PFR-187 Title: FM3 ESA SMA Secondary Actuator Failure

Assembly : ESA	**Subassembly : SMA B**	
Component : Release Plate	**Units Affected:**	**Units fixed:**
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Failure Occurred During (Check one√)

x Functional test □ Qualification test □ S/C Integration □ Launch operations □Other (Calibration)

Environment when failure occurred:

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

Problem Description

During Spacecraft Testing, the IDPU was commanded to "fire" the ESA SMA Actuator(s) primary-A & secondary-B in order to trip the ESA Hemisphere Cover release mechanism. SMA Actuator-A fired successfully. After re-cocking the mechanism, the IDPU attempted to fire SMA Actuator-B. SMA Actuator-B failed to fire. The SMA breakout harness was installed and SMA-B fired successfully using the EGSE Firing Box.

Analyses Performed to Determine Cause

Upon disassembly and inspection, the clamping screws for SMA Actuator–B were found to be loose. In addition, the adjustment of the SMA Actuator was out of specification. Substantial discussion and analysis by the working group determined that the most likely cause of the failure was inadequate torque on the mounting screws during the Release Plate subassembly process.

A secondary problem was failure to torque stripe and stake the screws and Actuator body.

A tertiary problem was that the problem was masked by firing actuators using the EGSE Firing box which has more power than the IDPU firing system. A summary of successful IDPU firing of Actuators on all other spacecraft was prepared and it was noted that there were no other failures. All other Actuators were re-fired using the IDPU Firing Circuits without problems,

Corrective Action/ Resolution

SMA Actuators-A and –B adjusted. Mounting screws torqued to 13 oz-in (#0-80). Both Actuators fired several times with EGSE Box. Both Actuators fired several times using IDPU signal. Screws striped and staked. Actuator staked to release plate. Analysis determined that it is most likely that the screws were not tightened during initial assembly. Our testing and checkout system caught the problem as it was designed to do.

Acceptance:

MAM: Ron Jackson_____; MSE: Ellen Taylor_____

PM: Peter Harvey_____; Cognizant Engineer /s/ Bill Elliott_____

Date of Closure_____

Deleted: *PFR_*