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Gravity Probe B Relativity Mission

ISOLATION AND GROUNDING TEST PROCEDURE FOR THE GYROSCOPE SUSPENSION SYSTEM (GSS) POWER SUBSYSTEM

GP-B Procedure

P0936 Rev –

12 August 2002

Prepared by: Jay Dusenbury	Date
Approved by: William Bencze RE, Gyroscope Suspension System (GSS) Group	Date
Approved by: Dorrene Ross GP-B Quality Assurance	Date
Approved by: Systems Engineering	Date

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1 REVISION HISTORY

Rev Level	Comments/notes	Date	Revised By
-	First release of this test procedure	10 Oct 2002	Jay Dusenbury

2 SCOPE

This procedure is an assembly level electrical function test for the GSS Power Subsystem. This test is performed on an unmated (i.e “stand alone”) Forward Suspension Unit Box (FSU) and a Aft Control Unit (ACU) / Aft Power Unit (APU) pair. The ACU is physically mated to the APU and flight power cable 8A01472 (W501) is installed between J12 of the ACU and J11 of the APU.

Figure 1 shows the FSU and ACU / APU in configuration for testing

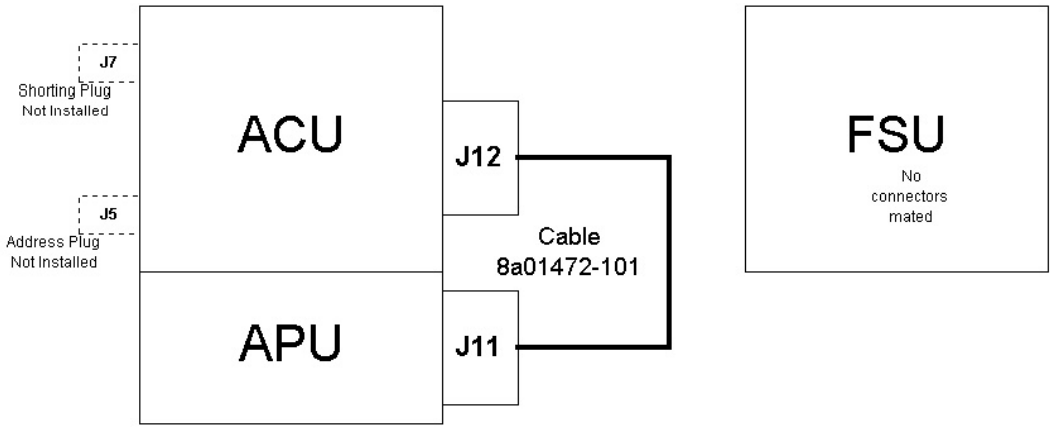

Figure 1 – Configuration of Devices Under Test

This procedure performs tests necessary to comply with the requirements stipulated in GSS PLSE-13 Part 1 Rev A as follows:

PLSE-13 Section	P0936 Section
3.5.7	13
3.5.10	14
3.5.11	15

3 REFERENCE DOCUMENTS

3.1 PWA Drawing, GSS Aft Suspension Unit Top Assy 26224-101.

3.2 PWA Drawing, GSS Fwd Suspension Unit Top Assy 26225-101.

3.3 PWA Drawing, GSS Aft Power Unit BE02598075

3.2 PWB Drawing, GSS Aft Backplane PWA 8A01901

3.3 Electrostatic Discharge Control Program for Protection of Electrical and Electronic Parts, Assemblies, and Equipment, MIL-STD-1686.

3.4 GSS Specification PLSE-13 Part 1 Rev A

3.5 GSS Interface Control Document (ICD) S0477

4 TEST FACILITIES

GSS Integrated Systems Lab, HEPL Room 181, Stanford University.

5 QA PROVISIONS

This procedure shall be conducted on a formal basis to its latest approved and released version. The QA Program Engineer (D. Ross) and the ONR representative (R. Gurr) shall be notified 24 hours prior to he start of this procedure. QA may monitor the execution of all or part of this procedure should they elect to do so.

Date/time:_____ Date/time:_____
GP-B QA (D. Ross) ONR (R. Gurr)

Upon completion of this procedure, the GSS manager and the GP-B QA manager shall certify her/his concurrence that the procedure was performed and accomplished in accordance with the prescribed instructions by signing and dating his approval at the end of this procedure.

6 TEST PERSONNEL

This test procedure is to be conducted only by the following personnel:

- Jay Dusenbury

7 GENERAL INSTRUCTIONS

7.1 Redlines can be initiated by the test personnel listed in section 6 and must be approved by QA.
7.2 Test operators shall read this procedure in its entirety and resolve any apparent ambiguities prior to beginning this test.
7.3 Any nonconformance or test anomaly will be documented in a Discrepancy Log, which will be attached to this report. Any significant problems will be listed in a Discrepancy Report. Refer to the Quality Plan, P0108. Do not alter or break test configuration if a test failure occurs; notify quality assurance.
7.4 Only the following persons have the authority to exit/terminate this test or perform a retest: Test operators listed in section 6 and GP-B QA.

8 HARDWARE SAFETY INSTRUCTIONS

8.1 This assembly is ESD sensitive; special care shall be exercised per the "Electrostatic Discharge Control Program for Protection of Electrical and Electronic Parts, Assemblies, and Equipment", MIL-STD-1686.

8.2 Ensure that power is removed from cable assemblies before connecting or disconnecting cable connectors.

8.3 Examine all mating connectors before attempting to mate them. Remove any foreign particles. Look for any damaged pins or sockets. Do not force the coupling action if excessive resistance is encountered. Ensure that key-ways are aligned when mating connectors.

9 ADDITIONAL TEST EQUIPMENT

The following support hardware, and test equipment will be used and the applicable information for the instruments shall be recorded below. Hand-written additions to this list may be made in the space provided.

Equipment Description	Qty	Make	Model	SN	Cal Due
Multimeter	1	Fluke			
Micro-Ohmmeter	1	Keithley	580	0624810	

10 DEVICES UNDER TEST (DUT)

Record the serial number of the Device Under Test, or DUT.

Aft Control Unit 26224-101	SN:
Aft Power Unit BE 02598075	SN
Fwd Control Unit 26225-101	SN

Test Operator:	Name:
Start of test:	Time/Date::

12 PRE-TEST VISUAL INSPECTION

All handling of these assemblies shall be performed using ESD control methods, as outlined in MIL-STD-1686. Do not remove units from storage container until unit is within the confines of an ESD certified station, test operators are wearing wrist straps and/or heel grounding straps, and any other necessary

Test Activity	✓	Notes
Remove FSU and ASU / APU mated pair from enclosures and bags		
Remove antistatic bags and place units on antistatic mat		
Verify that the FSU has no connectors installed		
Verify that the ASU / APU are physically mated and interconnect cable 8A01472-101 is installed as shown in Figure 1		

13 PRIMARY POWER ISOLATION TESTS

Verify that the APU primary power input and return leads shall be electrically isolated by a minimum of 1 megohm from the metallic case and from all signal, telemetry, command, and secondary power returns within the unit. Satisfactory completion of these tests demonstrates compliance with the requirement specified in GSS PLSE-13 Part 1 Rev A section 3.5.7.

- Set multimeter to “ohms” function.
- Use gold-tipped Pomona test probes for all measurements.
- Measure resistance between indicated connector reference designators or chassis (exterior metal surface) of appropriate unit
- After leads are in contact with the PWA, wait until meter reading at least exceeds stated requirement.
- Connector Designators Refer To APU Connectors **UNLESS OTHERWISE NOTED**

APU Node Pair	**Measurement**	**Requirement**	**P/F**
J1-2 to Chassis (+28 V Primary to Chassis)		≥ 1 megohm	
J1-9 to Chassis (+28 V Rtn Primary Chassis)		≥ 1 megohm	
J1-2 to J2-9 (+28 V Primary to HLD Return)		≥ 1 megohm	
J1-9 to J2-9(+28 V Rtn Primary to HLD Return)		≥ 1 megohm	
J1-2 to J21-1 (+28 V Primary to Digital Return)		≥ 1 megohm	
J1-9 to J21-1 (+28 V Rtn Primary to Digital Return)		≥ 1 megohm	
J1-2 to J21-4 (+28 V Primary to Suspension Power Return)		≥ 1 megohm	
J1-9 to J21-4 (+28 V Rtn Primary to Suspension Power Return)		≥ 1 megohm	
J1-2 to J21-13 (+28 V Primary to Heater Power Return)		≥ 1 megohm	
J1-9 to J21-13 (+28 V Rtn Primary to Heater Power Return)		≥ 1 megohm	
J1-2 to **ACU** J51-1 (+28 V Primary to AGND)		≥ 1 megohm	
J1-9 to **ACU** J51-1 (+28 V Rtn Primary to AGND)		≥ 1 megohm	
J1-2 to **ACU** J51-8 (+28 V Primary to Logic Ground)		≥ 1 megohm	
J1-9 to **ACU** J51-8 (+28 V Rtn Primary to Logic Ground)		≥ 1 megohm	

14 SECONDARY POWER GROUNDING REDUNDANCY TESTS

Verify that the APU secondary power is grounded to the unit chassis using appropriate grounding reference connectors where necessary. Satisfactory completion of these tests demonstrates compliance with the requirement specified in GSS PLSE-13 Part 1 Rev A section 3.5.10 when flight connectors at ACU J7 and FSU J47 are installed per ICD S0477 as shown below in flight configuration shown in figure 2 below:

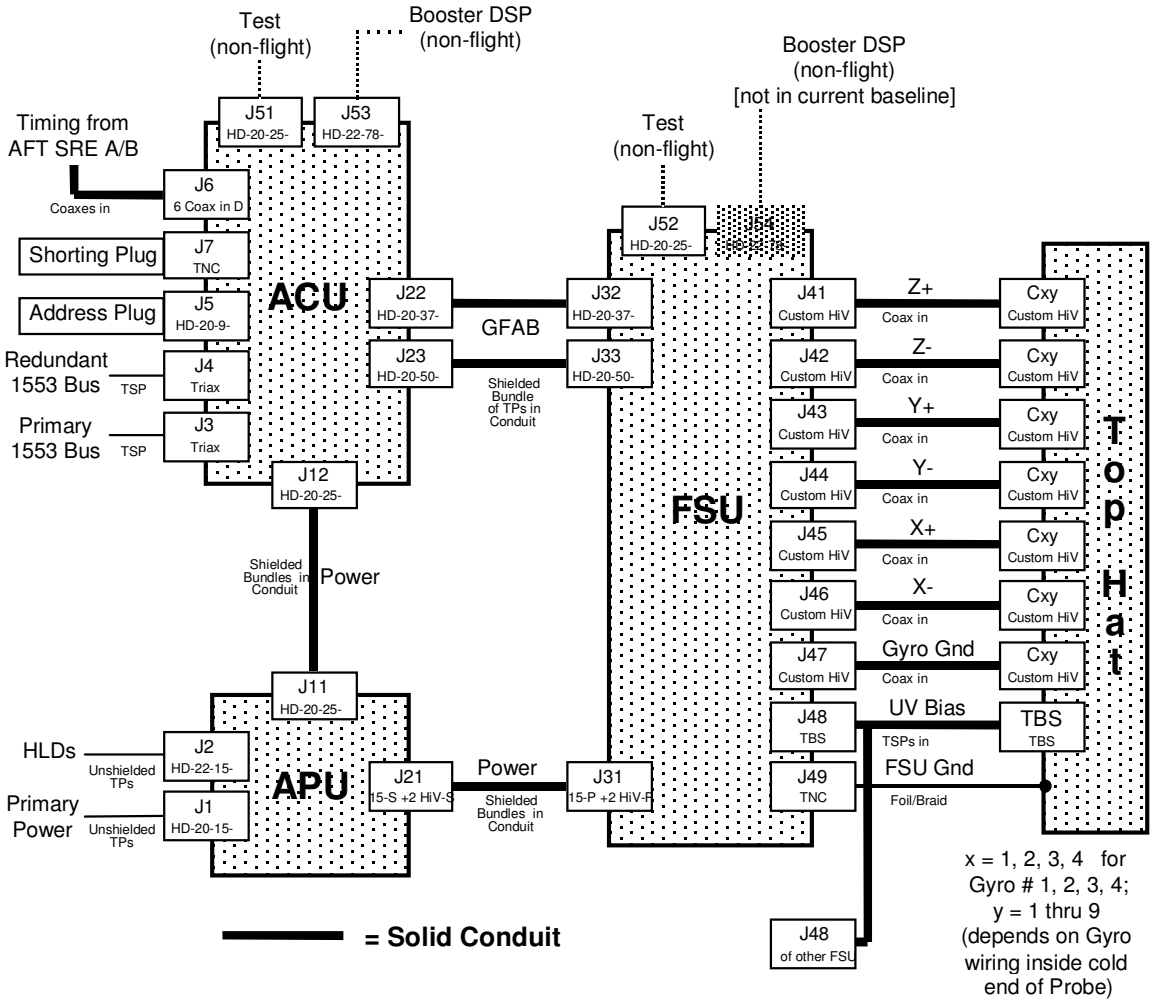

Figure 2 – Electrical Interconnect for Each GSS

14.1 Make the following measurements between designated node pairs on the APU/ACU mated units configured as shown in Figure 2. Record data in space provided and check if requirement is met.

- Use gold-tipped Pomona test probes for all measurements.
- Measure resistance between indicated connector reference designators or chassis (exterior metal surface of appropriate unit).

Node Pair	Measurement	Requirement	P/F
ACU J51-1 to J7 center (AGND to FSU Ground Reference)		< 10 ohms	
ACU J51-8 to J7 center (Logic Ground to FSU Ground Reference)		< 10 ohms	
ACU J7 backshell to chassis (Case Ground to chassis)		< 10 ohms	

14.2 Make the following measurements on the FSU box with no connectors or shorting plugs installed. Record data in space provided and check if requirement is met.

- Use gold-tipped Pomona test probes for all measurements.
- Measure resistance between indicated connector reference designators or chassis (exterior metal surface of appropriate unit)

Node Pair	**Measurement**	**Requirement**	**P/F**
FSU J31-1 to J47 center (Digital Power Return to FSU Single Point Ground)		< 10 ohms	
FSU J31-4 to J47 center (Suspension Power Return to FSU Single Point Ground)		< 10 ohms	

15 CABLE SHIELD TERMINATION TESTS

Verify that the shells of the connectors mounted on the APU are electrically bonded to the enclosure. Satisfactory completion of these tests demonstrates compliance with the requirement specified in GSS PLSE-13 Part 1 Rev A section 3.5.11

15.1 Make the following measurements between designated node pairs on the APU/ACU mated units configured as shown in Figure 2. Record data in space provided and check if requirement is met.

- Use gold-tipped Pomona test probes for all measurements.
- Measure resistance between indicated connector reference designators or chassis (exterior metal surface of appropriate unit)

Node Pair	Measurement	Requirement	P/F
APU J1 Connector Shell to chassis		<0.0025 ohm	
APU J2 Connector Shell to chassis		<0.0025 ohm	
APU J11 Connector Shell to chassis		<0.0025 ohm	
APU J21 Connector Shell to chassis		<0.0025 ohm	
ACU J3 Connector Shell to chassis		<0.0025 ohm	
ACU J4 Connector Shell to chassis		<0.0025 ohm	
ACU J5 Connector Shell to chassis		<0.0025 ohm	
ACU J6 Connector Shell to chassis		<0.0025 ohm	
ACU J7 Connector Shell to chassis		<0.0025 ohm	
ACU J12 Connector Shell to chassis		<0.0025 ohm	
ACU J22 Connector Shell to chassis		<0.0025 ohm	
ACU J23 Connector Shell to chassis		<0.0025 ohm	

16 COMPLETION OF PROCEDURE

Test Activity	✓	Notes
Return Assemblies to antistatic bags		
Place Assemblies in storage containers		

I certify that the this procedure was performed in whole and that the data recorded above is complete and accurate.

Test Engineer		Date	

This is to certify that the information obtained under this test procedure is as represented and the documentation is completed and correct.

GSS Representative		Date	
Quality Assurance		Date	