



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

(PTP) TRE INSTALLATION INCLUDING CABLES
GP-B PAYLOAD VERIFICATION TEST II OPERATIONS ORDER

P0541A
ECO 1203
18 September, 2000

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. Muhlfelder, Payload Technical Mgr. Date

REVISION RECORD

| REVISION | ECO | PAGES | DATE |
|----------|------|--|---------|
| A | 1203 | The procedure was revised to remove the use of the NAS1149V0363 #10 Titanium Washers, revised wording for Payload Verification Test II, and revised personnel listed in section 3.3. | 9/18/00 |
| | | | |

1. SCOPE

This procedure provides authority to install both Telescope Readout Electronics (TRE) Assemblies onto the neck of the Science Mission Dewar to be used during Payload Verification Testing II.

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

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

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 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 Test Director 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 Test Director or QA Representative, experiment functionality may be affected.

3.3 Personnel

The following personnel are qualified to perform this procedure:

- Bob Ajitomi
- Haig Yengoyan
- Tom Welsh
- Mike Taber
- Dave Murray
- Bob Farley

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 the 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. 2 | 8A00918-101 Rev. D TRE Assembly |
| Qt. 16 | NAS1351N3-12 or equivalent, 10-32 SHCS, A-286, 3/4" long |
| Qt. 16 | NAS620C10 or equivalent, #10 Flat Washer, CRES |
| Qt. 1 | 8A01287-101 Rev. B, TRE B J1 to Top Hat I8 (Non-Flight Cable) |
| Qt. 1 | 8A01288-101 Rev. B, TRE A J1 to Top Hat I9 (Non-Flight Cable) |
| Qt. 2 | 8A01948GSE-101 Rev. A, TRE GSE Test Cable |
| Qt. 1 | Torque wrench 10-120 in-lbs. |
| Qt. 1 | Mili Ohm meter |
| Qt. | ARHand tools (Alan wrenches, screw drivers, etc.) |

6. OPERATIONS:

Operator _____.

Date Initiated _____.

Time Initiated _____.

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

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: _____

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. INSTALLING THE TRE ASSEMBLIES AND CABLES

8.2 Mounting TRE's onto the Dewar

CAUTION

The TRE Units are ESD Sensitive. Use appropriate ESD protection when handling the units.

- 8.1.1 Clean the surfaces with Isopropyl Alcohol around the four F/N 9 fastener locations (SH 4 Zone D7 on the 8A00631 print) on the F/N 2 TRE A Assembly Box. Also clean the two previously installed F/N 5 & 6 brackets with Isopropyl Alcohol at the 22.5° and 112.5° locations (SH 3 Section A-A on the 8A00631 print) mounted on the dewar neck.
- 8.1.2 Repeat step 8.1.1 for TRE B Assembly Box.
- 8.1.3 Orient the F/N 2 TRE A Assembly Serial # 001 as shown on Sh. 3 and secure to the mounting brackets using eight each F/N 9 bolts and F/N 16 washers. Position the F/N 16 steel washers as shown in Detail F on Sh. 6 of the 8A00631 drawing.
- 8.1.4 Repeat for TRE B Serial # 002 Assembly.
- 8.1.5 Torque the eight F/N 9 bolts on TRE A Assembly to 35-45 inch-pounds per Note 3. Record data below.

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

- 8.1.6 Product Assurance to witness torque.

QA Witness _____

- 8.1.7 Torque the eight F/N 9 bolts on TRE B Assembly to 35-45 inch-pounds per Note 3. Record data below.

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

- 8.1.8 Product Assurance to witness torque.

QA Witness _____

- 8.1.9 Measure and record the electrical resistance between the F/N 2 TRE A Assembly and the F/N 5 & 6 brackets per Note 4. Resistance to be less than .0025 ohms.

Mili Ohm Meter Asset Number _____
Calibration Due Date _____
Resistance Value _____

8.1.10 Product Assurance to witness measurement.

QA Witness _____

8.1.11 Measure and record the electrical resistance between the F/N 2 TRE B Assembly and the F/N 5 & 6 brackets per Note 4. Resistance to be less than .0025 ohms.

Mili Ohm Meter Asset Number _____
Calibration Due Date _____
Resistance Value _____

8.1.12 Product Assurance to witness measurement.

QA Witness _____

Approval of Section 8.1

Approved: _____ Date: _____
Integration Engineer

Discrepancies if any:

Approved: _____ Date: _____
Test Director

Approved: _____ Date: _____
QA Representative

Approved: _____ Date: _____
Integration Manager

8.2 Mounting the TRE Cables

CAUTION

The TRE Units and associated cables are ESD Sensitive. Use appropriate ESD protection when handling these items.

- 8.2.1 Install NON-FLIGHT CABLE 8A01287-101 by mating P1 on cable to J1 on TRE B. Mate PI8 on cable to I8 on TOP HAT.
- 8.2.2 Install NON-FLIGHT CABLE 8A01288-101 by mating P1 on cable to J1 on TRE A. Mate PI9 on cable to I9 on TOP HAT.
- 8.2.3 Install 1 ea. TEST CABLE 8A01948GSE to Connector Panel A. Hand tighten connector fasteners. (Reference FIG 1)
 - 8.2.3.1 Install cable TRE-P2 to TRE A-J2.
 - 8.2.3.2 Install cable TRE-P3 to TRE A-J3.
 - 8.2.3.3 Install cable TRE-P4 to TRE A-J4.
 - 8.2.3.4 Install cable TRE-P5 to TRE A-J5.
 - 8.2.3.5 Install cable P15 to Connector Panel A-J15.
 - 8.2.3.6 Install cable P17 to Connector Panel A-J17

- 8.2.4 Install 1 ea. TEST CABLE 8A01948GSE to Connector Panel B. Hand tighten connector fasteners. (Reference FIG 1)
- 8.2.4.1 Install cable TRE-P2 to TRE B-J2.
- 8.2.4.2 Install cable TRE-P3 to TRE B-J3.
- 8.2.4.3 Install cable TRE-P4 to TRE B-J4.
- 8.2.4.4 Install cable TRE-P5 to TRE B-J5.
- 8.2.4.5 Install cable P15 to Connector Panel B-J15.
- 8.2.4.6 Install cable P17 to Connector Panel B-J17.

Approval of Section 8.2

Approved: _____ Date: _____
Integration Engineer

Discrepancies if any:

Approved: _____ Date: _____
Test Director

Approved: _____
QA Representative

Date: _____

Approved: _____
Integration Manager

Date: _____

9. PROCEDURE COMPLETED

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

Test Engineer _____

Date _____

Test Director _____

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 _____

FIGURE 1. TRE CONNECTIONS TO TRE GROUND SUPPORT EQUIPMENT RACK UNIT #1

