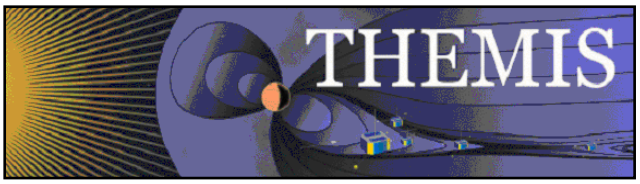




# PFR-127 Title: IDPU Resets during Probe SCT

| | | |
|---|---|---|
| **Assembly :** IDPU | **SubAssembly :** DCB | |
| **Component : FSW** | **Units Affected:** | **Units fixed:** |
| **Originator:** Ellen Taylor | x x x x x x | x x x x x x |
| **Organization:** Swales/UCB | **Date:** 12/14/05 | |
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**Failure Occurred During (Check one √)**

√ Functional test □ Qualification test □ S/C Integration □ Launch operations □ Other (Flight Assy)

**Environment when failure occurred:**

| | | | |
|---|---|---|---|
| √ Ambient | □ Vibration | □ Shock | □ Acoustic |
| □ Thermal | □ Vacuum | □ Thermal-Vacuum | □ EMI/EMC |

## Problem Description

During Probe Self-Compatibility Testing (SCT) on 12/14/05, the IDPU reset twice. On both occurrences, the resets seemed to happen immediately after playing out survey data to the packet minimum. On the first reset, the IDPU went to safe mode and the Reset counter = 1. On the second reset, the Reset counter = 2 even though it had been cleared to zero after the first reset.

The Probe was powered on SAS/Battery. The Probe was configured with all switched power services on (IRU, Pressure Transducer, Heaters). The transmitter was powered on during the first reset and powered off during the second reset. For the second reset, all of the probe heaters had just been powered off in sequence. The IDPU was configured with all Instruments on and collecting data. Commanding was through RF with attenuation set so the signal readback was approximately 1V. Telemetry was through the BAU hardline.

*Update 12/21/05:* During the Instrument LPT on 12/21/05, the IDPU again reset three times. On two occurrences, the resets happened at different points during the ESA Noise Test. The third reset happened after a re-run of the ESA Noise Test, during the ESA Pulser Test. In each case, the Reset counter =2. All Instruments were on and initialized during the resets. The Probe was powered on DPC only, with current limit set at 1.5A. Current draw prior to the resets was approximately 1.380A. The Probe was configured with no switched power services on except the IDPU. Commanding and telemetry was through BAU hardline.

## Analyses Performed to Determine Cause

To try and recreate the problem, a script was written (inst_startup_PRF127) to configure the Instruments exactly as they were configured for the SCT and run on the IDPU ETU….

*Update 12/21/05:* After the 1st reset on 12/21, the idpu_watchdog proc was loaded to read out what type of reset had happened. On all occurrences, the APID 404 readback showed Ad aa, indicating a watchdog reset. It was also confirmed that APID 404 readback would show a 2d aa on a poweron reset. Prior to the 3rd reset on 12/21, the idpu_diag.proc was loaded to provide information on the interrupts and program space during a reset. After the 3rd reset: readback of address 7f00 showed nothing changed in the main program; readback of address 7F10 showed the FSW had locked up on the 3f interrupt.

Update 15/March/06:

The problem was traced down to a race condition between two signals from the 8085 processor. The timing of these signals is temperature dependant, as the board warmed up during testing the signals would shift relative to each other and cause various parts of the program memory to be written to. This ultimately caused the IDPU to crash. By heating and cooling the ETU DCB board the problem could be recreated, as with a hanging 890uF of capacitance on the IOM line. By being able to recreate the problem at will enabled a solution to be worked. The solution involved synchronizing the two signals from the 8085 to the DCB Actel clock.

## Corrective Action/ Resolution

A flip-flop part (54AC74) was installed on the DCB board and used to synchronize the IOM and Address15 lines from the 8085 processor to the DCB Actel 20MHz clock. These synchronized signals were then fed in to the DCB Actel. This modification was tested on the bench and then in thermal vacuum for two cycles pausing over a number of temperatures to verify correct operation. No resets were seen during this testing. The modification has been made to all DCB boards.

Acceptance:
MAM: Ron Jackson_____; MSE: Ellen Taylor_____

PM: Peter Harvey_____; Cognizant Engineer_____

Date of Closure_____