STEREO IMPACT

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

Assembly : SIT Instrument	**SubAssembly : telescope**
Component/Part Number: SSD 44-120F	**Serial Number: 02**
Originator: Walpole	**Organization: UMd**
Phone : 301-405-6217	**Email : Walpole@umd.edu**

Failure Occurred During (Check one √)

x Functional test □ Qualification test □ S/C Integration □ Launch operations

Environment when failure occurred:

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

Problem Description

High count rate in SSD 44-120f. During alpha testing in vacuum at UMd following the replacement of detector 42-104a in the FM2 telescope, it was noted that the SSD bias current was larger than expected (measured: 0.7uA at 50v, 3 uA at 100v, expected: 0.9uA at 150v) and variable. It was also noted that the count rate was high and variable: few thousand/sec – few hundred thousand/sec. Expected was 100-200/sec.

Analyses Performed to Determine Cause

Behavior was monitored for two days and remained erratic. Unit was taken to GSFC for further test where at first it appeared that the current had stabilized but the output remained noisy and bursty. The detector was removed from the telescope and put under vacuum at GSFC (Tycho's detector test chamber) where it settled down for a few days but ultimately became erratic and noisy as before.
A mechanical piece from the outside of the telescope and a bolt from the inside of the UMd chamber were taken to the contamination control group where they were washed and the wash analyzed for contaminants. Nothing significant was found.
Conclusion is that this detector too has gone bad. This makes 9 out of 10 detectors received from Ortec that have been determined to be bad.

Corrective Action/ Resolution

□ Rework □ Repair □ Use As Is □ Scrap

New ion implant detectors will be procured from Micron to replace the Ortec surface barrier units. Some changes in detector stack components will be needed to accommodate the Micron wire bond method of connection which is different from the evaporative contacts used by Ortec. The thicker window on the Micron detectors will also increase the threshold of the instrument.
In the interim, the best available remaining Ortec SSD will be installed in FM2 to allow continuation of environmental testing. It is anticipated that the detector will be changed out in late 2005 and that a workmanship vibration will be performed.

Update 7/23/2005: New replacement Ortek detectors were installed into FM2. (Reference SIT Telescope Detector Replacement Procedure 7 July 2005.) Retest required was a single axis vibration and 4 thermal vacuum cycles. Vibration test passed successfully. The SIT FM2 Thermal Vacuum retest was terminated

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after completing 3 thermal cycles on 7/23/2005. Prior to the start of the thermal vacuum tests the detector was counting 11,000 counts/minute. After the first cold cycle (7/22/2005), the SSD became extremely noisy and had excessive count rates (16.8 million counts/minute) – similar to the original problem back in April. The counts stayed this way for the remainder of the test. All of the CPTs were otherwise successful. The electronics are functioning nominally.

Update 12/10/2006
Replaced the detectors in both flight units with the new ion implant detectors procured from Micron. Performed functional test, single axis vibe, functional test and final alpha test in vacuum.
High count rates were observed on FM2 due to crosstalk issues on the harness between the telescope and the HV. This issue was resolved by separating and shielding the SSD, start and stop wires that connect the telescope to the electronics. FM2 was then retested in vacuum with an alpha source and the crosstalk issues were resolved.

Date Action Taken:FM1 – 12/5/2005, FM2 – 12/13/05 **Retest Results**: Single axis vibe, 4 cycles thermal vac

Corrective Action Required/Performed on other Units X Serial Number(s): FM1__

Closure Approvals

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