS so that the mounting tabs will not be marred. Tighten the screws hand tight.
- 9.1.5 Verify that there is one flat washer under each socket head cap screw.
- 9.1.6 Repeat steps 9.1.3 through 9.1.5 for the remaining three GSS Units, if installed.
- 9.1.7 After all the fasteners are installed on the GSS Units, torque the thirty-two 10-32 screws (eight per GSS Unit) per Note 3 of the 8A00631 drawing to 35 to 45 inch-pounds.

Torque Wrench Asset Number \_\_\_\_\_  
Calibration Due Date \_\_\_\_\_  
Final Torque Value \_\_\_\_\_

- 9.1.8 Product Assurance to witness torque.

QA Witness \_\_\_\_\_

- 9.1.9 Verify that all screws were torqued and the GSS units are correctly oriented.
- 9.1.10 After the GSS units are installed, measure the electrical resistance between each GSS unit and the 5856126 & 5856127 mounting brackets per Note 4 of the 8A00631 drawing. The resistance is to be less than 0.0025 Ohms. Record the data below.

Ohm Meter Asset Number \_\_\_\_\_  
Calibration Due Date \_\_\_\_\_  
GSS #1 unit to mounting brackets \_\_\_\_\_  $\Omega$   
GSS #2 unit to mounting brackets \_\_\_\_\_  $\Omega$   
GSS #3 unit to mounting brackets \_\_\_\_\_  $\Omega$   
GSS #4 unit to mounting brackets \_\_\_\_\_  $\Omega$

9.1.11 Product Assurance to witness measurement.

QA Witness \_\_\_\_\_



## 10. INSTALLING GSS FLIGHT CABLES

**Note 1:** Routing and tie-down of flight cables shall be determined at time of assembly. Cables may be secured with tie-wraps to dewar structure, scaffolding, test stand cable mount blocks as appropriate.

**Note 2:** Every effort should be made to protect the flight cables and route them away from foot traffic or areas where equipment may be moved.

**Note 3:** Prior to installation, the cables may be sheathed in anti-static plastic sleeving as required as an additional abrasion and contamination control precaution.

(See P0849 for GSE connections to aft GSS)

NOTE: Following covers flight cable requirements for ACU #1 and FSU #1 only.

**10.1** Install ACU to FSU GFAB (A) cable PN 8A01473-101 (W550)

10.1.1 Mate 2A113P22 to ACU #1 J22. Mate 1A01P32 to FSU #1 J32.

10.1.2 Torque backshell fasteners to 4 – 5 inch pounds.

Torque Wrench Asset Number \_\_\_\_\_  
Calibration Due Date \_\_\_\_\_  
Final Torque Value \_\_\_\_\_

10.1.3 Product Assurance to witness torque

QA Witness \_\_\_\_\_

**10.2** Install ACU to FSU GFAB (B) cable PN 8A01474-101 (W558)

10.2.2 Mate 2A113P23 to ACU #1 J23. Mate 1A01P33 to FSU #1 J33.

10.2.2 Torque backshell fasteners to 4 – 5 inch pounds.

Torque Wrench Asset Number \_\_\_\_\_  
Calibration Due Date \_\_\_\_\_  
Final Torque Value \_\_\_\_\_

10.2.3 Product Assurance to witness torque

QA Witness \_\_\_\_\_

**10.3** Install ACU to FSU Power cable PN 8A01471-101 (W551)

10.3.1 Mate 2A113P21 to ACU #1 J21. Mate 1A01P31 to FSU #1 J31.

10.3.2 Torque backshell fasteners to 4 – 5 inch pounds.

Torque Wrench Asset Number \_\_\_\_\_

Calibration Due Date \_\_\_\_\_

Final Torque Value \_\_\_\_\_

10.3.3 Product Assurance to witness torque

QA Witness \_\_\_\_\_

**10.4** Install SRE to ACU #1 Timing cable PN 8A01434-101 (W414)

10.4.1 Mate 2A110P8 to SRE A J8. Mate 2A113P6 to ACU #1 J6.  
Connectors 2A111P8, 2A114P6, 2A115P6 and 2A116P6 not used at this time.

10.4.2 Torque backshell fasteners to 4 – 5 inch pounds.

Torque Wrench Asset Number \_\_\_\_\_

Calibration Due Date \_\_\_\_\_

Final Torque Value \_\_\_\_\_

10.4.3 Product Assurance to witness torque

QA Witness \_\_\_\_\_

**10. PROCEDURE COMPLETED**

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

Test Engineer \_\_\_\_\_ Date \_\_\_\_\_

Payload Test Dir. \_\_\_\_\_ 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 Manager \_\_\_\_\_ Date \_\_\_\_\_