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

# (PTP) FWD SRE TEMPORARY INSTALLATION

# GP-B PAYLOAD VERIFICATION TEST II OPERATIONS ORDER

**P0837**
6 June, 2001

| | | |
|---|---|---|
| PREPARED | H. Yengoyan/L. Yamanishi | Date |
| APPROVED | K. Pearce, Systems Test Engr. | Date |
| APPROVED | W. Bencze, Test Director | Date |
| APPROVED | D. Ross, Quality Assurance | Date |
| APPROVED | R. Brumley, Payload Technical Manager | Date |

## REVISION RECORD

| REVISION | ECO | PAGES | DATE |
|---|---|---|---|
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## 1. SCOPE

This procedure provides authority to temporarily install the SQUID Readout Electronics (SRE) Assemblies on top of the TRE Boxes that are mounted on the neck of the Science Mission Dewar to be used during Payload Verification II Phase B.

This procedure also installs the cables between the TRE, Forward SRE, Tophat, and Aft SRE boxes.

**NOTE**

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

## 2. REFERENCE DOCUMENTS

### 2.1. Procedures

### 2.2. Drawings

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

8A00848 – Forward SRE Assembly, Rev. C

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

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

8A00503 – SRE to Spacecraft Wiring Diagram, Rev B

8A02105 – Payload Cable and Installation Drawing, Rev NC

8A00557- W400 Aft SRE A to Fwd SRE A Power, Rev NC

8A00561- W404 SRE A HLD's, Rev NC

8A00562- W405 Aft SRE A to Fwd SRE B Digital, Rev NC

8A00563- W406 Aft SRE A to Fwd SRE B Pwr, Rev NC

8A01285- W450 & W451 Fwd SRE A to Top Hat, Rev B

8A01286- W453 & W454 Fwd SRE B to Top Hat, Rev B

8A01287- W460 TRE B to Top Hat I8, Rev D

8A01288- W461 TRE A to Top Hat I9, Rev D

8A01317- W412 & W413 Fwd SRE to Top Hat, Rev A

8A01410-W456 TRE to Fwd SRE, Rev A

8A01411- W457 TRE to Fwd SRE, Rev A

8A01412- W458 TRE to Fwd SRE, Rev NC

8A01413- W459 TRE to Fwd SRE, Rev NC

## 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
- Angelo Angelopoulos
- Tom Welsh
- Mike Taber
- Dave Murray
- Terry McGinnis
- Lou Yamanishi
- Bud Swihart
- Larry Cantanzano

Sees 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, SRE 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 SRE Units and Science Mission Dewar or particulate onto its surfaces.**

### 5.1 Hardware Required:

| | |
|---|---|
| Qt. 2 | 8A00848-101 SRE Assembly |
| Qt. 12 | NAS1351N3-14 or equivalent, 10-32 SHCS, A-286, 7/8" long |
| Qt. 12 | NAS620C10 or equivalent, #10 Flat Washer, CRES |
| 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 Government Notification

Quality Engineer to notify Government Representative 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 SRE UNITS

### 9.1 Mounting the SRE Units on the TRE Units

**CAUTION**

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

9.1.1 Locate the two TRE Units on the Dewar neck that will hold the SRE Units. Refer to sheet 3 of the 8A00631 drawing for the location. Wipe off the TRE and SRE mounting tabs with isopropyl alcohol.

9.1.2 Verify the orientation of the SRE Units on the TRE Units.

9.1.3 Lift one of the SRE units onto the TRE and orient it in the correct position and hold it against the TRE.

9.1.4 While one person is holding the SRE in place, the other person will attach the six 10-32 x .875" long socket head cap screws and six #10 flat washers. Make sure to place the rolled edge of the washer against the SRE 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 other SRE Unit.

9.1.7 After all the fasteners are installed on the SRE Units, torque the twelve 10-32 screws (six per SRE 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 SRE Units are correctly oriented.

9.1.10 After the SRE Units are installed, measure the electrical resistance between each SRE 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 _____
SRE Unit A to mounting brackets_____ Ω
SRE Unit B to mounting brackets_____ Ω

9.1.11 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 (see attached d-log)

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 _____

## 11. SRE A & B FLIGHT CABLE INSTALLATION

**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.

**11.1** Verify GSE interfaces to Aft SRE per Aft SRE Wiring Diagram 8A00503.

11.1.1 Product Assurance to verify
QA Verification _____

**11.2** Install Aft SRE A to Fwd SRE A cable PN 8A0557-101 (W400)

11.2.1 Mate 2A110P3 to Aft SRE A J3. Mate 1A08P8 to Fwd SRE A J8.

11.2.2 Torque backshell fasteners to 3.5 – 4.5 inch pounds.

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

11.2.3 Product Assurance to witness torque.

QA Witness _____

**11.3** Install Aft SRE A to Fwd SRE A cable PN 8A00558-101 (W401)

11.3.1 Mate 2A110P5 to Aft SRE A J5. Mate 1A08P5 to Fwd SRE A J5.

11.3.2 Torque backshell fasteners to 3.5 – 4.5 inch pounds.

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

11.3.3 Product Assurance to witness torque.

QA Witness _____

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**11.4** Install Aft SRE A to Fwd SRE A cable PN 8A00561-101 (W404)

11.4.1 Mate 2A110P7 to Aft SRE A J7. Mate 1A08P10 to Fwd SRE A J10.

11.4.2 Torque backshell fasteners to 3.5 – 4.5 inch pounds.

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

11.4.3 Product Assurance to witness torque

QA to Witness _____

**11.5** Install Aft SRE A to Fwd SRE B cable PN 8A00563-101 (W406).

11.5.1 Mate 2A110P4 to Aft SRE A J4. Mate 1A09P8 to Fwd SRE B J8.

11.5.2 Torque backshell fasteners to 3.5 – 4.5 inch pounds

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

11.5.3 Product Assurance to witness torque.

QA to Witness _____

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**11.6** Install Aft SRE A to Fwd SRE B cable PN 8A00562-101 (W405)

11.6.1 Mate 2A110P6 to Aft SRE A J6. Mate 1A09P5 to Fwd SRE B J5.

11.6.2 Torque backshell fasteners to 3.5 – 4.5 inch pounds.

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

11.6.3 Product Assurance to witness torque

QA witness _____

**11.7** Install Fwd SRE A to Top Hat cable PN 8A01285-101 (W450)

11.7.1 Mate P1 to Fwd SRE A J1. Mate PFB1 to Top Hat FB1 feedthru. Mate PMS1 to Top Hat MS1 feedthru. Mate PSS1 to Top Hat SS1 feedthru.

11.7.2 Torque backshell fasteners to Fwd SRE A J1 to 3.5-4.5 inch pounds.

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

11.7.3 Product Assurance to witness torque

QA witness _____

**11.8** Install Fwd SRE A to Top cable PN 8A01285-102 (W451)

11.8.1 Mate P2 to Fwd SRE A J2. Mate PSS3 to Top Hat feedthru SS3. Mate PFB3 to Top Hat feedthru FB3. Mate PMS3 to Top Hat feedthru MS3

11.8.2 Torque backshell fasteners to Fwd A SRE J2 to 3.5 – 4.5 inch pounds.

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

11.8.3 Product Assurance to witness torque

QA witness _____

**11.9** Install Fwd SRE A to Top Hat cable PN 8A1317-101 (W412).

11.9.1 Mate P3 to Fwd SRE A J3. Mate PX5 to Top Hat feedthru X5.

Mate PXS1 to Top Hat feedthru XS1.

11.9.2 Torque backshell fasteners to Fwd SRE A J3 to 3.5 – 4.5 inch pounds.

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

11.9.3 Product Assurance to witness torque

QA witness _____

**11.10** Install Fwd SRE B to Top Hat cable PN 8A01286-101 (W453).

11.10.1 Mate P1 to Fwd SRE B J1. Mate PSS2 to Top Hat feedthru SS2. Mate PFB2 to Top Hat feedthru FB2. Mate PMS2 to Top Hat feedthru MS2.

11.10.2 Torque backshell fasteners to Fwd SRE B J1 to 3.5 – 4.5 inch pounds.

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

11.10.3 Product Assurance to witness torque

QA witness _____

**11.11** Install Fwd SRE B to Top Hat cable PN 8A01286-102 (W454)

11.11.1 Mate P2 to Fwd SRE B J2. Mate PSS4 to Top Hat feedthru SS4. Mate PFB4 to Top Hat feedthru FB4. Mate PMS4 to Top Hat feedthru MS4.

11.11.2 Torque backshell fasteners to Fwd SRE B J2 to 3.5 – 4.5 inch pounds.

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

11.11.3 Product Assurance to witness torque

QA witness _____

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**11.12** Install Fwd SRE B to Top Hat cable PN 8A01317-102 (W413).

11.12.1 Mate P3 to Fwd SRE B J3. Mate PXS3 to Top Hat feedthru XS3.
Mate PX6 to Top Hat feedthru X6.

11.12.2 Torque backshell fasteners to Fwd SRE B J3 to 3.5 – 4.5 inch pounds.

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

11.12.3 Product Assurance to witness torque

QA witness _____

**11.13** Complete I3 interface connectors to Fwd SRE A & B J4. Part of cable PN8A01318-101 (W357) installed in ECU by Procedure P0835.

11.13.1 Mate 1A08P4 to Fwd SRE A J4. Mate 1A09P4 to Fwd SRE B J4.

11.13.2 Torque backshell fasteners to Fwd SRE A & B J4 to 3.5 – 4.5 inch pounds.

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

11.13.3 Product Assurance to witness torque

QA witness _____

## 12.0 TRE TO SRE AND TOP HAT CABLE INSTALLATION.

12.1 Cable connections to TRE A & B to be as follows:

a) Install SRE A&B to TRE A&B pwr cable PN 8A01412-101 (W458)
Mate P11 to SRE A J11 and P4 to TRE A P4
(Same for SRE B to TRE B)

b) Install SRE A&B to TRE A&B digital cable PN 8A01413-101

(W459)
Mate P7 to SRE A J7 and P5 to TRE A J5
(Same for SRE B to TRE B)

c) Install SRE A&B to TRE A&B analog 1 cable PN 8A01410 –101
(W456)
Mate P12 to SRE A J12 and P2 to TRE A J2
(Same for SRE A to TRE B)

d) Install SRE A&B to TRE A&B analog 2 cable PN 8A01411-101
(W457)
Mate P13 to SRE A J13 and P3 to TRE A J3
(Same for SRE B to TRE B)

e) Install TRE A to Top Hat cable PN 8A01288-101 (W461)
Mate P1 to TRE A J1 and PI9 Top Hat feedthru I9
f) Install TRE B to Top Hat cable PN 8A01287-101 (W460).
Mate P1 to TRE B J1 and PI8 to Top Hat feedthru I8.

12.1.2 Torque backshell fastenters to Fwd SRE A&B J7, J11, J12, J13 TRE A&B J1, J2, J3, J4, J5 to 3.5 – 4.5 inch pounds.

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

12.1.3 Product Assurance to witness torque

QA to Witness _____

**12.2** After test completion, remove cables and package for shipment to LMMS Bldg. 205. TRE cables to be removed in reverse sequence.

## 13. SRE/TRE CABLE INSTALLATION COMPLETED

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

Test Engineer _____ Date _____

Payload Test Dir. _____ Date _____

Discrepancies if any (see attached d-log)

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 _____