

STEREO IMPACT Technical Progress Report

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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 October 2004.

Sincerely,

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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

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	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

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	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 SEP flight harnesses, TBD	\$20,000	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	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

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
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
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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*

- Completed full IMPACT Suite Integration and Test
- Completed IMPACT Suite EMC tests
- Completed IDPU/SWEA TRR
- Completed SIT door review
- Participated in Project EMC committee meetings
- Participated in various MRB/FRB meetings

IMPACT Suite at EMC



1.3. *System Design Updates*

- None

1.4. *System Outstanding Issues*

- Persistent SEP mechanical issues impacting schedule.

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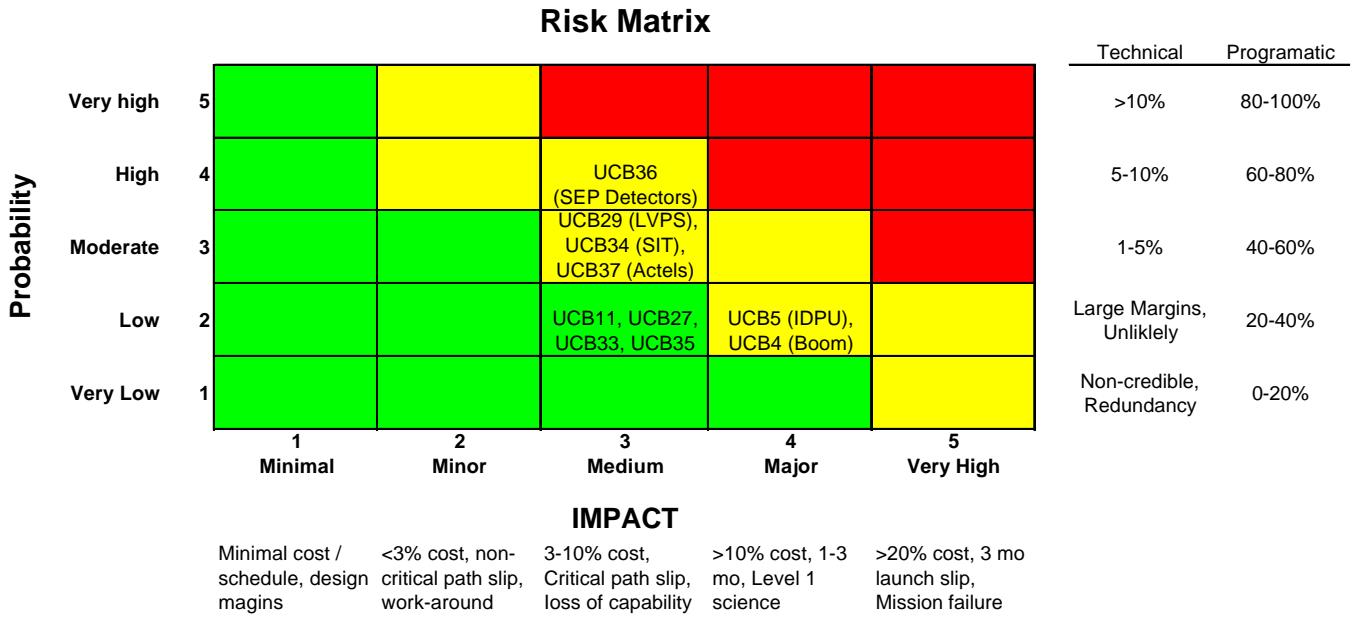
- PLASTIC Flight Software chronically behind schedule, beginning to impact PLASTIC test schedule

1.5. ***Top 10 Risks***

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

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IMPACT Top Ten Risks 10/2004



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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 a 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

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2. Berkeley Status

2.1. *Summary of Status*

Schedule status through September 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, participated in Suite I&T, ready for environments pending minor rework.
- FM2 SWEA/STE-D pending FM2 LVPS test completion

IDPU:

- IDPU FM1 integrated and passed CPT, participated in Suite I&T, ready for environments pending minor rework, fix MAG Heater board EMC problem.
- IDPU FM2 complete pending fix of MAG heater board EMC problem.
- PLASTIC software continues to be late. No problem with IMPACT Flight Software during Suite I&T.

LVPS/HVPS:

- SIT HVPS FM1 and FM2 coated, FM1 fixed, delivered.
- SWEA/STE-D FM1 LVPS FM1 delivered, FM2 in test.
- PLASTIC FM1 and FM2 LVPS delivered.
- SEP FM1, FM2 delivered
 - Some troubles found at Caltech, requires rework at UCB; PFR 1024
 - Also see some SEP intermittents in I&T likely to be caused by LVPS, under investigation.
 - SEP LVPS fails EMC CE – needs work/retest at UCB.
- IDPU FM1 and FM2 LVPS delivered.

Boom:

- FM1 and FM2 units complete, through vib & thermal vac, mated with MAG, STE-U.
- FM1 boom mated with FM1 SWEA for EMC.
- FM1 boom suite participated in Suite I&T, EMC.
- FM1 SWEA/STE demated for calibrations & environments.

GSE:

- All GSE delivered. Some added features in progress.

2.3. *Design Updates*

- None.

2.4. *Outstanding Problems*

- SEP LVPS issues

2.5. *New Problems*

- SEP and PLASTIC LVPS noise issues in EMC

2.6. *Top Risks.*

- Open Actel problems

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- 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	

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3. GSFC (SEP) Status

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

During the past month our efforts have been focused on three areas: (1) remotely supporting the IMPACT EMC test, (2) completing the design and fabrication of all the LET, HET, and SEP Central mechanical parts, and (3) completion of flight software. The EMC test went relatively smoothly for us. HET FM1 was delivered to Caltech prior to the EMC test. Some detectors that had been in HET FM1 for the Michigan accelerator test had to be replaced as a result of completing detector tests which were not done prior to going to Michigan State (MSU). As a result we currently find ourselves short of a full complement of detectors for HETs FM1 and FM2. Specifically, we will be populating both HET FM1 and FM2 with detectors which are all flight worthy except for the H6 detector in each telescope. The H6 detectors in FM1 and in FM2 will both be running at voltages somewhat lower than what is required for full-depletion. If possible we will eventually replace the two H6s. This is a relatively easy process once replacement detectors are available. Four possible replacements are on their way to GSFC now.

One of the important findings at MSU was that there are two types of cross-talk between pulse height analyzer channels in the HET electronics. This cross-talk was not considered in the design of the on-board software, resulting in misqueueing and incorrectly rejecting some events (primarily events where nuclei heavier than He enter the HET). One of the cross-talk types is cross-talk between H1i and H1o. This is associated with capacitance between these two detectors. The second type of cross-talk occurs in the PHASIC chip which contains the pulse height analyzers. Neither type of cross-talk became apparent until we were at MSU with a Ni beam which created very large signals.

The two types of cross-talk have now been extensively characterized and a C program has been written which properly analyzes simulated cross-talk events. New machine code has been written to implement the new processing algorithm on-board. Testing of the new machine code is currently underway. Ultimately a return trip to MSU will be highly desirable.

The LET collimator design is currently undergoing review and some changes are being implemented in the LET windows. The LET detector apertures are covered by two 1/3rd mil Kapton foils. The outer foil has Goddard composite coat on the outside and VDA on the inside. The inner foil was initially VDA on both sides. However concerns about the possibility of the outer foil rupturing have lead to the following alternative design: Make the inner foil identical to the outer foil and coat the interior of the LET collimator with Goddard composite coat.

The support tubes for LET have been remade and a revised stress/vibration analysis is underway for LET.

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A SIT door/collimator design review was conducted and the SIT door design is essentially complete. The more difficult parts for the SIT door/collimator have been submitted for fabrication.

There has been extensive support provided to SIT. There were two wires between the SIT FM1 detector and the SIT High Voltage Power Supply (HVPS) which needed to be interchanged. There were two wires between the SIT FM1 telescope and the HVPS which were broken and a second one which had undergone major pulling force. A clamp which had been installed upside down in the SIT telescope lead to a short-circuit to the telescope housing.

We regret that Larry Ryan, the analogue design engineer in charge of the HET electronics, abruptly decided to leave GSFC. Fortunately the two HET electronics systems were completed prior to his departure, as were short and comprehensive functional tests.

Next Month

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

Complete testing of the revised on-board HET code.

Support the Technical Readiness Review prior to starting environmental testing.

Assemble SIT FM2 and HET FM2.

Fabricate test harnesses for the SIT/SEPT thermal balance test and the SIT thermal vacuum test.

Complete submission of forms required for radioactive sources for testing HET, LET, and SIT at APL, GSFC, and KSC.

4. Kiel/ESTEC (SEPT) Status

SEPT Monthly Technical Progress Report October 2004

4.1. *Summary of Status*

- a) FM1 SEPT-E and -NS interface check with SEP-Central successful.
- b) FM2 SEPT-E and -NS interface check with SEP-Central successful.
- c) Failure in FPGA of SEPT-NS detected (see IMPACT PR-7005 SEPT-Counting). This failure does not invalidate EMC testing.
- d) EMC test of FM1 SEPT-E and -NS within FM1 IMPACT with minor exceedences.

4.2. *Major Accomplishments*

- a) FM1 SEPT-E and -NS completed interface checks with ETU SEP-Central and lab LVPS as well as with FM1 SEP-Central and FM1 LVPS.
- b) FM2 SEPT-E and -NS completed interface checks with ETU SEP-Central and lab LVPS as well as with FM1 SEP-Central and FM1 LVPS (not with FM2 SEP Central and FM2 LVPS!).
- c) Failure detected in electronics of FM1 SEPT-NS Telescope A (PDFE0 and PDFE1): stuck bit no. 15 in FPGA arithmetic prevents counting above 32,767. Telescope B (PDFE2 and PDFE3) okay. Failure may have been around since assembly of electronics and went undetected because test pulser runs generated counts only up to 20,000. Problem/Failure Report "IMPACT PR-7005 SEPT-Counting" issued.
- d) SEP onboard software was debugged. SEP GSE software was debugged.
- e) Revised specification for SEPT science data packets (CCSDS telemetry packets with APID 258hex and 259hex. Revised specification for SEP housekeeping data packets (CCSDS telemetry packets with APID 241hex).
- f) EMC test RE02 with minor exceedences (2 - 5 db) due to SEPT 18 MHz clock harmonics between 432 and 504 MHz.
- g) EMC test RE01: passed. Suspected 19.8 kHz and 39.6 kHz exceedence not caused by SEPT.
- h) EMC test CE01,03: 200 kHz converter harmonics seen on harness (not generated in SEPT, though).
- i) EMC test RS03: excess counts at 1 – 3 GHz.
- j) EMC test CS: passed.
- k) Rework started to recover from PR-7005.

4.3. *Design Updates*

4.4. *Outstanding Problems*

1. IMPACT PR 7001, 7002, 7003 will be closed after repetition of environmental tests Vibe and TV.
2. IMPACT PR 7004 will be closed pending Project approval.

4.5. *New Problems*

1. IMPACT PR 7005 SEPT-Counting issued (see above).

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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	

5. Caltech/JPL (SEP) Status

5.1. *Summary of Status*

Activities centered on repairing the L1 detector mounts, preparing for the EMC test by integrating FM 1 LET/HET/SEP Central/SIT and the Boom Suite and then executing most of the EMC test at a facility in Anaheim, CA.

5.2. *Major Accomplishments:*

- Completed repair of 27 of the L1 detector mounts.
- Integrated and tested the SEP and Boom suites for the first time.
- Completed most of EMC test.
- Prepared an acoustics/vibration test plan and procedure that was approved by GSFC Project personnel.

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

- Milestone 12: SEP Suite – FM 1 I&T was completed.
- Milestone 13: IMPACT Suite EMC Test Complete was not quite 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.

5.2.2. Detectors:

- The second and third sets of 10 L1 detectors were repaired at JPL. On three of the last batch a clear adhesive substance was noticed on and around flex bond pads, possibly interfering with the wire bonds. These three will be cleaned up before final repair.
- All L1 detectors were inspected for the jagged edge condition. Twenty have been identified as having smooth edges and will be the flight units. Several more were classified as “marginally-good” and will be the flight spares.
- The fabrication of the LET radiation test fixture was moved to Caltech. Small tweaks to the design were made and the fixture was in a Caltech shop being fabricated at month’s end.
- Thin-film resistors from State-of-the-Art were found to need a visual inspection. Only three types are used in LET and SEP Central and they are on the analog-post reg board. These will be inspected in November. If necessary, they will be replaced.
- It was decided to order more LET and HET detectors from Micron as spares. Six LET L1s and eight HET H3s will be ordered at a cost of \$43,000 dollars. Delivery is expected by the end of January 2005. The L1s will be in mounts that will need repair work at JPL.
- A new Actel directive may be in the works. Some missions are changing out their Actels for ones from a new foundry. What will be done on STEREO had not been decided by the end of the month.
- There is an issue with respect to the staking material used in the SEP flight harnesses made at JPL who used Solithane 113 instead of the GSFC-preferred Uralane 5753.

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GSFC and JPL were still in discussions at month's end to determine if they need to be remade.

5.2.3. Electronics:

- Flight sensors from other institutions were received and integrated with SEP Central and LET. Also the SEP suite was integrated and tested with the Boom suite in preparation for the EMC test.
- During these tests, SEP Central was observed to re-boot on occasion. It became stable enough to continue on with EMC testing and the cause will be investigated in November. It is thought to be a hardware problem, most likely an intermittent short. See PFR 1025.
- The clean room purge flow cleanliness test results were received and the GN2 was found to be very clean.
- The EMC test was started on 18 October and was nearly finished by month's end.
- The acoustics/vibration test plan for LET/HET/SEP Central was written by JPL personnel and approved by GSFC Project personnel.

5.2.4. Software:

- Continued making tweaks to the LET and SEP Central software.
- Continued analysis of MSU accelerator test data.
- The software and EEPROM review held in October led to some signal size measurements that revealed an unacceptable marginality and hence to the need for some small hardware changes on the logic board. These changes will be done in November.

5.2.5. GSE:

- It was decided to purchase an additional GSE computer at a cost of approximately \$3000.
- Most activity was directed towards preparing for and participating in the EMC test.

5.3. ***Design Updates***

- Resource updates will be sent separately.

5.4. ***Outstanding Problems***

- Some L1 detector mount traces were discovered broken after assembly into FM 1 and FM 2. See IMPACT_PFR_2002. A repair plan has been developed and is being implemented at JPL.

5.5. ***New 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.
- A clear adhesive material was found on some wire bond pads on L1 detectors. These will be cleaned before repairing the wire bonds.

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- SEP Central occasionally reboots. A hardware problem is suspected and an attempt will be made in November to track it down. See PFR 1025.
- Thin-film resistors from State of the Art may have a problem due to how they are cleaned. The ones in SEP Central will be inspected in November.
- SEP Central logic board will have some minor hardware changes done on it in November as a result of the October software/EEPROM review and subsequent measurements.

5.6. *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.

5.7. *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	

5.8. *Lien List*

- The L1 repair procedure at JPL has taken longer than expected and we are repairing more detectors than expected. We originally planned on repairing 26 detectors. Now we plan to repair 36. Earlier estimate was \$40,000. New estimate for expenditures to date: \$80,000. (Also as a heads-up for November's report, further repairs will be needed.)
- Purchase of six L1 spare detectors from Micron. Estimate: \$18000 for Micron, \$12000 for JPL, total = \$30,000
- 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.
- Partial design, fab, assembly, and cleaning of LET radiation test fixture was not in budget. Estimate: \$8000.
- Possible redo of harnesses depending on outcome of EMC test. Estimate: \$20,000

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- Actel swap. Estimate: \$0. This was done at Caltech and was part of Vincent's extension.
- 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.
- Possible swap of thin-film resistors. Estimate: \$5,000.
- Hardware changes to SEP Central logic boards. Estimate: \$4000.

6. SIT MONTHLY TECHNICAL PROGRESS REPORT

October 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 before TV.
- b) FM2
 - Electronics – conformal coated and baked out
 - Telescope – awaits assembly at GSFC
 - HVPS – FM1 at GSFC for repair and assembly to FM2 telescope. Conformal coated and baked out.
- c) Spare SSDs – still in manufacture at Ortec.
- d) 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 taken to Caltech where it was integrated with the rest of the IMPACT (except PLASTIC) and tested as a suite. SIT GSE software was used and modified to improve performance. The rest of the month was devoted to EMC testing in Anaheim. This testing was supported remotely from UMd.
- FM2 electronics was trimmed, conformal coated and baked out. Assembly of the FM2 telescope was begun.
- Work on the design of the telescope sunshade and acoustic cover continued and a design review was held.

6.2.2. Next Month

Next month we will return SIT FM1 to UMd where we will perform the post-EMC CPT, disassemble the electronics for bakeout and test the operation of the telescope and HVPS in vacuum with HV on and an Am241 source. (A test in September before EMC indicated that there were problems). HVPS bakeout will also be performed. Then we need to completely assemble both FM1 and FM2 with sunshades, covers, thermal hardware and everything tied down in flight fashion and prepare for Acoustic, Vibration and Thermal Balance testing at GSFC in December.

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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.

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9. EPO at UCB

Monthly E/PO Report

October, 2004

Formal Education:

Updates were made to the *Exploring Magnetism* Teacher's Guide sponsored by STEREO-IMPACT E/PO. These updates came from suggestions from teachers at a teacher professional development workshop at SSL at UC Berkeley that was part of a NASA THEMIS mission E/PO project and from the NASA Peer Review of Education materials. The guide was rated "outstanding" by the OSS review board and will be presented in Educators in November at NASA's Johnson Space Flight Center in Houston with other outstanding NASA products newly developed.

L. Peticolas and N. Craig met with D. Bithell and R. Morales Manzanares on October 12, 2004 to discuss the creation of a middle school lesson on sonification using scientific data.

L. Peticolas presented a workshop at the California Science Teacher's Association (CSTA) in San Jose, CA on Friday, October 15th called: "NASA STEREO (IMPACT) Mission Presents the Physics of the Sun." 86 teachers attended. California science standards were addressed while teaching about the electromagnetic spectrum, the different layers of the Sun, coronal mass ejections, and solar flares.

L. Peticolas and B. Mendez presented workshops entitled: "Teaching Space Science with GEMS Guides" at the Society for the Advancement of Chicanos and Native Americans in Science (SACNAS) conference in Austin, TX on Friday, October 22nd and the 23rd. These sessions taught about space weather using the Lawrence Hall of Science Great Explorations in Math and Science (GEMS) Teacher's Guide "Living with a Star." 22 teachers attended.

Informal Education and public outreach:

D. Bithell and R. Morales Manzanares continued to work on the sonification software for the STEREO sounds project. An upgrade of the Max-MSP software was purchased so that Java could be used. This may make it possible to use the software directly on a web page.

STEREO in general:

N. Craig worked with T. Kucera to create a special E/PO session at the Spring American Geophysical Union meeting for Solar and Geospace Mission E/PO poster presentations.

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