PFR-097 Title: SST Heater Noise

Assembly : SST	**SubAssembly : SST Sensor**	
Component : SST Heater	**Units Affected:**	**Units fixed:**
Originator: Michael Ludlam	x x x x x x	x x x x x x
Organization: UCB	**Date: 23/SEP/05**	
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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:

□ Ambient	□ Vibration	□ Shock	□ Acoustic
□ Thermal	□ Vacuum	x Thermal-Vacuum	□ EMI/EMC

Problem Description

During IDPU/ESA Thermal Vacuum excessive noise was seen in the SST data. The levels of noise were much higher than the pre-vacuum tests. The noise was seen using IDPU FM3 with SST sensors 3 and 4 (FM2). The noise was seen to be around 160kHz.

Analyses Performed to Determine Cause

Using a breakout box and scope on the SST sensor connector it was discovered noise on the heater line was causing the SST sensors to record high count rates. Unplugging the heater power and return line that was connected to the IDPU power return caused the count rate to go down. The heater and return lines were connected to the IDPU power return in response to noise seen during previous CPTs. When the chamber was vented the SST did not appear to be susceptible to the noise seen on the heater lines either plugged or unplugged from IDPU power return. The SST sensors were placed in a vacuum chamber on their own and a sine wave was injected on the heater ground line and the response measured. At ambient pressure the sensor showed some response at 6-8MHz with an input amplitude of around 400mV. This was slightly different to the noise seen with the IDPU, and was characterized by 8Hz noise. The chamber was pumped down and the tests repeated. The 8Hz noise was repeatable with the MHz input, but the response to the 160kHz noise seen with the IDPU was not reproduced. The chamber was left to pump down over the weekend and the test repeated. This time the SST sensors responded strongly to an applied signal from about 30kHz to 300kHz with a peak response around 70kHz. The chamber was brought up to ambient pressure and the same test repeated. The susceptibility was still present for several minutes and then returned to being non-susceptible as before.

After much discussion attention focused on aluminum shielding tape used to shield the SST Preamp from the Heater lines. This tape had shown to be a poor conductor when relying on the conductive adhesive to provide good connection. Testing the continuity of the aluminum tape showed intermittent conductivity.

Corrective Action/ Resolution

A cap made from copper foil was constructed and replaced the aluminum tape previously used to shield the heater from the SST Preamps. A good ground connection was made from this copper cap to ground using a screw. A capacitor coupling heater return to sensor ground was removed as it was decided that this could also couple in noise to the sensor. The modification was made to the ETU sensor first and tested in vacuum. The susceptibility was not seen. The sensor that had shown susceptibility was modified and retested in thermal vacuum. The susceptibility could not be reproduced. All sensors were modified and repair is complete.

Acceptance:

MAM: Ron Jackson_____; MSE: Ellen Taylor_____

PM: Peter Harvey_____; Cognizant Engineer_____

Date of Closure_____