

PFR-183 Title: F3 AXB V6 DC Functional Test Anomaly

Assembly : EFI		SubAssembly : AXB		
Component : Sensor Grounding Door		Units Affected:	Units fixed:	
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Failure Occurred During (Check one $$) \Box Functional test \Box Qualification test X S/C Integration \Box Launch operations \Box Other (Flight Assy)				
Environment when failure occurred:				
X Ambient	\Box Vibration	I	□ Shock	
Thermal	Vacuum	I	Thermal-Vacuum	□ EMI/EMC
Problem Description				

During an Instrument CPT on P3, it was found that the lower AXB (V6) EFI channel responded anomalously during the EFI Functional Test: in comparison to previous functional test results, and the response of the upper AXB (V5) EFI during the same tests, the response to the DC Functional excitation was of higher amplitude and noisier, and the response to the AC Functional excitation was severely highpass filtered.

Analyses Performed to Determine Cause

P3 was rolled over, and the sensor and sensor grounding doors of the lower AXB were visually and manually inspected to determine if there were any obvious mechanical causes for the anomalous electrical behavior; none were found.

When the probe was returned to its upright position, the channel in question responded intermitantly to several EFI Functional Tests run in succession over the course of a single day – in some cases performing in-spec and in-family, in others, showing the same or similar anomalous response to the excitation provided by the Functional test.

Limited isolation and continuity tests of the ACTEST, BIAS, and AGND lines to the upper and lower AXBs were performed through the EFI harness, and the boom unit connector; these tests indicated some sort of intermittent open between the ACTEST line and the AXB sensor on V6. A complete isolation and continuity check of all pins into the upper and lower AXBs confirmed this finding.

Isolation and continuity from the BIAS, ACTEST, and AGND lines to the lower AXB sensor were tested using a SoftTouch DMM probe to make contact with the DAG-coated sensor surface. These tests demonstrated that the BIAS line was intact, and that the anomaly arose due to an intermitant open in the ACTEST line, or the sensor grounding door that connects it to the AXB sensor surface. The electricallyopen condition could be reliably induced and removed by light lateral pressure on the AXB sensor. An EFI functional test with the ACTEST line forced into contact was performed, and the unit performed nominally (in spec and in family), demonstrating that the anomaly arose not with the preamp or sensor, but with the grounding and internal test circuitry; in other words, the channel still was functioning properly, but the test circuit was not.

A visual and manual inspection of the sensor and door mechanisms found that the sensor stacer was still properly stowed, and the door mechanism was still holding the sensor with the same forces as on other available Flight and Flight Spare units, indicating that whatever electromechanical issue was at hand in the ACTEST line would not affect the deployability of the AXB.

It was determined that a more detailed diagnosis and repair of the affected ACTEST line would require removal of the lower AXB from the axial boom tube, which would be difficult and problematic at best at this stage of spacecraft integration (risk of damage to composite tube and fasteners; lack of access due to already integrated RCS components; etc.).



Corrective Action/ Resolution

Based on the findings that the actual functionality of the lower AXB unit was not affected by the mechanical issue with the sensor grounding door, as well as the finding that the sensor remained grounded through the other of the two doors present on the unit, it was felt that the risk associated with attempting further diagnosis and repair of the non-critical ACTEST line mechanism outweighed the potential loss of information on the state-of-health of the lower AXB on-orbit. The unit will FLY AS IS.

Because of the nature of the anomaly, the unit still provided a partial indication of sensor and preamp state of health (through the anomalous, but consistant DC Functional response), and so there will still be sufficient information available on state of health to make probe assignment decisions on orbit.

A piece of red-tag MGSE that provides sufficient lateral force on the AXB sensor to force the ACTEST line into proper contact will be fabricated and used during environmental testing at JPL in order to prevent the anomalous response from occurring during post-VIBE and TVAC testing. Required work has been completed as of 9/25/06.

Acceptance:	
MAM: Ron Jackson	; MSE: Ellen Taylor
PM: Peter Harvey	; Cognizant Engineer

Date of Closure