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Gravity Probe B Relativity Mission

BOARD-LEVEL TEST PROCEDURE FOR THE GYROSCOPE SUSPENSION SYSTEM (GSS) A/D and D/A (ADDA) BOARD

PWA 8A01886 Rev I   **S/N:**

GP-B Procedure
P0604 Rev -

Prepared by: Scott Smader   Date

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

Approved by: Dorrene Ross   Date
GP-B Quality Assurance

Table of Contents:

1.0 Revision History

Rev Level	Comments/notes	Date	Revised By
-	First release of this test procedure	1 Oct 00	S. Smader

2.0 Scope:

This procedure details the board-level electrical functional tests on the GSS A/D and D/A (ADDA) card. No mechanical or thermal stress testing shall be performed at this time.

This test plan has been written to be run with the GSS "Gold System" test fixture – an electrically and interface equivalent of the GSS flight units. In General, the Device Under Test (DUT) shall be inserted into the Gold System in place of the equivalent Gold System card, any additional electrical connections to the Gold System shall be made, and a set of software-based and possibly manual tests will be run on the board. Upon successful completion of this procedure, this board is considered electrically functional.

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.

3.0 Reference Documents

3.1.   GSS Gold System Hardware and Software Configuration Standard, P0663

3.2.   PWA Drawing, GSS A/D and D/A board, 8A01886

3.3.   PWB Drawing, GSS A/D and D/A board, 8A01870

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

4.0 Test Facilities

HEPL Room 127, Stanford University

5.0 QA Provisions:

5.1.   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)

5.2.   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.

6.0 Test Personnel

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

6.1.   William Bencze

6.2.   Lo Van Ho

7.0 General Instructions

7.1.   Redlines can be initiated by the test personnel listed in Section 6.0 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 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.

7.4.   Only the following persons have the authority to exit/terminate this test or perform a retest: Test operators listed in Section 6.0 and GP-B QA.

7.5.   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.

8.0 Hardware Safety Requirements:

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.

9.0 Equipment Pretest Requirements:

9.1.   The GSS Gold System in which this board is to be tested must have passed successfully the P0663 – Gold System Certification Procedure prior to the start of this test. Record the Gold System serial number and date of its certification, below

GSS Gold System SN:	
Date of Certification	
Configuration (circle one)	Full Partial

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 may be made in the space provided.

Equipment Description	Make	Model	SN	Cal Due
1. Multimeter	Fluke			
2. Dynamic Signal Analyzer with attached plotter	HP	3562A	3005A05537	
3. SMA-to-BNC patch cable	Stanford	NA	NA	NA
4. BNC-to-Pomona mini-clip test cable	Stanford	NA	NA	NA
5. Signal Generator	SRS			
6. Digital Oscilloscope	Tek			
7. 10x Scope probes	Tek	NA	NA	NA

11.0   Device Under Test (DUT):

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

PWA 8A01886GSS ADDA Card 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 at an ESD certified station. Wrist straps and/or heel grounding straps or conductive shoes shall be used.

Test/Activity	P/F	Notes
12.1. Remove PWA from storage container.		
12.2. Verify that no parts are missing, unless called out in the assembly drawing.		
12.3. Verify that the following capacitors are installed in the proper orientation: C7, C8, C9, C17, C18, C19, C27, C28, C29, C37, C38, C40, C92, C93, C95, C96, C107, C113, C116		
12.4. Verify the correct installation of the jumper wires as specified in the assembly drawing: pads 1-2 of JP1-22, JP24. [PWA note 25]		
12.5. Verify the proper orientation of pin 1 of all DIP packages: U1-14, U16-42. For U43, see note 31.		
12.6. Verify that the stiffener is installed.		

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 at an ESD certified station. Wrist straps and/or heel grounding straps or conductive shoes shall be used.

13.1.   Power circuits isolation check

A. Set meter to "ohms", record indicated resistance between the indicated circuit points.

B. Note orientation of (+) and (-) leads on meter.

C. Use gold-tipped Pomona test probes for all measurements.

D. After leads are in contact with the PWA, wait 30 seconds for meter reading to stabilize before recording measurement.

DUT passes this section if all measurements are high impedance, > 10 kohms.

	P/F	Notes
13.1.1. (+) CN3 pin 1 [P12A] ↔ (-) CN3 pin 2 [AGND]		Value
13.1.2. (+) CN3 pin 1 [P12A] ↔ (-) CN3 pin 3 [M12A]		Value
13.1.3. (+) CN3 pin 1 [P12A] ↔ (-) CN3 pin 4 [P5A]		Value
13.1.4. (+) CN3 pin 1 [P12A] ↔ (-) CN3 pin 16 [CGND]		Value
13.1.5. (+) CN3 pin 1 [P12A] ↔ (-) CN3 pin 28 [P5D]		Value
13.1.6. (+) CN3 pin 1 [P12A] ↔ (-) CN3 pin 41 [DGND]		Value
13.1.7. (+) CN3 pin 2 [AGND] ↔ (-) CN3 pin 3 [M12A]		Value
13.1.8. (-) CN3 pin 2 [AGND] ↔ (+) CN3 pin 4 [P5A]		Value
13.1.9. (+) CN3 pin 2 [AGND] ↔ (-) CN3 pin 16 [CGND]		Value
13.1.10. (-) CN3 pin 2 [AGND] ↔ (+) CN3 pin 28 [P5D]		Value
13.1.11. (+) CN3 pin 2 [AGND] ↔ (-) CN3 pin 41 [DGND]		Value
13.1.12. (-) CN3 pin 3 [M12A] ↔ (+) CN3 pin 4 [P5A]		Value
13.1.13. (-) CN3 pin 3 [M12A] ↔ (+) CN3 pin 16 [CGND]		Value
13.1.14. (-) CN3 pin 3 [M12A] ↔ (+) CN3 pin 28 [P5D]		Value
13.1.15. (-) CN3 pin 3 [M12A] ↔ (+) CN3 pin 41 [DGND]		Value
13.1.16. (+) CN3 pin 4 [P5A] ↔ (-) CN3 pin 16 [CGND]		Value
13.1.17. (+) CN3 pin 4 [P5A] ↔ (-) CN3 pin 28 [P5D]		Value
13.1.18. (+) CN3 pin 4 [P5A] ↔ (-) CN3 pin 41 [DGND]		Value
13.1.19. (-) CN3 pin 16 [CGND] ↔ (+) CN3 pin 28 [P5D]		Value

13.1.20. (+) CN3 pin 16 [CGND] ↔ (-)CN3 pin 41 [DGND]		Value
13.1.21. (+) CN3 pin 28 [P5D] ↔ (-)CN3 pin 41 [DGND]		Value

14.0   In-System Testing – Flight Configuration

Note: Tests run in this section are run with the hardware in "flight" configuration: no external test equipment or cables. The tests here use only the onboard diagnostic facilities of the GSS hardware. These will be the equivalent of the on-orbit tests of this system.

This section not applicable

15.0 In-System Testing – Ground Test Configuration

Note: *Tests run in this section require the addition of test cables and external test hardware. They are used to verify the board functioning of the board in fine detail, and are only used at the time of board-level test and acceptance. These may be considered "Engineering Confidence Tests".*

15.1. Gold System Configuration with Open Frame Enclosure

This test requires probing the PWA while it is inserted in the FSU open-frame enclosure. Note that the FSU enclosure does not affect the FSU system in any electrical way. Furthermore, the open-frame enclosure and the dip-braised enclosure are otherwise equivalent for the purposes of this test.

	P/F	Notes
15.1.1. Install PWA in open-frame gold system per the instructions in P0663 – Gold System certification procedure. Note that the DUT is the only circuit card in the enclosure at this time other than the FBP, the FRM simulator, and the two test cards that connect to the component side of the FBP.		
15.1.2. Cable system for "Configuration A" per P0663 – Gold System certification procedure (PC-EBI), except that only the power cable and the test cards are to be connected at this time.		

15.2.   Power Supplies Test:

Turn on the power to the FSU.

With the negative lead connected to TP 16 (GND), measure the following voltages:

Test/Activity		Min	Max	Measured	P/F
15.2.1.	Attach positive lead to TP13. Record voltage. (ADCREF)	2.4	2.6		
15.2.2.	Attach positive lead to TP14. Record voltage. (12V)	11.4	12.6		
15.2.3.	Attach positive lead to TP15. Record voltage. (-12V)	-12.6	-11.4		
15.2.4.	Attach positive lead to TP17. Record voltage. (5VA)	4.75	5.25		
15.2.5.	Attach positive lead to TP18. Record voltage. (5VD)	4.75	5.25		

If all voltages are within listed ranges, the card passes this section.

15.3. Signal Analyzer Setup:

The tests in sections 15.4 through 15.7 utilize a common setup for the signal analyzer.

Test/Activity	Notes	P/F
15.3.1. CAL: AUTO=OFF		
15.3.2. MEAS MODE: SWEPT SINE		
15.3.3. MEAS MODE: LOG FREQ		
15.3.4. FREQ: START=10 Hz		
15.3.5. FREQ: SPAN=3 DECADES		
15.3.6. SOURCE: LEVEL=0.1V		
15.3.7. SEL MEAS: FREQ RESPONSE		
15.3.8. INPUT COUPLE: CH1=DC		
15.3.9. INPUT COUPLE: CH2=DC		
15.3.10. MEAS DISP: FREQ RESP		
15.3.11. Connect the SOURCE and CHANNEL1 BNCs on the signal analyzer front panel with a short patch cable		
15.3.12. Tee-in BNC-to-SMA patch cable to the SOURCE.		
15.3.13. Connect a BNC-to-clip cable to CHANNEL2		

15.4. XPOS A/D filters

15.4.1. XPOS A/D Analyzer Setup

15.4.1.1.	Connect analyzer SOURCE to X_POS on PC610 test card.		
15.4.1.2.	Connect CHANNEL 2, negative clip (black) to TP16 GND on DUT		
15.4.1.3.	Connect CHANNEL 2, positive (red) clip to TP1 XPOS on DUT.		

15.4.2. XPOS A/D Science Mode filter

Test/Activity		Notes	P/F
15.4.2.1.	On PC610, connect JP34 pin 2 (MODE 1) to JP34 pin 3 (GND).		
15.4.2.2.	On PC610, connect JP31 pin 2 (MODE 0) to JP31 pin 3 (GND).		
15.4.2.3.	Run a transfer function measurement using the HP dynamic signal analyzer. (This operation will take a few minutes.)		
15.4.2.4.	Plot the transfer function on a bed plotter. Date and initial plot, label it: "X POS A/D Science," and attach it to this procedure.		
15.4.2.5.	Measure and record the cutoff (-3dB) frequency. If the cutoff frequency is 100 hz +/- 10%, record 'Pass', else record 'Fail'.		

15.4.3.   XPOS A/D Spinup Mode filter

Test/Activity		Notes	P/F
15.4.3.1.	On PC610, connect JP34 pin 2 (MODE 1) to JP34 pin 1 (P5D).		
15.4.3.2.	On PC610, connect JP31 pin 2 (MODE 0) to JP31 pin 3 (GND).		
15.4.3.3.	Run a transfer function measurement using the HP dynamic signal analyzer. (This operation will take a few minutes.)		
15.4.3.4.	Plot the transfer function on a bed plotter. Date and initial plot, label it: "X POS A/D Spinup," and attach it to this procedure.		
15.4.3.5.	Measure and record the cutoff (-3dB) frequency. If the cutoff frequency is 310 hz +/- 10%, record 'Pass', else record 'Fail'.		

15.4.4.   XPOS A/D Ground Test Mode filter

Test/Activity		Notes/Record	P/F
15.4.4.1.	On PC610, connect JP34 pin 2 (MODE 1) to JP34 pin 1 (P5D).		
15.4.4.2.	On PC610, connect JP31 pin 2 (MODE 0) to JP31 pin 1 (P5D).		
15.4.4.3.	Run a transfer function measurement using the HP dynamic signal analyzer. (This operation will take a few minutes.)		
15.4.4.4.	Plot the transfer function on a bed plotter. Date and initial plot, label it: "X POS A/D Ground Test," and attach it to this procedure.		
15.4.4.5.	Measure and record the cutoff (-3dB) frequency. If the cutoff frequency is 1150 hz +/- 10%, record 'Pass', else record 'Fail'.		

15.5. YPOS A/D filters

15.5.1. YPOS A/D Analyzer Setup

15.5.1.1.	Connect analyzer SOURCE to Y_POS on PC610 test card.		
15.5.1.2.	Connect CHANNEL 2, negative clip (black) to TP16 GND on DUT		
15.5.1.3.	Connect CHANNEL 2, positive (red) clip to TP2 YPOS on DUT.		

15.5.2. YPOS A/D Science Mode filter

Test/Activity		Notes	P/F
15.5.2.1.	On PC610, connect JP34 pin 2 (MODE 1) to JP34 pin 3 (GND).		
15.5.2.2.	On PC610, connect JP31 pin 2 (MODE 0) to JP31 pin 3 (GND).		
15.5.2.3.	Run a transfer function measurement using the HP dynamic signal analyzer. (This operation will take a few minutes.)		
15.5.2.4.	Plot the transfer function on a bed plotter. Date and initial plot, label it: "Y POS A/D Science," and attach it to this procedure.		
15.5.2.5.	Measure and record the cutoff (-3dB) frequency. If the cutoff frequency is 100 hz +/- 10%, record 'Pass', else record 'Fail'.		

15.5.3.   YPOS A/D Spinup Mode filter

Test/Activity	Notes	P/F
15.5.3.1. On PC610, connect JP34 pin 2 (MODE 1) to JP34 pin 1 (P5D).		
15.5.3.2. On PC610, connect JP31 pin 2 (MODE 0) to JP31 pin 3 (GND).		
15.5.3.3. Run a transfer function measurement using the HP dynamic signal analyzer. (This operation will take a few minutes.)		
15.5.3.4. Plot the transfer function on a bed plotter. Date and initial plot, label it: "Y POS A/D Spinup," and attach it to this procedure.		
15.5.3.5. Measure and record the cutoff (-3dB) frequency. If the cutoff frequency is 310 hz +/- 10%, record 'Pass', else record 'Fail'.		

15.5.4.   YPOS A/D Ground Test Mode filter

Test/Activity	Notes	P/F
15.5.4.1. On PC610, connect JP34 pin 2 (MODE 1) to JP34 pin 1 (P5D).		
15.5.4.2. On PC610, connect JP31 pin 2 (MODE 0) to JP31 pin 1 (P5D).		
15.5.4.3. Run a transfer function measurement using the HP dynamic signal analyzer. (This operation will take a few minutes.)		
15.5.4.4. Plot the transfer function on a bed plotter. Date and initial plot, label it: "Y POS A/D Ground Test," and attach it to this procedure.		
15.5.4.5. Measure and record the cutoff (-3dB) frequency. If the cutoff frequency is 1150 hz +/- 10%, record 'Pass', else record 'Fail'.		

15.6. ZPOS A/D filters

15.6.1. ZPOS A/D Analyzer Setup

15.6.1.1.	Connect analyzer SOURCE to Z_POS on PC610 test card.		
15.6.1.2.	Connect CHANNEL 2, negative clip (black) to TP16 GND on DUT		
15.6.1.3.	Connect CHANNEL 2, positive (red) clip to TP3 ZPOS on DUT.		

15.6.2. ZPOS A/D Science Mode filter

Test/Activity		Notes	P/F
15.6.2.1.	On PC610, connect JP34 pin 2 (MODE 1) to JP34 pin 3 (GND).		
15.6.2.2.	On PC610, connect JP31 pin 2 (MODE 0) to JP31 pin 3 (GND).		
15.6.2.3.	Run a transfer function measurement using the HP dynamic signal analyzer. (This operation will take a few minutes.)		
15.6.2.4.	Plot the transfer function on a bed plotter. Date and initial plot, label it: "Z POS A/D Science," and attach it to this procedure.		
15.6.2.5.	Measure and record the cutoff (-3dB) frequency. If the cutoff frequency is 100 hz +/- 10%, record 'Pass', else record 'Fail'.		

15.6.3.   ZPOS A/D Spinup Mode filter

Test/Activity	Notes	P/F
15.6.3.1. On PC610, connect JP34 pin 2 (MODE 1) to JP34 pin 1 (P5D).		
15.6.3.2. On PC610, connect JP31 pin 2 (MODE 0) to JP31 pin 3 (GND).		
15.6.3.3. Run a transfer function measurement using the HP dynamic signal analyzer. (This operation will take a few minutes.)		
15.6.3.4. Plot the transfer function on a bed plotter. Date and initial plot, label it: "Z POS A/D Spinup," and attach it to this procedure.		
15.6.3.5. Measure and record the cutoff (-3dB) frequency. If the cutoff frequency is 310 hz +/- 10%, record 'Pass', else record 'Fail'.		

15.6.4.   ZPOS A/D Ground Test Mode filter

Test/Activity	Notes	P/F
15.6.4.1. On PC610, connect JP34 pin 2 (MODE 1) to JP34 pin 1 (P5D).		
15.6.4.2. On PC610, connect JP31 pin 2 (MODE 0) to JP31 pin 1 (P5D).		
15.6.4.3. Run a transfer function measurement using the HP dynamic signal analyzer. (This operation will take a few minutes.)		
15.6.4.4. Plot the transfer function on a bed plotter. Date and initial plot, label it: "Z POS A/D Ground Test," and attach it to this procedure.		
15.6.4.5. Measure and record the cutoff (-3dB) frequency. If the cutoff frequency is 1150 hz +/- 10%, record 'Pass', else record 'Fail'.		

15.7.   MUXMON A/D filters

15.7.1.   MUXMON A/D Analyzer Setup

15.7.1.1.	Connect analyzer SOURCE to MUXMON on PC620 test card.	
15.7.1.2.	Connect CHANNEL 2, negative clip (black) to TP16 GND on DUT	
15.7.1.3.	Connect CHANNEL 2, positive (red) clip to TP4 VMON on DUT.	

15.7.2.   MUXMON A/D Science Mode filter

Test/Activity	Notes	P/F
15.7.2.1. On PC610, connect JP34 pin 2 (MODE 1) to JP34 pin 3 (GND).		
15.7.2.2. On PC610, connect JP31 pin 2 (MODE 0) to JP31 pin 3 (GND).		
15.7.2.3. Run a transfer function measurement using the HP dynamic signal analyzer. (This operation will take a few minutes.)		
15.7.2.4. Plot the transfer function on a bed plotter. Date and initial plot, label it: "MUX MON A/D Science," and attach it to this procedure.		
15.7.2.5. Measure and record the cutoff (-3dB) frequency. If the cutoff frequency is 100 hz +/- 10%, record 'Pass', else record 'Fail'.		

15.7.3.   MUXMON A/D Spinup Mode filter

Test/Activity	Notes	P/F
15.7.3.1. On PC610, connect JP34 pin 2 (MODE 1) to JP34 pin 1 (P5D).		
15.7.3.2. On PC610, connect JP31 pin 2 (MODE 0) to JP31 pin 3 (GND).		
15.7.3.3. Run a transfer function measurement using the HP dynamic signal analyzer. (This operation will take a few minutes.)		
15.7.3.4. Plot the transfer function on a bed plotter. Date and initial plot, label it: "MUX MON A/D Spinup," and attach it to this procedure.		
15.7.3.5. Measure and record the cutoff (-3dB) frequency. If the cutoff frequency is 310 hz +/- 10%, record 'Pass', else record 'Fail'.		

15.7.4.   MUXMON A/D Ground Test Mode filter

Test/Activity	Notes	P/F
15.7.4.1. On PC610, connect JP34 pin 2 (MODE 1) to JP34 pin 1 (P5D).		
15.7.4.2. On PC610, connect JP31 pin 2 (MODE 0) to JP31 pin 1 (P5D).		
15.7.4.3. Run a transfer function measurement using the HP dynamic signal analyzer. (This operation will take a few minutes.)		
15.7.4.4. Plot the transfer function on a bed plotter. Date and initial plot, label it: "MUX MON A/D Ground Test," and attach it to this procedure.		
15.7.4.5. Measure and record the cutoff (-3dB) frequency. If the cutoff frequency is 1150 hz +/- 10%, record 'Pass', else record 'Fail'.		

15.8.   Interrupt Strobes Detection Register test

	Notes	P/F
15.8.1. Perform Flight S/W system test commands: 16 100 16 2 257 20 16 2 256 7 16 1 0x020E If the value of "PIT 3-diag. Monitors", "Monitor 3:" is 0x0003, record 'Pass' for this test. Otherwise record 'Fail'.		

15.9.   D/A filters tests

15.9.1.   Board installation:

	Notes	P/F
15.9.1.1. Install PWA in gold system enclosure per the instructions in P0663 – Gold System certification procedure		
15.9.1.2. Cable system for "Configuration B" per P0663 – Gold System certification procedure (RAD6000)	Test Cards 1 and 2 (PC610 and PC620) must be installed.	
15.9.1.3. Perform Flight S/W system test commands: 16 2 0x200 0 16 2 0x202 0 16 2 0x204 0 16 2 0x206 0 16 2 0x208 0 16 2 0x20A 0	If 15.8.1 Flight S/W commands have not been performed, perform them before this step.	

15.9.2. Test equipment setup

15.9.2.1.	Use oscilloscope probe for Ch1. Use BNC-to-SMA cable for Ch2.		
15.9.2.2.	Set digital oscilloscope Ch1 and Ch2 vertical gains to 5 V/div.		
15.9.2.3.	Set display to allow Ch2 waveform to traverse −10 volts to +10 volts.		
15.9.2.4.	Set Timebase to 20 microseconds/div.		
15.9.2.5.	Set trigger source to Ch1.		
15.9.2.6.	Set trigger level to 2.5 volts.		
15.9.2.7.	Set trigger slope to positive.		
15.9.2.8.	Set trigger mode to normal.		
15.9.2.9.	If cursors are on, turn them off.		
15.9.2.10.	Set scope to MEASURE Ch2 Rise Time.		
15.9.2.11.	Set Display mode to normal. Set Display style to vectors.		
15.9.2.12.	On the "Acquire Menu", select "Stop After Single Seq". Set Acquisition Mode to Sample.		
15.9.2.13.	Connect Ch1 ground to PC610 TP6.		
15.9.2.14.	Connect Ch1 signal to PC610 JP16 pin 5.		

15.9.3. DA_X1 filter

	Allowed Min	Allowed Max	Measured	P/F
15.9.3.1. Connect Ch2 to PC620 J9 (DA_X1).	N/A	N/A		
15.9.3.2. Press RUN/STOP. Measure Ch2 voltage.	-10.2 v	-9.8 v		
15.9.3.3. Perform Flight S/W system test commands: 16 2 256 0 16 2 0x0200 0xffff	N/A	N/A		
15.9.3.4. Press RUN/STOP button. (Oscilloscope will display "Trig?" to indicate that DAC strobe is not running.)	N/A	N/A		
15.9.3.5. Perform Flight S/W system test commands: 16 2 256 7 (Oscilloscope will trigger and display Ch2 waveform.)	N/A	N/A		
15.9.3.6. Record the measured Ch2 Rise Time.	90 us	120 us		
15.9.3.7. Measure Ch2 voltage at end of waveform.	+9.8 v	+10.2 v		

15.9.4. DA_X2 filter

	Allowed Min	Allowed Max	Measured	P/F
15.9.4.1. Connect Ch2 to PC620 J10 (DA_X2).	N/A	N/A		
15.9.4.2. Press RUN/STOP. Measure Ch2 voltage.	-10.2 v	-9.8 v		
15.9.4.3. Perform Flight S/W system test commands: 16 2 256 0 16 2 0x0202 0xffff	N/A	N/A		
15.9.4.4. Press RUN/STOP button. (Oscilloscope will display "Trig?" to indicate that DAC strobe is not running.)	N/A	N/A		
15.9.4.5. Perform Flight S/W system test commands: 16 2 256 7 (Oscilloscope will trigger and display Ch2 waveform.)	N/A	N/A		
15.9.4.6. Record the measured Ch2 Rise Time.	90 us	120 us		
15.9.4.7. Measure Ch2 voltage at end of waveform.	+9.8 v	+10.2 v		

15.9.5. DA_Y1 filter

	Allowed Min	Allowed Max	Measured	P/F
15.9.5.1. Connect Ch2 to PC620 J11 (DA_Y1).	N/A	N/A		
15.9.5.2. Press RUN/STOP. Measure Ch2 voltage.	-10.2 v	-9.8 v		
15.9.5.3. Perform Flight S/W system test commands: 16 2 256 0 16 2 0x0204 0xffff	N/A	N/A		
15.9.5.4. Press RUN/STOP button. (Oscilloscope will display "Trig?" to indicate that DAC strobe is not running.)	N/A	N/A		
15.9.5.5. Perform Flight S/W system test commands: 16 2 256 7 (Oscilloscope will trigger and display Ch2 waveform.)	N/A	N/A		
15.9.5.6. Record the measured Ch2 Rise Time.	90 us	120 us		
15.9.5.7. Measure Ch2 voltage at end of waveform.	+9.8 v	+10.2 v		

15.9.6. DA_Y2 filter

	Allowed Min	Allowed Max	Measured	P/F
15.9.6.1. Connect Ch2 to PC620 J12 (DA_Y2).	N/A	N/A		
15.9.6.2. Press RUN/STOP. Measure Ch2 voltage.	-10.2 volts	-9.8 volts		
15.9.6.3. Perform Flight S/W system test commands: 16 2 256 0 16 2 0x0206 0xffff	N/A	N/A		
15.9.6.4. Press RUN/STOP button. (Oscilloscope will display "Trig?" to indicate that DAC strobe is not running.)	N/A	N/A		
15.9.6.5. Perform Flight S/W system test commands: 16 2 256 7 (Oscilloscope will trigger and display Ch2 waveform.)	N/A	N/A		
15.9.6.6. Record the measured Ch2 Rise Time.	90 us	120 us		
15.9.6.7. Measure Ch2 voltage at end of waveform.	+9.8 volts	+10.2 volts		

15.9.7.   DA_Z1 filter

	Allowed Min	Allowed Max	Measured	P/F
15.9.7.1. Connect Ch2 to J13 (DA_Z1).	N/A	N/A		
15.9.7.2. Press RUN/STOP. Measure Ch2 voltage.	-10.2 v	-9.8 v		
15.9.7.3. Perform Flight S/W system test commands: 16 2 256 0 16 2 0x0208 0xffff	N/A	N/A		
15.9.7.4. Press RUN/STOP button. (Oscilloscope will display "Trig?" to indicate that DAC strobe is not running.)	N/A	N/A		
15.9.7.5. Perform Flight S/W system test commands: 16 2 256 7 (Oscilloscope will trigger and display Ch2 waveform.)	N/A	N/A		
15.9.7.6. Record the measured Ch2 Rise Time.	90 us	120 us		
15.9.7.7. Measure Ch2 voltage at end of waveform.	+9.8 v	+10.2 v		

15.9.8.   DA_Z2 filter

	Allowed Min	Allowed Max	Measured	P/F
15.9.8.1. Connect Ch2 to J14 (DA_Z2).	N/A	N/A		
15.9.8.2. Press RUN/STOP. Measure Ch2 voltage.	-10.2 v	-9.8 v		
15.9.8.3. Perform Flight S/W system test commands: 16 2 256 0 16 2 0x020A 0xffff	N/A	N/A		
15.9.8.4. Press RUN/STOP button. (Oscilloscope will display "Trig?" to indicate that DAC strobe is not running.)	N/A	N/A		
15.9.8.5. Perform Flight S/W system test commands: 16 2 256 7 (Oscilloscope will trigger and display Ch2 waveform.)	N/A	N/A		
15.9.8.6. Record the measured Ch2 Rise Time.	90 us	120 us		
15.9.8.7. Measure Ch2 voltage at end of waveform.	+9.8 v	+10.2 v		

16.0   Completion of procedure:

P/F	Test/Activity	Notes
	16.1. Turn off power to FSU and ACU enclosures.	
	16.2. Remove PWA from enclosure per P0663 and return to storage container	

I certify that 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 ☐