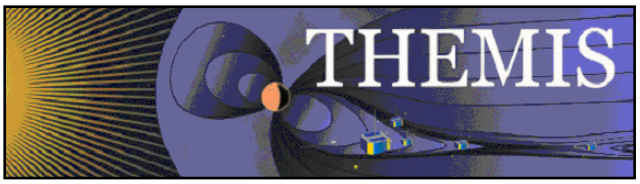

Problem/Failure Report
THM_PFR_109
F2 burst memory full

PFR-109 Title: F2 Burst memory full

Assembly : FM2 suite	**SubAssembly : FM2 IDPU**	
Component :	**Units Affected:** - X - - - -	**Units fixed:** X X X X X X
Originator: Corinna Chen		
Organization: UCB SSL Themis	**Date: October 20, 2005**	
Phone: 510.642.8030	**Email : corinnac@ssl.berkeley.edu**	

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 transition from the 6th hot cycle to the 6th cold cycle of thermal vacuum for FM2 suite, the IDPU was left running in continuous mode. One hour into the transition, the particle bust memory segment readback indicated that the memory segment was full. During continuous mode, APID packets are not routed to particle burst segment. Plots were made from the housekeeping packets and it indicated the memory segment was filled with packets and that it was playing out. From the telemetry gathered, it was obvious the packet that accumulated at burst rate was 44C.

Analyses Performed to Determine Cause

Tests Performed. As soon as PFRs 109, 110 and 113 were logged, the instrument configuration (Version 2.09 and instrument in Continous Mode) was duplicated on the ETU IDPU. After several hours the IDPU reset similar to PFR110.

Numerous attempts to localize the failure to a single instrument failed, the theory developed that it was a resource overload due to running all of the instruments at the same time.

A small diagnostic was introduced to determine the interrupt routine last executed before the crash. This routine saves the data in an area of RAM not cleared upon reset. In this configuration, two resets were found and both were interrupt 0x13 (19) of the ISR7.5 interrupt which occurs at 256 Hz.

Interrupt 13H services the ETC (ESA and SST) packets as well as ESA High Voltage management. Additional sentry diagnostics were added to determine where the interrupt gets to when the crash occurs, but this yielded no definitive result.

Based upon evidence that the flight code was being modified (109, 113) an additional diagnostic was developed to determine which memory locations are being modified. This would give a “heads up” when the system did something to the main program. However, this process never found a source for the change.

At this point, the interrupt time for ISR7.5 was measured and found 13H as the longest interrupt. By viewing the logic analyser log against the source code, it was clear that the interrupt was trying to do too much on a single 3.9 msec interrupt. The design allocation was 2 msec for telemetry handlers. Thus, an SCR-29 was issued to move the ETC TM handler to its own interrupt. The configuration should yield 1.2 msec on 13H and on the 4 BKG interrupts (08H, 18H, 28H, 38H). SCR-29 was built into Version 2.13 (2D)

Tested Version 2.13 for 10 days from Oct 28 to Nov 7th and had no crashes or other obvious anomalies. The diagnostics were checked to determine if the flight program had changed and there were no occurrences.

Corrective Action/ Resolution

Upgrade to Version 2.13 or later and repeat the test on the flight system.

Acceptance:
MAM: Ron Jackson_____; MSE: Ellen Taylor_____

PM: Peter Harvey_____; Cognizant Engineer_____

Date of Closure_____

A. Test Script

```
REM
REM TEST_PFR109_diags.CMD
REM
START c:\IDPU Testing\Scripts\IDPU\RUNV21.cmd

START c:\IDPU Testing\Scripts\Instrument_Functional_Procedures\INST_CONT_MODE_F2_hot.CMD

/idputable a 5
/idpuload 1
/idpuload 1
/idpuload 1
/idpuload 1
/idpurawhex 8100

START c:\IDPU Testing\Scripts\IDPU\DIAGS.raw
/IDPUCMDS  1
/IDPUEXEC

/IDPUDUMPADRH 7F
/IDPUDUMPADRL 00
```