

STEREO IMPACT

PROBLEM REPORT

PR-2007

LET Sine Survey

4/29/2005

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

Assembly: SEP	SubAssembly: LET
Component/Part Number:	Serial Number: FM2
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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

During the pre-vibration sine survey, there was a resonance peak at 590 Hz, which is normal. This peak can also be seen on FM1. After vibration, the resonance peak seen in the post-vibration sine survey had split into two peaks: ~550 Hz and ~700 Hz for FM2 only.

Reference attached Vibration test results:(SEP-C FM1, FM2vibration-2.pdf, Doc# 352G: MOC: 0527)

Analyses Performed to Determine Cause

- LET FM2 unit was disassembled step by step, measuring "removal" torque on all screws and writing everything down. The cause of the sine survey shift in the interface force post-Y axis vib test can be explained by the following findings:
 - There were 2 screws that were found missing from the bottom LET FM2 board. All but one was found. (Details on the following page.)
 - The remaining 10, 0-80 screws on the bottom LET FM2 board are loose and are not holding full torque. All of the 0-80 screws had been torqued to 2 lb-in during assembly, and the semi-loose ones are now showing on average 0.5 to 1 lb-in.
 - 4 of the 12, 0-80 screws holding the LET assembly to the bracket are semi-loose (1 in lb) and were staked with 2216 on the heads.
- The FM2 SEP LVPC top cover was removed and one #2-56 screw without any uralane staking was not holding up to torque.

Corrective Action/ Resolution

- Rework Repair Use As Is Scrap
- Completely disassembled FM2 SEP/HET/LET (5/12/2005) and the SEP LVPC and was **unable to find the one missing screw.**
 - SEP LVPC was disassembled, inspected and then retested at UCB. The screws in this assembly were torqued and staked during reassembly. The unit then was returned to Caltech for reassembly in the FM2 SEP/HET/LET.
 - Disassembled and replaced all of the screws in SEP Central, HET and LET. Reference assembly procedures: LETAssemblyProcPartial_revB.doc, SEP-fastener-replace-proc.doc, HETAssemblyProcParital.doc (Reference PFR 2006)
 - Applied a locking feature (Poly-Lok) to all of the hardware.
 - Through analysis and test determined the proper torque value to use for the new hardware.
 - When possible, staked the threads of all of the screws with 2216. (reference procedure to the screws that were not staked.)
 - Carefully reassembled, following a detailed procedure, which included the documentation and verification of each screw in the all of the assemblies. The "buddy system" was required during all assembly.
 4. Continue with thermal vacuum testing. Acoustic tests do not need to be repeated. Retest needed for vibration. Recommended – 3 axis vibrate, which was successfully completed during 7/13/05-7/14/05.

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Date Action Taken: 5/1/2005 – 5/8/2005 Retest Results: success

Corrective Action Required/Performed on other Units Serial Number(s): n/a

Closure Approvals

Subsystem Lead:	Branislav Kecman_____	Date: <u>8/31/05</u>
IMPACT Project Manager:	_____	Date: _____
IMPACT QA:	_____	Date: _____
NASA IMPACT Instrument Manager:	_____	Date: _____

Analysis Performed to Determine Cause:

5/11/2005, 5/12/2005

LET FM2 unit was disassembled step by step, measuring "removal" torque on all screws and writing everything down. The cause of the sine survey shift in the interface force post-Y axis vib test can be explained by the following findings:

1. Bottom LET FM2 board is missing two 0-80 screws from the center section where it ties into L23 detector module and single-flexi side wall. The remaining ten 0-80 screws on that board are semi-loose, i.e., they are not holding full torque the way other assembly parts do (like four half-moon shields, top board, etc.).

The two missing screws had fallen straight into the SEP Central main box and we shook it upside down, but only one of them got out. The other one is still hiding inside, we believe, so we will continue the search with a good light in the morning (note that there is nothing at risk from this loose screw inside SEP Central). We even tried listening with a stethoscope, but to no avail. All of the 0-80 screws had been torqued to 2 lb-in during assembly, and the semi-loose ones are now showing on average 0.5 to 1 lb-in.

2. Four of dozen 0-80 screws holding the LET assembly to the bracket are semi-loose (1 lb-in) even though they had been staked after torquing during the original assembly. There's no way that these four could have been missed during the torquing operation. Obviously, their staking on the head with epoxy 2216 did not prevent them from getting loose. These four screws are all on the single-flexi side, which is on the same side of LET assembly where the other two screws fell out. That side of LET is just above HET, for your reference.

3. The torque was checked on all of the #2-56 screws holding SEP Central Boards and they were all ok – with or without staking. The screws on the chassis appears to have held its torque well.

