PFR-072 Title: Failed Actuation of FM2 EFI SPB Doors

Assembly: EFI.	**SubAssembly: SPB.**	
Component: Doors.	**Units Affected:**	**Units fixed:**
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Organization: UCBSSL.	**Date:**	
Phone:	**Email :**	

Failure Occurred During (Check one √)

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

Environment when failure occurred:

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

Problem Description

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

During deploy testing of the FM1 and FM2 EFI SPBs, it was found that if one of the two units of a pair under test opened its doors before the other, the end-of-travel microswitch on the SMA door release actuator would open, breaking the current path to both unit's door actuators. This open switch prevented the other door from actuating, as the door actuation circuits of both units were wired in series in the harness, rather than in parallel. This failure mode occurred in 3 of the 4 door actuation tests on FM1 and FM2, and so represents a significant risk for the successful deployment of the radial EFI sensors.

Analyses Performed to Determine Cause

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

Upon reflection, it was obvious that this failure arose due to the interaction between the design of the end-of-travel switch on the door actuator and the door actuation circuit on the PCB. The end-of-travel switches were included to protect the SMA wires in the door actuation mechanism from damage due to overheating. The SPB door actuator circuits on the PCB were originally designed to actuate the units in parallel from the +5-volt actuator supply; however, it was found that that supply would not be able to provide sufficient current, and the door actuator circuit was moved to the +28-volt actuator line. The increased actuator voltage required that the units be wired in series, and this series connection between the doors lead to a failure when the two doors race to actuation.

Corrective Action/ Resolution

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

All of the flight units have been modified by adding two lines to the test/enable connector. These two lines lead back to the leads on the end-of-travel switch, and allow one to either keep the switch in the actuator circuit, or bridge across it, thus removing the switch from the actuator circuit. Special Red Tag Test Enable