



PFR-030 Title: Actuator Commands Dependent Upon Act Voltage

Assembly : Instrument	SubAssembly : IDPU
Component : PCB	Date: 3-15-05
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Failure Occurred During (Check one ✓)

☒ Functional test ☐ Qualification test ☐ S/C Integration ☐ Launch operations

Environment when failure occurred:

☒ Ambient ☐ Vibration ☐ Shock ☐ Acoustic
☐ Thermal ☐ Vacuum ☐ 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.)

In the middle of firing a Mag Boom actuator, the GSE 28V Actuator supply was manually switched off.

Subsequently, the IDPU was stuck holding the Mag Boom Actuator FET ON, such that turning on the 28V Actuator Supply meant that the current would flow immediately to the Mag Boom Actuator. Commands to turn off the Mag Boom Actuator did not clear the switch ON condition. Repeating a new pulse to the Mag Boom Actuator DID clear the actuator; ie. turning it ON, then OFF appeared to work.

Analyses Performed to Determine Cause

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

By trying various combinations of Actuator 28V and IDPU commands to the Power Control Board (PCB), it was determined that the PCB would accept the Mag Boom Release command only if the Actuator Voltage was present. This was demonstrated by running a standard functional test of the FET control (on and off with the Actuator Power supply at 28V), followed by the following test sequence:

- [1] PCBRELEASE 1 to turn on the FET;
- [2] Turn off Actuator Power;
- [3] PCBRELEASE 0 to turn off the FET;
- [4] Turn On Actuator Power.

After step 4, the actuator power was still flowing, meaning that the command in step 3 was ignored.

Corrective Action/ Resolution

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

The PCB Actel does not provide status back to the IDPU software regarding the state of the Actuator control register. The only method to clear the register while having the Actuator Supply = 0V is to send the IPCB_RESET command, which also turns off all instruments.

Based upon the above, the IDPU FSW will incorporate the IPCB_ACTRESET into the SAFE script. This script is run at IDPU reset and any time the SAFE bit is raised by the Spacecraft. During SAFE, all



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instruments are turned off, so this implementation is consistent with the SAFE mode already. In the event that the Actuator supply trips off during an Actuation, the ground shall send the SAFE command.

Acceptance:

MAM: Ron Jackson _____; MSE: Ellen Taylor _____

PM Peter Harvey _____; Cognizant Engineer _____

Date of Closure _____