W. W. Hansen Experimental Physics Laboratory
STANFORD UNIVERSITY
STANFORD, CALIFORNIA 94305 - 4085

Gravity Probe B Relativity Mission

BOARD-LEVEL TEST PROCEDURE FOR THE GYROSCOPE SUSPENSION SYSTEM (GSS) FSU ARBITER (ARB) BOARD

PWA 8A01885 Rev A **S/N:**

GP-B Procedure
P0606 Rev –
September 04, 2001

Prepared by: William J. Bencze — Date
RE, Gyroscope Suspension System (GSS) Group

Approved by: William J. Bencze — Date
RE, Gyroscope Suspension System (GSS) Group

Approved by: Dorrene Ross — Date
GP-B Quality Assurance

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1.0 Revision History

Rev Level	Comments/notes	Date	Revised By
-	First release of this test procedure	18 Oct 1999	WJ Bencze

2.0 Scope:

This procedure details the tests required to perform board-level electrical functional tests on the GSS Arbiter (ARB) card. No mechanical or thermal stress testing shall be performed at this time.

3.0 Scope:

This procedure details the board-level electrical functional tests on the GSS Arbiter (ARB) card. No mechanical or thermal stress testing shall be performed at this time. The arbiter state machine function will be tested at the box level using the GSS testbed and

This test plan has been written to be run with the a GSS "gold system" backplane and test card (PC610/PC620) in an open-frame GSS chassis.

All data recorded during this test is recorded in this document; each test of a board will use its own copy of this procedure, and will be identified by serial number on the cover sheet.

4.0 Reference Documents

4.1. PWA Drawing, GSS Arbiter board, 8A01885.

4.2. PWB Drawing, GSS Arbiter board, 8A01878.

4.3. FSU Assembly drawing, 26225.

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

5.0 Test Facilities

HEPL Room 127, Stanford University

6.0 QA Provisions:

6.1. 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 (E. Ingraham) 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 (E. Ingraham)

6.2. 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.

7.0 Test Personnel

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

7.1. William Bencze

7.2. Lo Van Ho

8.0 General Instructions

8.1. Redlines can be initiated by the test personnel listed in Section 7.0 and must be approved by QA.

8.2. Test operators shall read this procedure in its entirety and resolve any apparent ambiguities prior to beginning this test.

8.3. Any nonconformance or test anomaly should be reported by a Discrepancy Report. Refer to the Quality Plan, P0108, for guidance. Do not alter or break test configuration if a test failure occurs; notify quality assurance.

8.4. Only the following persons have the authority to exit/terminate this test or perform a retest: Test operators listed in Section 7.0 and GP-B QA.

8.5. In this document, “Perform Flight S/W system test commands:” means to prepare the test system software as described in P0670 Board-Level Test Software Operational Procedure, and then issue the listed commands according to the procedure described in P0670.

9.0 Hardware Safety Requirements:

9.1. 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

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

9.3. 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.

10.0 Additional Test Equipment

The following support hardware, test equipment, or software will be used and the applicable information for the instruments shall be recorded below. Hand-written additions to this list shall be made in Section 16.0, below.

Equipment Description	Make	Model	SN	Cal Due
Digital Oscilloscope	Tektronix			
Multimeter	Fluke			
Power Supply, triple output	HP			
Power Supply, dual output	HP			
2 ea 10x scope probes with tip clip and ground clip	Tektronix			N/R
PC400 Gold system backplane	GSS	PC400		N/R
Open-frame FSU chassis	GSS	N/A		N/R
PC 610 test card	GSS	PC610		N/R
PC 620 test card	GSS	PC620		N/R

11.0 Device Under Test (DUT):

Record the serial number of the board under test (ie, Device Under Test,or DUT).

PWA 8A01885 GSS Arbiter	SN:	
Test Operator:	Name:	
Start of test:	Date:	

12.0 Pre-test visual inspection.

Note: All handling of this PWA shall be performed using ESD control methods, as outlined in MIL-STD-1686. Unit shall be inspected a an ESD certified station. Wrist straps and/or heel grounding straps shall be used. An ESD approved laboratory coat shall be worn when in close proximity to this PWA.

		✓	Notes
12.1.	Verify that no parts are missing, unless called out in the assembly drawing.		
12.2.	Verify that the following capacitors are installed in the proper orientation: C17, C32, C33, C34.		
12.3.	Verify that pin 1 of the resistor packs are installed adjacent to the silkscreened triangle on the PWB: RP1, RP2, RP3, RP4, RP5, RP6, RP7.		
12.4.	Verify the correct installation of jumper wires for JP3, JP4, JP5, JP6, JP7 as specified in the assy drawing.		
12.5.	Verify the proper orientation of pin 1 of all DIP packages: U1, U2, U3, U4, U5, U6, U8, U9, U10, U11, U12, U13, U14, U15, U16, U17, U18, U19. (Note, there is no U7, U18).		
12.6.	Verify that D1 has been installed with correct orientation		
12.7.	Verify that there is an aluminum wafer installed under U1, U2, U3 and that these devices are bonded to the PWB with an epoxy compound.		
12.8.	Verify the part number of U11 (PROM) matches the PN on the latest release of the assy drawing bill of materials for this card.		PROM 26222-101 Rev:

13.0 Pre-Insertion Static Electrical Tests:

Note: All handling of this PWA shall be performed using ESD control methods, as outlined in MIL-STD-1686. Unit shall be inspected a an ESD certified station. Wrist straps and/or heel grounding straps shall be used. An ESD approved laboratory coat shall be worn when in close proximity to this PWA.

13.1. Power circuit isolation check

Set meter to "ohms", record indicated resistance between the indicated pins. Note the polarity for meter hookup.

		✓	Notes
13.1.1.	(+) to CN1 pin 1 [P12A] ↔ (-) to CN1 pin 2 [AGND]		Pass: R > 5 kohm
13.1.2.	(+) to CN1 pin 4 [P5A] ↔ (-) to CN1 pin 2 [AGND]		Pass: R > 5 kohm
13.1.3.	(+) to CN1 pin 2 [AGND] ↔(-) to CN1 pin 3 [M12A]		Pass: R > 5 kohm

14.0 Board tests

14.1. System Configuration:

		✓	Notes
14.1.1.	Verify power to the forward gold system enclosure is turned off		
14.1.2.	Inspect all connector interfaces on DUT for cleanliness and pin straightness; correct and note any problems found.		
14.1.3.	Insert DUT into gold system backplane		
14.1.4.	Connect Ch1 of scope to PC610/TP7 (P5D), ground strap to PC610/TP8 (DGND). Set scope channel gain to 5 V/div horz.		
14.1.5.	Connect Ch2 of scope to PC610/JP41, pin 2 (center pin). Set scope channel gain to 5 V/div horz.		
14.1.6.	Timebase to 0.2 sec/div.		
14.1.7.	Set trigger to Ch2, level 2.5v, positive slope. Trigger mode: Normal		

14.2. Arbiter Threshold Test:

		✓	Notes
14.2.1.	Power on card		
14.2.2.	Set power supply connected to PC610 card to 0 volts. Monitor PS output with a calibrated DMM.		
14.2.3.	Raise the voltage on the power supply until ARB_LBU_TR LED lights on PC610 lights.		
14.2.4.	Voltage shall be +1.5 ± 0.2 V. Record level at right		
14.2.5.	Raise the voltage on the power supply until ARB_BWOD_TR LED lights on PC610 lights.		
14.2.6.	Voltage shall be +3.55 ± 0.2 V. Record level at right		
14.2.7.	Reverse polarity of voltage applied to bridge inputs.		
14.2.8.	Lower the voltage on the power supply until ARB_LBU_TR LED lights on PC610 lights.		
14.2.9.	Voltage shall be -1.5 ± 0.2 V. Record level at right		
14.2.10.	Lower the voltage on the power supply until ARB_BWOD_TR LED lights on PC610 lights.		
14.2.11.	Voltage shall be -3.55 ± 0.2 V. Record level at right		

14.3. Power-on reset verification.

		✓	Notes
14.3.1.	Turn off power to FSU; wait at least 10 seconds.		
14.3.2.	Reapply FSU power; the scope should trigger on Ch2.		
14.3.3.	Measure the time between 90% rise on Ch1 and the trigger point (~0V to ~5v transition on Ch2). Record time at the right. Verify the time is between 400 and 600 msec.		

14.4. Arbiter Transition Testing

Arbiter function and transition testing shall be tested at the box level with the GSS testbed.

15.0 Completion of Procedure:

	✓	Notes
15.1. Turn off power to DUT..		
15.2. Remove DUT and return to packaging.		

The results obtained in the performance of this test procedure are acceptable.

Test Engineer		Date	
GSS Representative		Date	

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

Quality Assurance		Date	

16.0 Additional Equipment Addendum

List additional test equipment, as required (Addendum to Section 3.0)

Equipment Description	Make	Model	SN	Cal Due