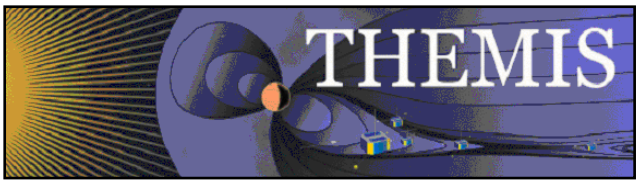

Problem/Failure Report
THM-PFR-50

PFR-50 Title: SPB S915 COLD TVAC DOOR RELEASE FAILIURE

Assembly : THM-SPB-MEC-001 SPB Top Level Assy	**SubAssembly :** THM-SPB-MEC-400 Release Panel Assy	
Component : SMA Wire & Limit Switch	**Units Affected:**	**Units fixed:**
Originator: Dalton/Donakowski	- - - X - -	- - - X - -
Organization: SSL	**Date: 9 May 05**	
Phone: 510.643.9240	**Email : gdalton@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 cold TVAC deployment, the UUT (unit under test) did not fire the *Release Strut* (THM-SPB-MEC-631) properly, terminating the test and constituting a failure. Preliminary indications were the visual indication that the *Release Ring Assy* (THM-SPB-MEC-427) did not rotate sufficiently enough to allow the Release Struts to fire forward, which in turn normally release the *Doors* (THM-SPB-MEC-617). The SMA firing circuit drew nominal current initially, but then the circuit opened, as it should at the end of the firing, and did not reset. This indicated that the *Release Ring Assy* rotated enough to roll the circuit limit switch off the *Limit Switch Ramp* (THM-SPB-MEC-628), but not enough to fully fire the *Release Struts*. The UUT was removed from the chamber and moved to the lab bench for further investigation.

Analyses Performed to Determine Cause

Bench tests were performed and the *Release Ring Assy* demonstrated reliability in ambient conditions. The failure in TVAC environment, in addition to worse case voltage supply levels for the test, led to believe the SMA wire was not adjusted properly and that the SMA circuit limit switch position required adjustment. Operation of the mechanism revealed that the *Limit Switch Ramp* was rolling off the limit switch and opening the SMA circuit too early. It was noted that the *Release Ring Assy* did not return to its initial position, centered on the *Release Struts*. This indicated that the SMA wire was too taught and needed to be adjusted. In addition, the *SMA Lever Arm* (THM-SPB-MEC-407) was found to be bent because of over-stress during re-stowing, exacerbated by the poor adjustment of the SMA wire.

Corrective Action/ Resolution

The *SMA Lever Arm* was replaced, the SMA wire was adjusted properly, and visual checks were done on the bench to ensure the *Release Ring Assy* operated properly and returned to its initial position as required for re-stowing. Retraining of engineers and technicians was performed to avoid future failures, *Release Ring Assy Procedure* THM-SPB-MEC-440 was modified to include inspection points and operational checks. Previously built units were inspected and no anomalies were recorded. All other previously tested units performed as expected in TVAC deployments. The UUT retest in TVAC was performed satisfactorily and a workmanship re-vibraitonal test will be performed before Scientific Calibration to fully qualify this unit.

Acceptance:

MAM: Ron Jackson_____; MSE: Ellen Taylor_____

PM: Peter Harvey_____; Cognizant Engineer_____

Date of Closure_____

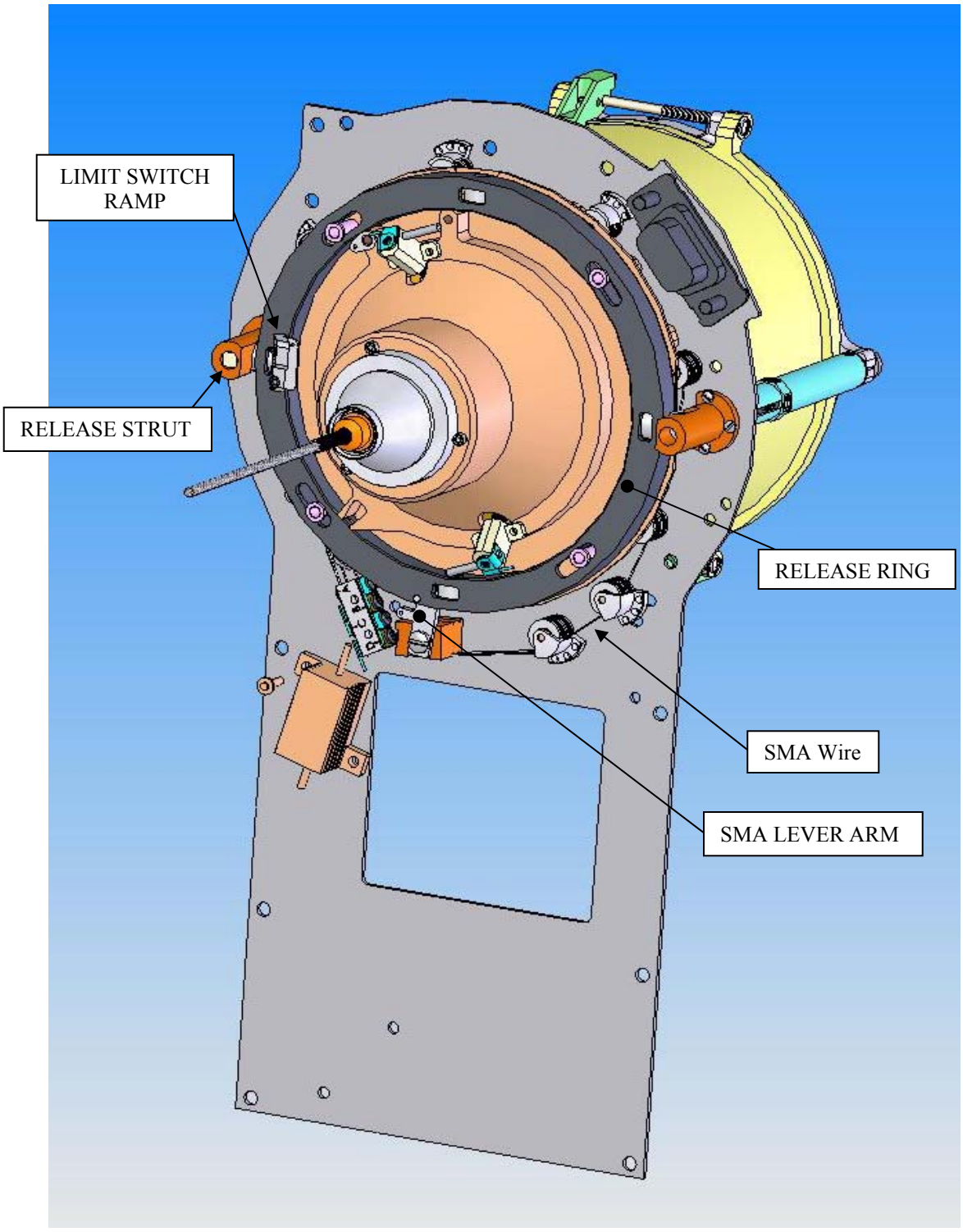

Fig. 1 THM-SPB-MEC-400 RELEASE PANEL ASSY