



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

**(PTP) MAGNETOMETER TEMPORARY INSTALLATION  
GP-B PAYLOAD VERIFICATION TEST II OPERATIONS ORDER**

**P0846**  
4 June, 2001

PREPARED	_____	_____
	H. Yengoyan	Date
APPROVED	_____	_____
	K. Pearce, Systems Test Engr.	Date
APPROVED	_____	_____
	M. Taber, Test Director	Date
APPROVED	_____	_____
	H. Moskowitz, Safety Engineer	Date
APPROVED	_____	_____
	D. Ross, Quality Assurance	Date
APPROVED	_____	_____
	B. Brumley, Payload Technical Mgr.	Date

**REVISION RECORD**

REVISION	ECO	PAGES	DATE

## **1. SCOPE**

This procedure provides authority to temporarily install the Payload Magnetometer Assemblies onto the Forward Vacuum Shell Cone of the Science Mission Dewar. The magnetometers will be used during Payload Verification II 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**

8A02025 –Payload Magnetometer Installation Drawing (GP-B), Rev. -  
SK007 – Special GP-B GSE Cover Drawing (Unreleased)

### **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
- 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.

#### 5. HARDWARE REQUIREMENTS

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

##### 5.1 Hardware Required:

Qt. 2	900-1130R Payload Magnetometer, Right Hand
Qt. 2	900-1130L Payload Magnetometer, Left Hand
Qt. 2	SK007-101 Right GSE Cover Assembly
Qt. 2	SK007-102 Left GSE Cover Assembly
Qt. 16	NAS6803LU2 or equivalent, 10-32 Bolt, 6Al-4V, .470" long
Qt. A/R	#10 Flat Washer, Brass or equivalent
Qt. 8	10-32 Nut, Brass or equivalent
Qt. 1	Torque wrench 10-120 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 MAGNETOMETERS

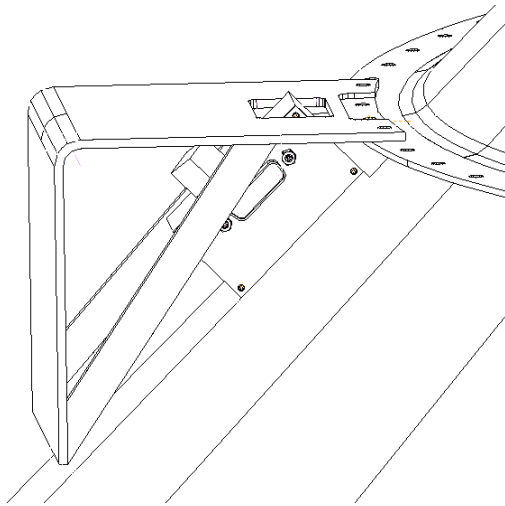
### 9.1 Mounting the Right and Left Magnetometers

#### **CAUTION**

**The Magnetometers are ESD Sensitive. Use grounding wrist straps for ESD protection when handling the units or installing associated covers.**

- 9.1.1 Prior to starting any of the operations below, have the 10-32 bolts, 10-32 nuts, #10 washers, and the GSE covers magnetically screened to Zone 4 Requirements.

- 9.1.2 Locate the  $-X$  and  $-Y$  axes on the Dewar Vacuum Cone that will hold the F/N 1 Right Hand Magnetometers. Refer to sheet 3 of the 8A02025 drawing for the locations. Wipe off the forward cone mounting points, the magnetometer mounting tabs, and the SK007-101 Covers with isopropyl alcohol.
- 9.1.3 Carefully place one magnetometer under the flange of the vacuum cone. Refer to Section D-D of sheet 4 of the 8A02025 drawing.
- 9.1.4 Now place the SK007-101 GSE Cover on top of the flange (as shown below) and screw the cover to the magnetometer with two 10-32 bolts and brass washers. Use as many washers as needed to correctly shim the bolt height. Tighten the screws hand tight.



- 9.1.5 Place one washer and bolt through each remaining hole of the GSE Cover.
- 9.1.6 From the bottom side, secure each bolt with a washer and 10-32 nut. Tighten the screws hand tight.
- 9.1.7 Repeat steps 9.1.3 through 9.1.6 for the other right hand magnetometer unit.
- 9.1.8 Locate the  $+X$  and  $+Y$  axes on the Dewar Vacuum Cone that will hold the F/N 2 Left Hand Magnetometers. Refer to sheet 3 of the 8A02025 drawing for the locations. Wipe off the forward cone mounting points, the magnetometer mounting tabs, and SK007-102 Covers with isopropyl alcohol.
- 9.1.9 Install the F/N 2 Left Hand Magnetometers per steps 9.1.3 through 9.1.6, except use the SK007-102 covers.

9.1.10 After all the fasteners are installed on the Magnetometers and GSE Covers, torque the sixteen 10-32 bolts (four per Magnetometer) per Note 2 of the 8A02025 drawing to 30 to 35 inch-pounds.

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

9.1.11 Product Assurance to witness torque.

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

9.1.12 Verify that all screws were torqued and the Magnetometers are correctly oriented.

9.1.13 After the Magnetometers are installed, measure the electrical resistance between each unit and the Forward Vacuum Cone per Note 3 of the 8A02025 drawing. The resistance is to be less than 0.0025 Ohms. Record the data below.

Ohm Meter Asset Number \_\_\_\_\_  
Calibration Due Date \_\_\_\_\_  
Magnetometer Unit #1 to Vacuum Cone \_\_\_\_\_  $\Omega$   
Magnetometer Unit #2 to Vacuum Cone \_\_\_\_\_  $\Omega$   
Magnetometer Unit #3 to Vacuum Cone \_\_\_\_\_  $\Omega$   
Magnetometer Unit #4 to Vacuum Cone \_\_\_\_\_  $\Omega$

9.1.14 Product Assurance to witness measurement.

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 \_\_\_\_\_