

STEREO IMPACT Technical Progress Report

Lillian Reichenthal , Code 463.0
STEREO IMPACT Instrument Manager
Goddard Space Flight Center
Greenbelt, MD. 20771

Subject: IMPACT Monthly Technical Progress Report, Contract NAS5-00133

Lil:

Enclosed is the monthly technical progress report for the STEREO IMPACT project for the month of November 2004.

Sincerely,

David Curtis
IMPACT Project Manager
University of California, Berkeley

CC:

Julie.A.Janus.1@gsfc.nasa.gov
Debra.G.Dusterwald.1@gsfc.nasa.gov
Lillian.S.Reichenthal@nasa.gov
IMPACT Team

STEREO IMPACT Technical Progress Report

1. IMPACT Overview

This report is presented in sections by institution. Section 1 is an IMPACT Project Manager / System Engineer's overview.

1.1. Contracting / Funding

Funding through January 2005 has recently been received and subcontracts will be augmented.

1.1.1. Liens

This is a list of Liens. Liens for activities at other institutions are sometimes repeated in their subsections of this report. These liens are estimated additional costs that might be incurred if problems happen. Only problems with a significant likelihood of occurrence are tracked. These liens are usually associated with risks in the risk list (see section 1.5), and you can see the predicted likelihood of occurrence there. Some of these liens have been requested to be encumbered by Project, marked (*). Items included in the POP04 budget recently submitted are marked in yellow.

UCB:

No.	Cause	Amount	Date
1*	LVPS schedule delays extend manpower (Risk UCB29). Cost a 1-month delay at full LVPS team spending rate.	\$35,000+	01/04
2	Late failure in thermal vac requires rework/retest (Risk UCB27, etc).	\$30,000	10/04
3	Testing failure requires rebuild/retest a board (using existing spare parts)	\$20,000	10/04
4	EMC rework and retest required (Risk UCB11). Assume rework can be done in a week or two. Does not include cost of retest of vibration & thermal vac. (see also item 17)	\$30,000	10/04
5	Schedule delays cause the consumption of boom suite schedule contingency (various risks). Cost 35 days of contingency at UCB I&T team rate.	\$50,000+	07/04
6	STE calibrations sources.	\$2,500	11/04
7	SEP Thermostats. These were over the budgeted amount. Budget was \$10K at Caltech. Parts were actually \$21,200, paid by UCB. New budget takes this into account.	\$11,200	11/03
8	Subcontract J&T for board assembly work to maintain schedule	\$50,000	1/04
9	Calibration and thermal vac chambers at UCB use oil roughing pumps. Replace those pumps with dry scroll pumps to reduce risk of contamination	\$14,000	3/04
10	Increase travel to cover staffing requirements at APL during I&T	\$40,000	10/04-1/06
11	Launch delay costs (launch 2/06)	\$226,000	12/05
12	Redesign & rework costs should Actels need to be replaced due to reliability problems. Depends strongly on what kind of replacement is selected.	\$500,000	?
13	PLASTIC Software extended effort to complete to 10/04,	\$130,000	9/04

STEREO IMPACT Technical Progress Report

	with continuing effort at a lower level through March 2005; 100% probability		
14	LVPS completion, including rescreening and replacement of LTC1877s, 100% probability	\$75,000	9/04
15	UCB SWEA/STE effort to complete, 100% probability	\$40,000	9/04
16	DCB Actel swap-out with parts programmed with new algorithm, plus replace the 1553 connectors, 100% probability	\$8,000	8/04
17	Extra EMC facility costs due to diagnostics and retest, 100% probability	\$5,136	10/04

Caltech:

No.	Cause	Amount	Date
1	Budget does not contain funding for investigations of part failures or contamination failures, re-makes of boards if coupons fail, etc. Some of this has already occurred, as more rework has been required in the hybrid development area than we budgeted for. Some die have failed test, some units have failed PIND testing, and in a couple of cases leaks have occurred after lead bending, which was caused by a problem with the tooling that has been corrected. In addition, QA costs have been a far bigger percentage of the overall cost than anticipated. Currently the yield of hybrids has improved with 16 of 20 passing electrical test in the last batch. (Amount = ~\$50,000 (guess); Probability = 100%; time frame = March 2004).	\$50,000	03/04
2	Unfunded schedule reserve: ~\$25,000. This is becoming a reality, as our latest schedules show delivery in September 2004 (as required), whereas we had budgeted for delivery in July 2004. (Amount = \$25,000; Probability = 100%; time frame = August 2004).	\$25,000	8/04
3	Possible under-budgeting of environmental testing and bake out. \$100K has been allocated. However, recent estimates suggest that the thermal balance/thermal vacuum test may require about 3 weeks. Recent cost estimates at JPL suggest that that might take the entire \$100K. We are investigating other places for the environmental test program where the costs may be less. (Amount = ~\$50,000 (guess); Probability = 50%; time frame = July 2004).	\$50,000	7/04
4*	GSE Software support (extend a few months after January 2004)	\$60,000	1/04
5*	Engineering Assistant (Risk UCB033)	\$24,000	1/04
6*	Engineering support to maintain schedule (Risk UCB033)	\$63,000	1/04
7*	Technician Support to maintain schedule (Risk UCB033)	\$38,000	1/04
8	Overlooked hybrid costs: it was not realized that the cost estimate we were given for the hybrids did not include the	\$10,000	3/04

STEREO IMPACT Technical Progress Report

	qualification costs of 10 units. We have asked for a quote from JPL. (Amount = ~\$10,000 (guess); Probability = 100%; time frame = March 2004).		
9	Unbudgeted tests: there are a number of tests outlined in the STEREO/IMPACT Requirements Verification Matrix that we are listed as responsible for but for which we did not budget. (Some I wasn't aware of and some I mistakenly thought would be done at UCB as part of EMC testing.) Test plans and procedures will need to be written and existing instrumentation either calibrated or new instrumentation obtained. These include requirements 4.10, 4.12, 4.23, 4.27, 4.28, and 4.42. If we have to get JPL to help us, the cost could be significant. (Amount = ~\$25,000 (guess); Probability = 50% (UCB might help us); time frame = July 2004).	\$25,000	7/04
10	Launch delay costs to Feb 06	\$67,757	12/05
11	Extra work due to schedule delays, delivery in Jan 2005, probability 100%	\$133,115	10/04
12	LET L1 detector repair, probability 100%	\$60,000 \$80,000	10/04
13	Purchase 5 6 spare L1 detectors to replace jagged edge detectors (plus new mounts), 100%	\$23,000 \$30,000	10/04
14	Repair Analog post reg. & Bias supply boards, 100%	\$5,000	9/04
15	Design & Fab radiation test fixture (was at GSFC), 100%	\$5,000 \$8,000	10/04
16	Rebuild Rework SEP flight harnesses, 100%	\$20,000 \$10,000	11/04
17	Purchase 8 HET H3 detectors, 100%	\$25,000	11/04
18	Additional GSE, 100%	\$3,000	11/04
19	SEP Thermal Vac cables; cannot use ACE parts, 100%	\$6,000 \$10,000	11/04
20	SOTA thin film resistor swap, probability low	\$5,000	11/04
21	Hardware changes to SEP logic board (EEPROM reset issue), 100%	\$4,000	11/04
22	Repair L1 detectors at JPL + associated manpower due to schedule delay, 100%	\$150,000	12/04
23	New L1 detectors from Micron, incl. test at Caltech	\$106,000	1/05
24	Install new L1s in SEP, repeat some environments	\$125,000	5/05

UMd:

No.	Cause	Amount	Date
1	SIT foils fail acoustic test	\$20,000	2/04
2	SIT Vibration (currently planned to be combined with HET instruments, but may not work out)	\$15,000	2/04
3	Parts screening (some parts not yet Oked by PCB and may need addition screening)	\$10,000	9/03

STEREO IMPACT Technical Progress Report

4	Particle Calibration at BNL.	\$20,000	8/04
5*	Engineering Support to maintain schedule (Risk UCB033)	\$60,000	1/04
6	Replacement SSD detectors (only 2 of 5 detectors passed)	\$10,000	5/04
7	Extend Peter Walpole due to late delivery	\$17,800	11/04

GSFC (Tycho):

No.	Cause	Amount	Date
1	Revise SEP Central/LET/HET vibration analysis if required	\$5,000	11/03
2*	Extra Solid-state Detector Lab manpower support to accommodate late detector delivery (Risk UCB033)	\$20,000	12/03
3	Travel for accelerator end-to-end test, 100%	\$5,000	6/04
4	Tom Nolan flight software support (Risk UCB033)	\$15,000	5/04
5*	Engineering support to maintain schedule (Risk UCB033)	\$40,000	1/04
6	Tycho's thermal vac chamber is planned for SIT and SEPT tests. If that fails we will have to rent a chamber. Probability low-moderate.	\$25,000	8/04
7	Late HET Detector delivery resulting in additional acceptance tests for one instrument	\$40,000	7/04
8	LET foils fail acoustic testing (unlikely since ETU tests passed)	\$10,000	5/04
9	HET Actel additional testing	\$20,000	6/04
10	SEPT re-test if Kiel cannot pay for it	\$30,000	5/04

1.2. **Significant System-Level Accomplishments**

- Participated in Project EMC committee meetings
- Participated in various MRB/FRB meetings
- Participated in several SEP thermal vac test planning meetings
- Participated in several PLASTIC Flight Software meetings
- Held STREO IMPACT Status meeting with Project at UCB

1.3. **System Design Updates**

- None

1.4. **System Outstanding Issues**

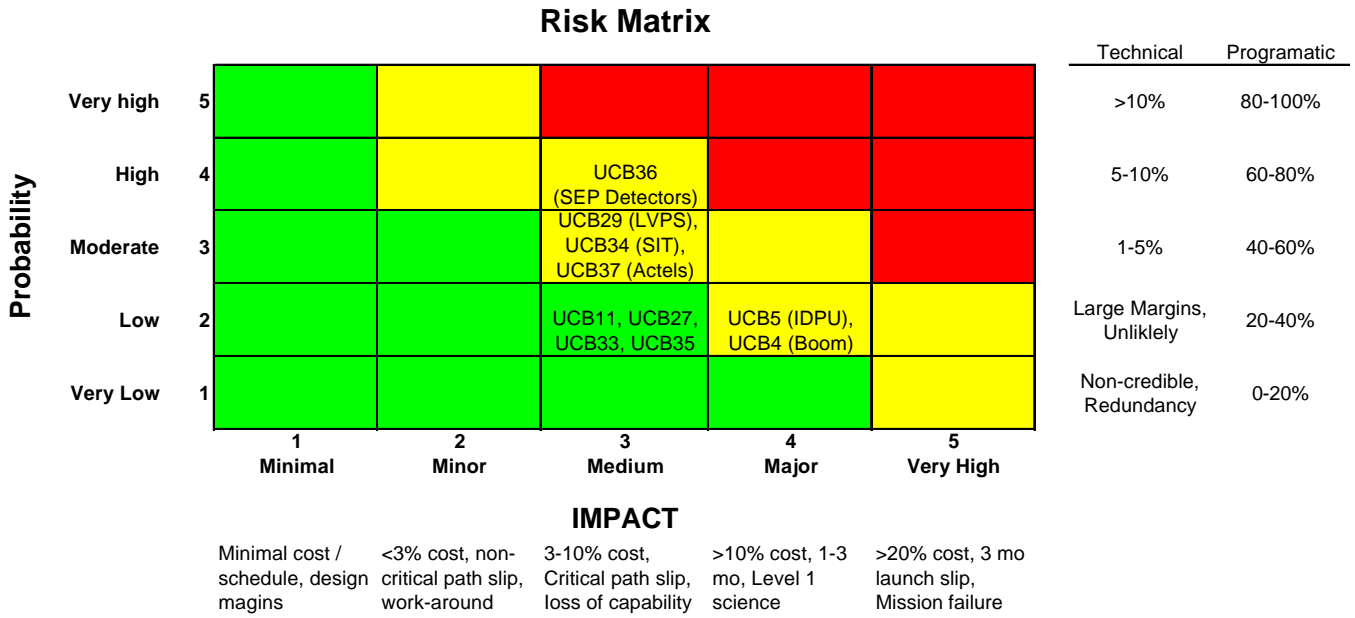
- LET L1 detector problems.
- PLASTIC Flight Software chronically behind schedule, beginning to impact PLASTIC test schedule

1.5. **Top 10 Risks**

Top 10 risks are attached. No change since last month.

STEREO IMPACT Technical Progress Report

IMPACT Top Ten Risks 10/2004



STEREO IMPACT Technical Progress Report

No.	Risk Item	Score	Mitigation	Mitigation Schedule			
				Sub-system Test	System Test	Env test	Early Orbit Test
UCB_5	IMPACT boom is a new design. Failure could affect Imager pointing requirements as well as boom-mounted instruments.	MEDIUM	Design for reliability. Early prototype testing. Qual model testing completed. Adequate force margins demonstrated.	MEDIUM	MEDIUM	MEDIUM	LOW
UCB_4	The IDPU is a single point failure mechanism for the IMPACT suite and PLASTIC	MEDIUM	IDPU is a simple, reliable system. Extra attention has been paid to ensuring its reliability, minimizing the risk of fault propagation. Extensive EM & FM testing	MEDIUM	MEDIUM	MEDIUM	MEDIUM
UCB_36	HET, LET, and SIT detector fallout during life test. Not enough HET detectors for the flight build, and few or no spares for SIT and LET. New detectors being obtained, but there is a schedule risk	MEDIUM	Prep for early delivery of replacement detectors. Proceed with poor detectors and replace them with new ones later in the schedule	MEDIUM	MEDIUM	MEDIUM	LOW
UCB_34	SIT Schedule slippage, on critical path	MEDIUM	Add manpower to recover schedule	MEDIUM	LOW	LOW	LOW
UCB_29	LVPS behind schedule, on critical path; further slipping could delay delivery to spacecraft	MEDIUM	Add manpower to LVPS task to avoid further slippage	MEDIUM	LOW	LOW	LOW
UCB_37	Some Actels have been programmed with the old algorithm. Recent data from RK indicates the possibility of failure of these parts	MEDIUM	Replace Actels in IDPU and SEP Central since these are single point failures for multiple instruments. SEPT, SWEA, STE, HET Actels not changed. Accumulate test hours to reduce risk	LOW	MEDIUM	MEDIUM	MEDIUM
UCB_35	New undiagnosed Actel part failures may impact flight hardware	LOW	Keep abreast of Actel's analysis results; Make changes to minimize ground bounce which may be related to failures according	LOW	LOW	LOW	LOW
UCB_33	Instrument fabrication & test schedule limited by available personnel	LOW	Subcontract assembly work, authorize over time, bring on new people	LOW	LOW	LOW	LOW
UCB_11	Stringent EMI requirements may delay schedule if testing fails	LOW	Careful design, ETU power converter testing, early system testing	LOW	LOW	LOW	LOW
UCB_27	Actel timing differences between flight & ETU parts may cause failures late in testing impacting delivery schedule	LOW	Do FM Thermal Vac early to allow time for finding and fixing timing problems; for designs on the critical path, consider installing a flight Actel in the ETU &	LOW	LOW	LOW	LOW

STEREO IMPACT Technical Progress Report

2. Berkeley Status

2.1. *Summary of Status*

Schedule status through November has been provided separately.

2.2. *Major Accomplishments*

SWEA/STE:

- STE-U FM1 and FM2 environmental tests complete
- FM1 SWEA/STE-D integrated and tested, completed calibrations. One channel is found to fail during calibrations when it was warm.
- FM2 SWEA/STE-D ready to assemble

IDPU:

- IDPU FM1 integrated and passed vibration. Some trouble in thermal vac due to a bad diode in the LVPS; thermal vac aborted after 5 good cycles. Diode replaced with one from a newer lot. Workmansip vib and remaining thermal vac cycles pending
- IDPU FM2 complete.
- PLASTIC software continues to be late. No problem with IMPACT Flight Software during Suite I&T.

LVPS/HVPS:

- SIT HVPS FM1 and FM2 delivered.
- SWEA/STE-D FM1 LVPS FM1 and FM2 delivered.
- PLASTIC FM1 and FM2 LVPS delivered. A question about some rework that was done results in some additional rework to be done (authorization for repair given in December).
- SEP FM1, FM2 delivered, returned. The top board of FM1 to be replaced to improve reliability (see PFR 1024). Input filter to be reworked to improved noise suppression in both converters. Possible source of problem 1025 identified and to be reworked in both converters.
- IDPU FM1 and FM2 LVPS delivered.

Boom:

- FM1 and FM2 units complete, through vib & thermal vac, mated with MAG, STE-U.

GSE:

- All GSE delivered. Some added features in progress.

2.3. *Design Updates*

- None.

2.4. *Outstanding Problems*

- SEP LVPS issues
- PLASTIC LVPS rework
- PLASTIC flight software behind schedule

2.5. *New Problems*

2.6. *Top Risks.*

- Open Actel problems

STEREO IMPACT Technical Progress Report

- PLASTIC IDPU software late

2.7. *Problem/Failure Quick Look*

ID #	Description	Assignee	Opened	Closed
1001	Qual boom deployment failure in Thermal Vac	McCauley	2003-08-15	2004-01-07
1002	STE-U Assembly problems (broken bond wire)	Curtis	2004-04-12	2004-06-25
1004	SEP LVPS Middle FM1 Problem	Heavner	2004-04-23	2004-06-08
1005	SEP LVPS Top FM1 Problem	Heavner	2004-04-27	2004-06-08
1006	STE-U FM1 Mis-wire (thermal vac feed-through)	Curtis	2004-04-30	2004-06-25
1007	SWEA LVPS FM1 LTC1877 Failure	Curtis	2004-05-10	
1008	STE-U FM1 Door failure (cold)	Curtis	2004-05-10	2004-06-25
1009	STE-U FM1 preamp oscillations	Curtis	2004-06-14	2004-06-25
1011	STE-U FM1 Door failure (post-vib)	Curtis	2004-06-28	
1012	IDPU FM1 LVPS part failure	Curtis	2004-07-15	
1013	STE-U FM2 door failure (status sense switch)	Curtis	2004-07-27	
1014	STE-U FM2 door failure, actuator burn-out	Curtis	2004-07-30	
1015	SEP FM1 LVPS Middle Board, pin damage	Heavner	2004-07-28	
1016	FM2 Boom Lock Pins, epoxy in the hole	McCauley	2004-08-02	
1017	SEP FM2 LVPS Middle board, wire damage	Heavner	2004-08-05	
1018	SIT FM2 HVPS stack broke	Berg	2004-08-25	
1020	FM2 Boom Actuator Harness	McCauley	2004-09-13	
1021	FM2 SWEA/STE-D Temp Sensor	Curtis	2004-09-27	
1022	SIT FM1 HVPS Stack broke	Curtis	2004-09-28	
1023	SWEA FM1 LVPS Transformer	Curtis	2004-10-04	
1024	SEP FM1 LVPS flex problem	Curtis	2004-10-08	
1025	SEP Intermittents during Suite I&T	Curtis	2004-11-05	
1026	FM2 PLASTIC LVPS short	Heavner	2004-12-1	
1027	FM1 IDPU Thermal Vac D5 Failure	Curtis	2004-11-23	

STEREO IMPACT Technical Progress Report

3. GSFC (SEP) Status

STEREO Progress Report for November, 2004 (GSFC: Tycho von Roseninge, Sandy Shuman, Kristin Wortman, and John Hawk)

During the past month our efforts have been focused on four areas: (1) testing HET detectors, (2) completing the design and fabrication of all the remaining mechanical parts, (3) completion of the HET flight software, and (4) preparation for the SIT/SEPT Thermal Balance test in Building 4 and the subsequent SIT Thermal Vacuum test.

Last month it was reported that we were short of a full complement of detectors for HETs FM1 and FM2. Four new H3 detectors were received from Micron and they have been subjected to I-V tests (current versus bias voltage), C-V tests (Capacitance versus bias voltage tests), alpha tests, and a lifetest. All four detectors have looked very good. In particular the leakage currents have been very stable during lifetest and these detectors will all be fully depleted with the existing flight bias voltage. Consequently we have requested that Micron make new H1 detectors (for which we currently have no spares), also with the single Si oxide layer.

The parts for SIT are almost all designed and fabricated (a small cover to go over a SIT thermostat and a bushing for the SIT door both need to be completed). The coatings for the SIT and LET collimator interiors have both been revised, as has the choice of inner LET aperture foil (this foil now looks just like the outer foil and so provides redundancy in case the outer foil breaks). We have supported systematic testing of the FM2 SIT and, as a result, some assembly errors have been corrected. A source holder to hold a Ru106 electron source on the front of a HET has been designed and will be available soon.

A revised stress/vibration analysis was completed for LET. This analysis shows a resonant frequency of 68 Hz and adequate safety margins.

A new version of the flight software has been developed to deal with detector cross-talk (see last month's progress report). Testing has revealed several errors in the design and in the on-board software implementation. At least one residual error is causing crashes to occur and is being actively searched for. The prior version was stable throughout the SEP EMC test but it lacks the cross-talk corrections.

Next Month

Complete fabrication/coating of all the telescope thermal-control surfaces (primarily window foils and collimator coatings).

Complete testing of the revised on-board HET code.

Support the Technical Readiness Review prior to starting environmental testing.

Deliver HET FM2.

STEREO IMPACT Technical Progress Report

Complete submission of forms required for radioactive sources for testing HET, LET, and SIT at APL, GSFC, and KSC. These are essentially complete now.

Support the SIT/SEPT TB and TV tests.

4. Kiel/ESTEC (SEPT) Status

November 2004

4.1. *Summary of Status*

- a) FM1 SEPT-NS reworked after failure in FPGA (see IMPACT PR-7005 SEPT-Counting).
- b) All four units (FM1 and FM2, SEPT-E and -NS) re-vibration carried out with one failure of minor importance (see IMPACT PR-7006 SEPT-Rod).
- c) All four units (FM1 and FM2, SEPT-E and -NS) TV re-qualification carried out with nominal performance.
- d) All four units ready for Thermal Balance Test and delivery to Project in January 2005.

4.2. *Major Accomplishments*

- a) To recover from an FPGA failure in the digital electronics of FM1 SEPT-NS, which was detected during SEP flight model integration at JPL, the digital and analog electronics boards of this unit were exchanged with the respective boards of the flight spare in accordance with the plan of action in IMPACT PR-7005 SEPT-Counting.
- b) The failed digital board received a new SRAM which did not remove the failure pattern, corroborating the failure diagnosis pointing to the FPGA. The failing FPGA has not yet been removed, awaiting further instructions from the Project failure review board. This is holding up the repair work for the board which shall serve as flight spare. The flight spare is needed for SEPT proton calibration.
- c) After a series of failures and an accident earlier this year and after repair work has been carried out, the flight units were subjected to a full level re-qualification programme. Vibration tests were passed with nominal performance of the sensors and electronics, except for a loosening of two pin-puller rods, which were not properly torqued and staked in the internal M2 thread of the pin-puller tip. This staking was not done for the fear of losing a pin-puller in case of an unexpected failure later-on in the I&T programme which might require a disassembly. However, having proceeded thus far in the programme, we considered it justified to stake the rods now, even in those mechanisms which performed well after vibration (see IMPACT PR-7006 SEPT-Rod). This staking after vibration does not invalidate the vibration test. All doors opened flawlessly. A Vibration Re-test Plan (Doc. No. STEREO-ETKI-005b) and a preliminary Vibration Re-test Report (Doc. No. STEREO ETKI-011b) were issued. A final test facility report will be issued in due time.
- d) With the staking applied to all pin-puller rods, the units were subjected to a TV re-qualification to the full temperature range from -40 °C through +50 °C in 7 cycles. All CPTs performed nominally, all 16 doors opened flawlessly (8 in hot soak, 8 in cold soak). A Thermal Vacuum Re-Test Plan (Doc. No. STEREO-ETKI-006b) and a preliminary Thermal Vacuum Re-Test Report (Doc. No. STEREO-ETKI-012b) were issued. A final test facility report will be issued in due time.

4.3. *Design Updates*

STEREO IMPACT Technical Progress Report

4.4. *Outstanding Problems*

1. IMPACT PR-7005 SEPT-Counting needs Failure Review Board approval in order to continue repair work of the flight spare electronics. Unresolved situation delays the proton accelerator calibration activities.

4.5. *New Problems*

4.6. *Top Risks*

4.7. *Problem/Failure Quick Look*

ID #	Description	Assignee	Opened	Closed
7001	SEPT-DoorOpening	Mueller-Mellin	2004-02-20	
7002	SEPT-Detector	Mueller-Mellin	2004-03-05	
7003	SEPT-Pinpuller	Mueller-Mellin	2004-03-10	
7004	FM2 SEPT-NS accident	Mueller-Mellin	2004-05-04	
7005	SEPT-Counting	Mueller-Mellin	2004-10-10	
7006	SEPT-Rod	Mueller-Mellin	2004-11-23	

5. Caltech/JPL (SEP) Status

5.1. *Summary of Status*

Activities centered on investigating the L1 detector mount failures and finishing the EMC test.

Major Accomplishments:

- Completed EMC test.
- LET radiation test fixture completed.
- All Caltech electronic boards are ready for integration.

Critical Milestones status (from Critical/Key Milestone chart of 3/31/04):

- Milestone 13: IMPACT Suite EMC Test Complete was completed.
- Milestone 17: SEP Suite – FM 1 Environmental Tests were not completed.
- Milestone 19: SEP Suite – FM 2 Ready for Delivery to APL was not completed.

Detectors:

- Upon removal from FM1 the reason for the open circuit on one of the L1 detectors was discovered: one of the haywires was broken. Inspection of all 40 haywires on the 10 L1 detectors in FM1 revealed that a few others were also broken but they were on the guard of the detector, which is not used. In addition, 9 wires were stretched and necked down.
- At the end of the month a plan to replace the necked-down portions of the 9 haywires and to provide more strain relief for the existing haywires was being prepared.

Electronics:

- The EMC test of FM 1 was finished early in the month.
- A decision was made to replace the Solithane 113 staking material in the SEP flight harnesses with a different material acceptable to the GSFC project.
- A thermal balance/thermal vacuum plan for SEP Central/LET/HET was written by John Hawk and distributed for review.
- Small hardware changes were made to the logic boards in response to a problem discovered following the EEPROM and software review in October.
- The thin-film resistors on LET and SEP Central were inspected and no problems were found.
- By month's end, all electronic boards produced at Caltech were ready for installation in the flight units.

Software:

- Continued making tweaks to the LET and SEP Central software.
- Continued analysis of MSU accelerator test data.

GSE:

- Most activity was directed towards preparing for and participating in the EMC test.

5.2. *Design Updates*

- Resource updates will be sent separately.

STEREO IMPACT Technical Progress Report

5.3. *Outstanding Problems*

- Jagged edges on L1 detectors are present in a good fraction of the detectors inspected so far and there appears to be a correlation with breakages in handling and acoustics. We have identified just enough detectors (20) that have smooth edges to use in the LET flight instrument. And additional 7 with “marginally good” edges will be classified as flight spares.

5.4. *New Problems*

- The L1 haywire repair did not leave enough strain relief and several wires were broken or stretched thin upon installation into FM 1. A new repair cycle is being initiated.

5.5. *Top Risks.*

- Actel parts may not be reliable. This would affect many NASA projects.
- Some problem may crop up during environmental testing to delay the schedule.
- The budget is very tight with no reserve being held at Caltech.
- L1 detectors may break during acoustics.

5.6. *Problem/Failure Quick Look*

ID #	Description	Assignee	Opened	Closed
2001	SEP Bias Supply post-regulator failure FM 1	Kecman	2004-04-27	
2002	L1 Detector mounts with fissure in traces	Cummings	2004-07-01	

5.7. *Lien List*

- The L1 repair procedure at JPL took longer than expected and more detectors were repaired than expected. We originally planned on repairing 26 detectors. A total of 36 were repaired. Earlier estimate was \$40,000. New estimate for expenditures to date: \$80,000.
- Purchase of eight H3 detectors from Micron. Cost = \$25,000.
- Repairs to Analog/post reg and Bias Supply boards at JPL were not in budget. Estimate: \$5,000.

STEREO IMPACT Technical Progress Report

- Partial design, fab, assembly, and cleaning of LET radiation test fixture was not in budget. Estimate: \$8000.
- Remove Solithane 113 from harnesses and replace with Conathane at JPL. Estimate: \$10,000
- Additional GSE: \$3000
- Design and fab T/V test cables. We had hoped to use the ones from ACE and make adapters but the connectors have cadmium and will outgas too much. We had \$4,000 in for this activity. New estimate: \$10,000, for a delta of \$6,000.
- Hardware changes to SEP Central logic boards. Estimate: \$4000.
- Estimate of costs for L1 detector repair and replacement (\$391,000 +):
 - Purchase of six L1 spare detectors from Micron. Estimate: \$18,000 for Micron.
 - New L1 order for 30 L1s: \$75,000
 - Testing manpower at Caltech/JPL (36 units): \$18,000
 - Modify Caltech test mounts: \$5,000
 - JPL 2nd round of repairs on haywires: \$50,000 + \$10,000 for fixture mods
 - Acoustic test of 7 bad-edge detectors: \$10,000
 - Schedule slip: \$80,000
 - Retest environments at JPL in May: \$100,000
 - Manpower for reassembly and test in May: \$20,000
 - Extra travel for removing instrument from spacecraft: \$5,000
 - New mounts and inspection costs: GSFC to provide.

6. SIT MONTHLY TECHNICAL PROGRESS REPORT

November 2004

6.1. SUMMARY of STATUS

- a. FM1 unit - Conformal coated and Assembled (with FM2 HVPS) but missing: Sunshade/cover, thermal hardware. Needs final bakeout of electronics plus installation of shield board and thermal hardware before TV.
- b. FM2 - Electronics – conformal coated and baked out and tested. At GSFC waiting installation of shield board and thermal hardware.
- c. Telescope is assembled but missing sunshade/cover and thermal hardware. It is assembled to the coated and baked FM1 HVPS. Under test at Umd.
- d. Spare SSDs – still in manufacture at Ortec.
- e. Flight Software – Current version is 09/03/04 and is under test at UMD .

6.1.1. Schedule Changes

The current SIT schedule is available from the project scheduler.

6.2. MAJOR ACCOMPLISHMENTS

6.2.1. This Month

FM1 was returned from Caltech to Umd where it underwent vacuum testing, first with the telescope and hvps, (and the hvps by itself) and then with all three boxes together. Problems were encountered getting the hv in the telescope up to a working level. (Noted previously in September). These were tracked to wiring and assembly errors in the telescope which were fixed. The telescope/hvps combination was then operated successfully at the high end of its operating range. The electronics was integrated, and a successful alpha run was taken. The unit was returned to GSFC for installation of sunshade/cover, thermal hardware, electronics shield board and miscellaneous mechanical bits when they become available.

FM2 telescope was assembled and integrated with the FM1 HVPS. The combination is at Umd undergoing vacuum testing. We have had similar problems to the FM1 unit getting the telescope HV up to a working level, but for apparently different reasons. Work continues to resolve this.

All major sunshade/cover parts were released to the shops.

6.2.2. Next Month

Next month we will finish troubleshooting the FM2 telescope high voltage problem. We also hope to make progress getting the missing hardware (sunshade, thermal, shield board, bits) installed on both units so we can proceed to environmental testing. In addition we hope to bakeout the FM1 unit (less the telescope).

STEREO IMPACT Technical Progress Report

6.3. **DESIGN UPDATES**

6.3.1. Resources

	Last Month	This Month	Change
Mass (kg) *	1.46	1.46	0
Power (W)	1.65	1.65	0
Telemetry (bps)	418	418	0

* Includes 200g book-kept by GSFC for SIT structure

6.4. **OUTSTANDING PROBLEMS**

Spare SSDs are stuck in manufacturing at Ortec.

6.5. **NEW PROBLEMS**

6.6. **NEW RISKS**

6.7. **PROBLEM/FAILURE QUICK LOOK**

Starts at first turn-on of flight hardware.

ID #	Description	Assignee	Opened	Closed
SIT1	Apparent failure of PH300 chip U4 of FM1 energy board	PHW	4/29/04	
	TBD			

7. CESR (SWEA) Status

Both flight units delivered to UCB, no open issues. Integration with UCB electronics covered in UCB section.

8. GSFC (MAG) Status

FM1 and FM2 complete and delivered to UCB for integration with the IDPU and Boom. See the UCB section for status of that activity.

STEREO IMPACT Technical Progress Report

9. EPO at UCB

Monthly E/PO Report

November, 2004

Formal Education:

3,000 copies of *Exploring Magnetism* and *Exploring Magnetism in the Solar Wind* Teachers Guides were printed. This printing was mostly funded with STEREO-IMPACT E/PO funds with supplemental funds from the E/PO programs of THEMIS, RHESSI, and FAST.

Nov. 5th: L. Peticolas and N. Craig presented a booth at “Smithsonian Teacher’s Night 2004” at the Chabot Science Center in Oakland, CA. 400 teachers attended this event. We distributed the STEREO flier with the teachers. We also had stations with the magnetism activities in the *Exploring Magnetism* teacher’s Guide.

Nov. 13th: AISES in Anchorage – L. Peticolas and N. Craig presented teacher professional development workshop on magnetism with new magnetism guide, auroras, and the Sun. Also gave a short presentation on the space weather and showed movies and simulations of the CMEs.

Nov. 19th: NASA Education Resource Workshop at the Johnson Space Flight Center in Houston, TX to present the Exploring Magnetism Guide originally developed by the STEREO-IMPACT E/PO program. (L. Peticolas) This workshop was designed so that all the materials that were rated “outstanding” by the OSS product review could be disseminated to teachers, E/PO specialists, scientists, and science museum staff.

Informal Education:

D. Bithell and R. Morales Manzanares continued to work on the sonification software for the STEREO sounds project. They met with N. Craig, L. Peticolas, and J. Luhmann to discuss future direction on Nov. 30th. D. Bithell and R. Morales Manzanares will present a demo at the SWG meeting in December.

STEREO in general:

N. Craig and L. Peticolas gave feedback on E/PO STEREO poster, on STEREO visualizations of spacecraft.

N. Craig, T. Kucara and D.Christopher’s request for a new AGU Joint Assembly special session for Spring ’05 is approved. The title is *Bringing the Sun to Earth: Solar and Sun-Earth Science Education and Public Outreach Efforts*.

Respectfully Submitted,
IMPACT E/PO Lead and Specialist, Nahide Craig and Laura Peticolas