



PFR-206 Title: F4 AXB Temperature Sensor Reading Anomalous, 1052 C.

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|--|--|---------------------|
| Assembly : EFI | SubAssembly : AXB | |
| Component : Temperature Sensor | Units Affected: | Units fixed: |
| Originator: Ellen Taylor/John Bonnell | - - - X - - | - - - X - - |
| Organization: UCBSSL | Date: 18 July 2006 (DATE FOUND) | |
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Failure Occurred During (Check one ✓)

X Functional test ☐ Qualification test ☐ S/C Integration ☐ Launch operations ☐ Other (Flight Assy)

Environment when failure occurred:

X Ambient ☐ Vibration ☐ Shock ☐ Acoustic
X Thermal ☐ Vacuum ☐ Thermal-Vacuum ☐ EMI/EMC

Problem Description

The F4 instruments were powered on for a quick functional test after the PCA Vibration test and prior to Acoustics. During this test it was noticed that the F4 AXB temperature sensor was reading incorrectly (1052C instead of the typical room temperature). Subsequent testing prior to TV showed this readback OK, indicating an intermittent problem. During the 2nd cycle of TV, however, the readback was again anomalous and stayed this way for the rest of the TV testing, as well as after TVAC tests during the final Instrument CPTs at ambient.

The anomalous function is limited to the temperature sensor on the F4 AXB; the performance of the associated EFI channel (V5; Upper (+Z) AXB) remained in-family and in-spec throughout the entire environmental test sequence at JPL.

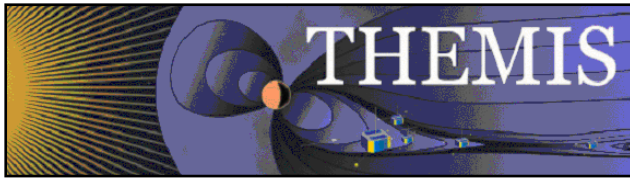
Analyses Performed to Determine Cause

The physical mounting of the AXB temperature sensor was analyzed to determine the risk posed by a malfunction of the temperature sensor, or the electrical lines supplying it. The temperature sensor in question is an RTD-type unit (Minco 6-ST1503PF12(A); 1-kohm) that is mounted inside the EFI preamp enclosures of channels 4 and 5 (SPB -Y; AXB +Z). The temperature sensor is part of the negative feedback path for the temperature sensor circuit, located on the BEB. It has no direct connect to any of the power or signal lines feeding or originating from the EFI preamp itself.

All the lines supplying both the temperature sensor and the preamp were soldered and strain-relieved according to standard NASA protocols: The RTD and the solder connections to it were epoxy-encapsulated as part of the EFI cable assembly procedure. The completed temperature sensor sub-assembly was then potted into a hole bored into the custom socket assembly, and the other lines serving the preamp itself were individually potted and shrink-wrapped to the solder cups on the custom preamp socket receptacles. On the boom unit end of the cable, the lines leading to the temperature sensor are potted and strain-relieved with heat-shrink tubing at the Airborn cable connector. These procedures insure that even if a given line opens electrically, there is little or no chance of that line coming into contact with any of the other lines serving the preamp without essentially crushing the connectors at either end of the EFI cable.

A bench test on the F6 Flight Spare Instrument suite was performed to determine if the anomalous reading on the F4 AXB temperature sensor could be caused by a simple short or open of the two lines leading to the temperature sensor. It was found that the anomalous reading (1052 C) corresponds to an open condition. The open condition forces the output of the op-amp in the temperature sensor circuit on the BEB (RTD2, U45B) to +5 volts; this poses no risk to the temperature sensor circuit on the BEB.

Corrective Action/ Resolution



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Because the temperature sensor is not critical to the operation of the EFI, and the risk associated with the apparently open line to the AXB temperature sensor is minimal, the temperature sensor will be left AS IS, and no repair or rework will be attempted. The failed state of the F4 AXB temperature sensor will be noted in any required Flight Ops logs, etc. so as to forestall inadvertent alarm conditions on-orbit or before.

Acceptance:

MAM: Ron Jackson _____; MSE: Ellen Taylor _____

PM: Peter Harvey _____; Cognizant Engineer _____

Date of Closure _____