

# PFR-070 Title: FM1 GSE Disconnect & IDPU Software Corruption

| Assembly : GSE             | SubAssembly : NIOS               |
|----------------------------|----------------------------------|
| Component :                | Units Affected: Units fixed:     |
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#### **Failure Occurred During (Check one** $\sqrt{}$ )

x Functional test  $\Box$  Qualification test  $\Box$  S/C Integration  $\Box$  Launch operations  $\Box$  Other (Flight Assy)

| Environment when failure occurred: |             |                  |            |  |
|------------------------------------|-------------|------------------|------------|--|
| Ambient                            | □ Vibration | □ Shock          | □ Acoustic |  |
| Thermal                            | Vacuum      | x Thermal-Vacuum | □ EMI/EMC  |  |

## **Problem Description**

(In this section it is important to document the specific symptoms which exhibited the problem. In the event we see it happen again, we would like to know as much as possible.)

During functional testing of the suite in thermal vacuum (5<sup>th</sup> June 2005) the connection to the APID splitter from the GSE was lost followed by a lost of connection from the GSE to the NIOS board at 15:39. It was not possible to reconnect to the Nios board by simply clicking the 'connect' button on the GSE. The Nios board was reset, and the GSE then was able to connect to the Nios board. However the large download of data stored in the Nios board to the GSE froze up the GSE and the GSE computer had to be rebooted. The Nios board was also power cycled during this time. After reconnecting the GSE and Nios board HK data was again received from the IDPU. Most of the APID 404 packet looked ok, but the command counter was toggling between 119 and 237 and the IDPU was rejecting commands, Science data was being transmitted but it was corrupted. It was not possible to soft reboot the IDPU and so power to the instrument was cycled. IDPU ran nominally after this.

## **Analyses Performed to Determine Cause**

(How do we know how the failure happened? Was it a bad part, bad handling, what?)

The serial port connection from the GSE to the NIOS board was set up to record messages from the NIOS board in case of further disconnections to help with debugging.

Curtis Ingraham performed analysis on software behavior of removal of DCB interface signals and adds "On July 12 I investigated the IDPU response to communication failure on the IDPU to NIOS (Probe) electrical interface at IDPU-J301. I used the ETU IDPU, disconnected combinations of the signals there, and observed the ApID 404 packets at the GSE. I did not power cycle any of the equipment during this test.

Using a breakout box I disconnected the BUS1HZ pair for about five seconds, then reconnected it. I did the same with the BUS8MHZ pair and with the entire J301 connector. I repeated each disconnect at least ten times.

In every case 404 packets stopped during the disconnect, then resumed after reconnection. The reset counter IDPU\_RSTCTR incremented roughly once per second of disconnection for BUS1HZ, once per disconnect for BUS8MHZ, and once per disconnect for the entire J301.



During my observations, IDPU to NIOS to GSE communication always resumed after a reconnection. I see no IDPU or FSW problem in this behavior. The ICD requires "The IDPU shall be powered off to reset the IDPU to a known state.""

#### **Corrective Action/ Resolution**

(How do we fix the unit? And how do we make sure it doesn't happen again?)

One of the reasons that the GSE disconnected from the Nios board may have been heavy traffic on the router used by both, for future use the traffic on the router should be kept low, ideally no other connections hooked up. The wireless network on the GSE was also active, this was disabled as a precaution.

It is not normally expected that the IDPU continues to function correctly if the TLM signals are removed, but from testing it is seen that the IDPU behaves nominally after this occurs and it receives a cold reset. This is a requirement on the BAU and outlined in the ICD.

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

Date of Closure