STEREO IMPACT

PROBLEM REPORT
PR-1011
STEU FM1 Door 2
2004-06-28

PR Numbers: 1xxx=UCB, 2xxx=Caltech/JPL, 3xxx=UMd, 4xxx=GSFC/SEP, 5xxx=GSFC/Mag, 6xxx=CESR, 7xxx=Keil, 8xxx=ESTEC, 9xxx=MPAe

Assembly : STE-U	**SubAssembly :** Door
Component/Part Number:	**Serial Number:** FM1
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Failure Occurred During (Check one √)

Functional test	v Qualification test	S/C Integration	Launch operations

Environment when failure occurred:

Ambient	v Vibration	Shock	Acoustic
Thermal	Vacuum	Thermal-Vacuum	EMI/EMC

Problem Description

During the CPT following the FM1 Boom/STE-U/MAG vibration the STE-U door failed to open fully in response to a door open command on several attempts. The door was observed to rotate approximately 90 degrees of the normal 130-degree rotation. It appeared to move more slowly and less smoothly than usual and came to a stop as if something were slowing it down rather than hitting a stop. Multiple open commands without intervening close commands did not move the door much further. The timeout was increase to 1.5s (which is considered safe in air), but that did not allow the door to fully open (the normal open time in air is ~0.62 s). Door closure worked normally, taking the normal amount of time. Manual manipulation of the door indicated no unusual resistance.

Analyses Performed to Determine Cause

STE-U was removed from the boom (as planned) and further tests were performed on the door while monitoring the voltage waveforms in the IDPU (which drives the door). See the plot below. There is no sign of a problem with the actuator power or any intermittent in the actuator continuity, and current continues to timeout.

More below.

Corrective Action/ Resolution

v Rework	Repair	Use As Is	Scrap

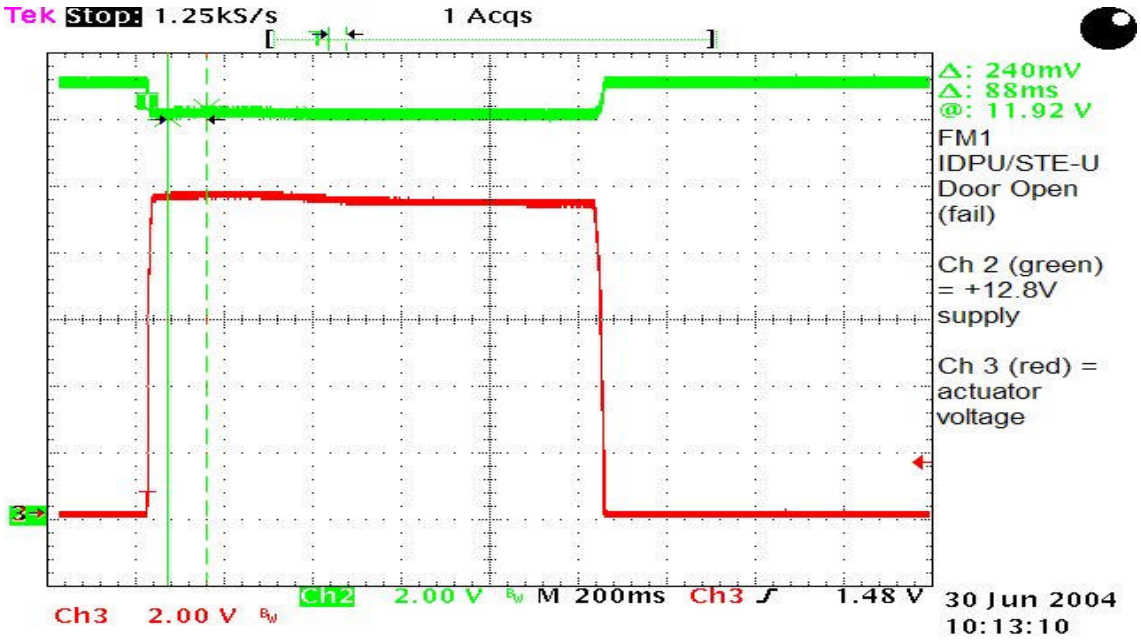
Installed correct washer under detector mounting screw to avoid interference with the door mechanism.

Date Action Taken: 2004-7-20 **Retest Results**: 100-cycle test passed

Corrective Action Required/Performed on other Units v Serial Number(s): STE-U FM2, STE-D FM1 & FM2; Verify washers used on detector mounting screws and no interference with door mechanism

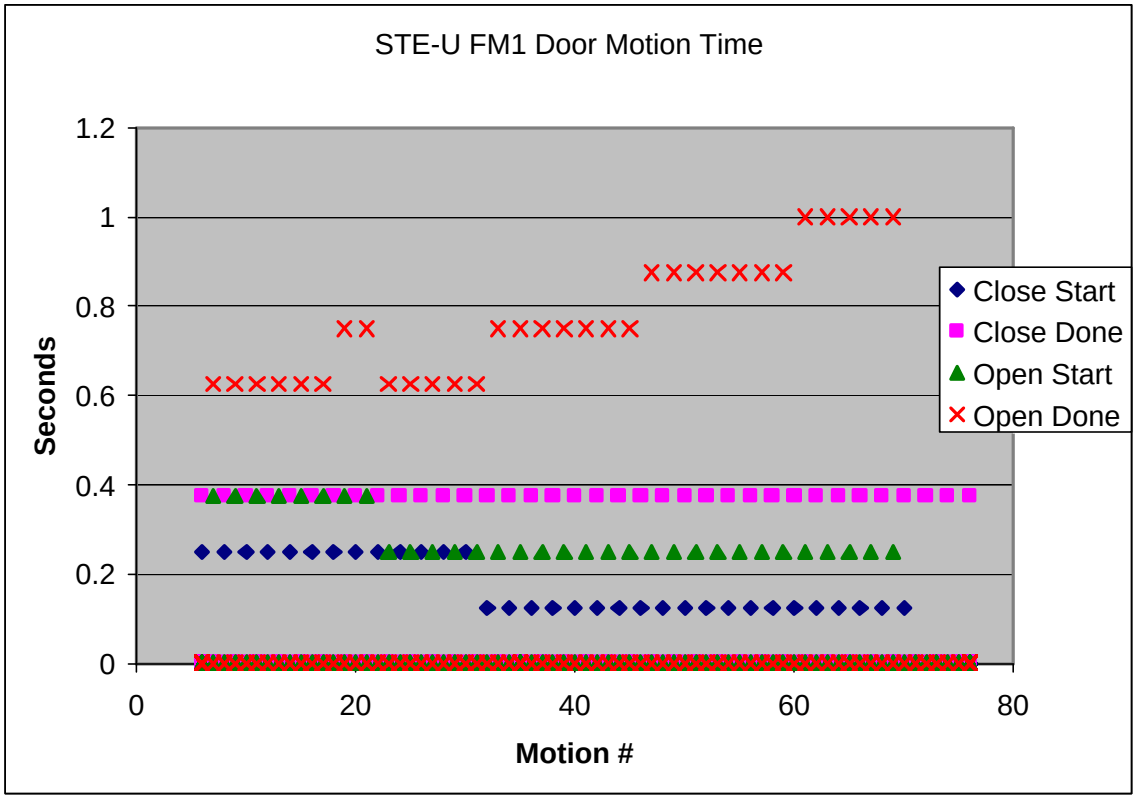
Closure Approvals

Subsystem Lead:	_____	Date:_____
IMPACT Project Manager:	_____	Date _____
IMPACT QA:	_____	Date:_____
NASA IMPACT Instrument Manager:	_____	Date:_____



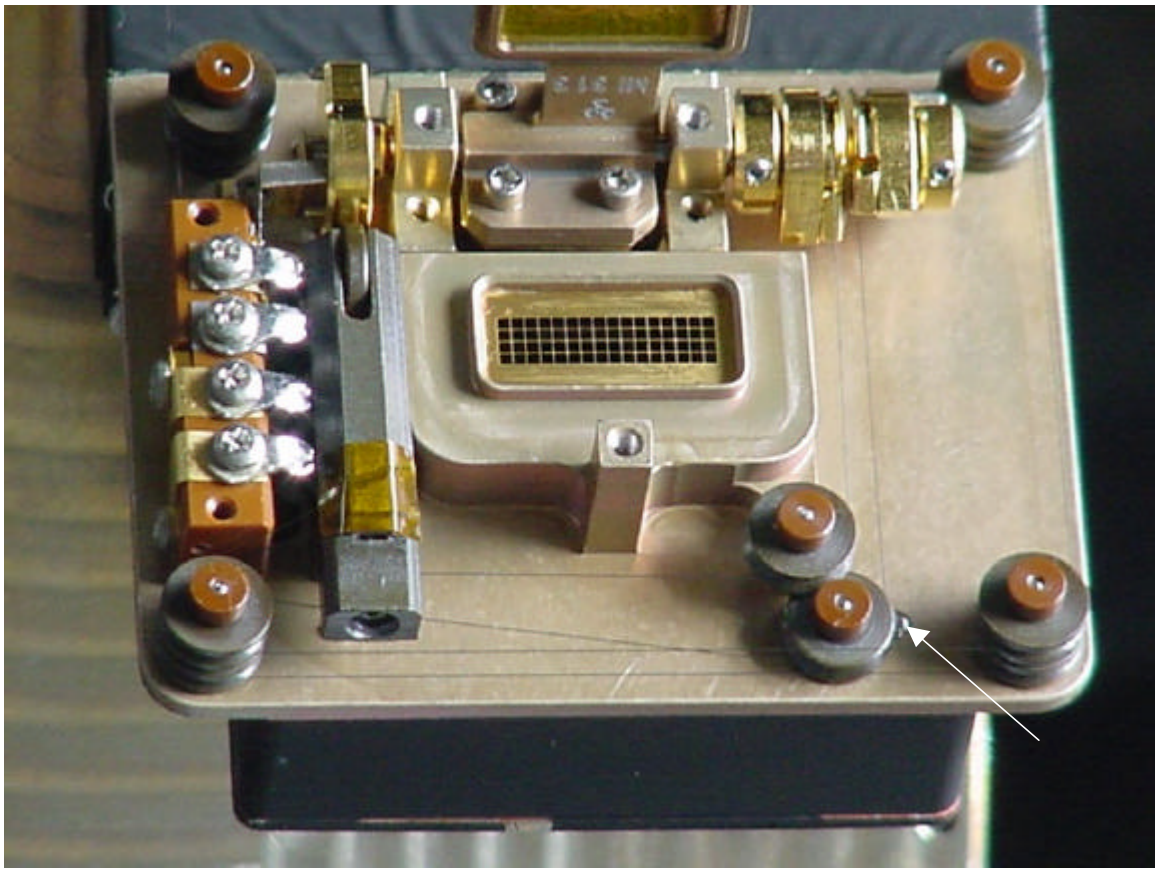
STE-U FM1 door open attempt (fails). Green trace is the supply that powers the door actuator; the voltage sag is within spec and as measured previously. The red trace is the voltage on the actuator (after a 15 ohm series resistor), and is also normal (the actuator resistance is ~55 ohms). The door power continues till timeout after 1 second without completing the door motion (normally when the door reaches the open position a sense switch closure causes the actuator power to be discontinued).

The cover was removed from the STE-U door actuator mechanism and inspected for any damage or foreign material, which was not found. The door actuator itself was not touched. The door was then actuated with a GSE and found to operate normally, though not smoothly. Margin in terms of lower actuator operating current were demonstrated. The cover was replaced without touching the actuator. The test with the IDPU was repeated several times and the door was found to open and close normally with the normal operation time. However after the door was cycled ~15 times the open actuation time started to increase, and after ~35 times it timed out. Note that the door had previously passed a 100-cycle test with no sign of trouble.



Door actuation times. Starts normally, but Open Completion time starts to rise and reaches the 1 second timeout after ~70 motions (1 open/close cycle is two motions). There is also a small downwards trend in the time it takes to start moving in both directions that may be significant. Note that the time measurement resolution is 1/8 second.

Inspection of the door operation while the cover was removed showed one of the actuator wire pulleys was not moving. It was found that one of the detector mounting screws was long enough to come through the chassis and touch the pulley, preventing it from moving smoothly. The detector was installed after the 100-cycle door test but before the thermal vac and vibration tests. Inspection of the detector mounting shows that a washer was omitted which caused the screw to be too long. The washer was installed and it was verified that the screw no longer touches the pulley.



The door was again actuated with the cover off and a much smoother and somewhat faster motion was observed. The pulley was observed to rotate normally. A 100-cycle test was performed while monitoring the actuation time and the door motion. The door continued to operate smoothly and the actuation time showed no trends.