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

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

Sincerely,

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CC:

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IMPACT Team

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 February has been received, with a new allocation through May in the pipe. Because of pipe-line delays in the system through to the subcontractors (Caltech and UMd) it is important that IMPACT be funded somewhat in advance of expected spending.

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	02/04
3	Testing failure requires rebuild/retest a board (using existing spare parts)	$20,000	~02/04
4	EMC rework and retest required (Risk UCB11). Assume rework can be done in a week or two.	$30,000	05/04
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. $12,500 Quote is over the earlier ROM of $10K.~~	~~$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 (for now Caltech will hold the $10K against other liens)	$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

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 qualification costs of 10 units. We have asked for a quote from JPL. (Amount = ~$10,000 (guess); Probability = 100%; time frame = March 2004).	$10,000	3/04
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	$25,000	7/04

	could be significant. (Amount = ~$25,000 (guess); Probability = 50% (UCB might help us); time frame = July 2004).		
10	Launch delay costs to Feb 06	$67,757	12/05
11	Continued detector testing at Caltech in the event that delivery is delayed from October 04 to January 05	$118,089	10/04

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. This is desired but not required.	$20,000	11/03
5*	Engineering Support to maintain schedule (Risk UCB033)	$60,000	1/04
6	Replacement SSD detectors (only 2 of 5 detectors passed)	$6,000	3/04

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	$5,000	12/03?
4	Tom Nolan flight software support (Risk UCB033)	$15,000	2/04
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

1.2. *Significant System-Level Accomplishments*

- Held the SEPT TRR in preparation for the start of SEPT environments at ESTEC
- Participated in Project EMC and Contamination committee meetings
- Worked out the IMPACT bakeout plan with Contamination personnel

1.3. *System Design Updates*

- None

1.4. *System Outstanding Issues*

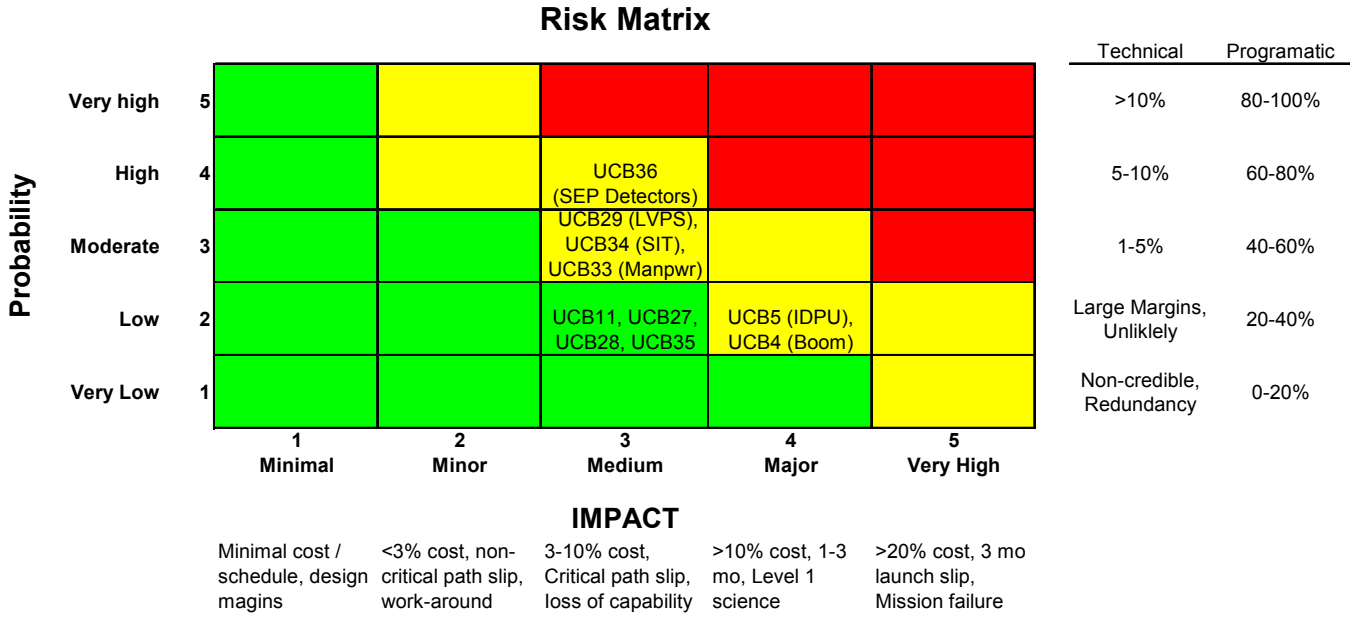
- IMPACT harness shielding waiver approved by EMC committee, pending CCB approval
- SWEA door activation transient waiver approved by EMC committee, pending CCB action.

- SWEA VMI Multiplier MRB pending test results (PFR 6001)
- A number of waivers against the environmental test specification submitted (Acoustics for SEPT, STE and SWEA, Thermal balance on one usit only, and SWEA vibration off the boom).

1.5. *Top 10 Risks*

Top 10 risks are attached. No changes to the list.

IMPACT Top Ten Risks 2/2004



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 mechanisim 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	Pree 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_33	Instrument fabrication & test schedule limited by available personnel	MEDIUM	Subcontract assembly work, authorize over-time, bring on new people	LOW	LOW	LOW	LOW
UCB_35	New undiagnosed Actel part failures may impact flight hardware	LOW	Keep abrest of Actel's analysis results; Make changes to minimize ground bounce which may be related to failures according	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
UCB_28	Thermal limitations of detectors result in a low bakeout temperature which might require a very long bakeout	LOW	Bakeout subsystems prior to detector integration to reduce time of instrument-level bakeout; early bakeout	LOW	LOW	LOW	LOW

2. Berkeley Status

2.1. *Summary of Status*

Schedule status through February has been provided separately.

2.2. *Major Accomplishments*

SWEA/STE:

- SWEA/STE flight boards in fabrication at J&T.
- First STE flight Preamp board loaded and tested
- First batch of STE flight detector boards test complete; all are acceptable, though some are significantly better than others. The Second batch is due soon.
- STE mechanical assembly started
- STE doors calibration sources applied, en route back to UCB

IDPU:

- Working on software Build 3 for IMPACT.
- PLASTIC software Build #2.3 tested with PLASTIC ETU at UNH; Next builds planned.

LVPS/HVPS:

- SIT HVPS FM1 tested with ETU SIT instrument, passed. Go-ahead given for FM2 build. There is an issue with the qualification of the capacitors used in the SIT HV stack that is being worked with the PCB.
- SWEA/STE-D FM1 LVPS in fabrication at UCB.
- PLASTIC FM1 LVPS assembly complete, in test. A few layout issues were discovered and closed via an MRB. The supply works but has stability issues that we are in the processes of tuning out. Also there seem to be some mechanical keep-out zone violations that may require an MRB to resolve.
- SEP FM1 boards loading complete for two boards, in test. Third board due soon from J&T.
- IDPU LVPS board layout problems discovered in fit-check prior to loading; the problem was fixed on the layout and a new board is in fabrication.

Boom:

- Subassemblies complete, units cleaned and transferred to clean room
- Top level assembly in progress

GSE:

- Last Science GSE (SWEA) complete. On-going software fix/improvement in progress
- Two new IDPU simulators in fabrication (one for Caltech to allow parallel testing of two units, one for UCB for parallel SWEA/STE testing).

2.3. *Design Updates*

- None.

2.4. *Outstanding Problems*

2.5. *New Problems*

2.6. *Top Risks.*

- LVPS schedule tight
- Open Actel problems

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

3. GSFC (SEP) Status

STEREO/IMPACT/SEP/GSFC Progress Report for February, 2004 – (von Rosenvinge, Baker, Hawk, Shuman, Nahory, Wortman)

3.1. *Summary of Status*

The current delivery dates of the HET flight units to Caltech are 1 June and 22 June of 2004. This change resulted from the recent rescheduling exercise.

3.2. *Major Accomplishments*

A C version of the on-board particle identification algorithms for HET was delivered to the flight programmers (K. Wortman and Tom Nolan). Translation of these algorithms to MISC code has been completed and is undergoing verification. The penetrating-particle algorithm uses tables with single byte values, whereas the MISC uses 3-byte words. Originally the one-byte values were each stored in a 3-byte word. To save memory space, three tables are now overlaid onto the first, second, and third bytes respectively of a MISC table of three-byte words. These tables are significantly compressed when they are uploaded and stored in the LET E2PROM. When they are read into the HET RAM, they are decompressed and overlaid. A similar scheme is used for the stopping-particle algorithm.

Initial attempts by the Thermal Coatings group to make LET foil material lead to a foil which, when released, rolled up into a roll with a pencil-sized diameter. We therefore designed and fabricated LET inner-foil mounting rings which can be used to mount foils prior to coating..

Received 9 additional HET detectors, which are just starting to be tested.

The first long-term test of HET and SIT detectors is nearing termination. As reported last month, our outstanding problem remains the low yield of detectors with stable leakage currents (particularly of H3 detectors). One of the two 'good' SIT detectors started to have noise growth prior to having an incident in which a power glitch caused the TV chamber safety valve to close and the cryopump to shut down (but did not cause the high voltage to shut off). After resuming pumping, this SIT detector was found to have an even higher noise. Subsequently this noise has slowly relaxed back to about the initial level. The other SIT detector has been stable throughout. An order has been placed for 20 H1 and 40 H3 detector mounts and Micron, the HET/LET detector manufacturer, is working on additional L3, H1, and H3 detectors. An order for additional SIT detectors is also being worked on.

The SIT ETU sensor was taken apart and parts were photographed. Some of the parts were found to differ from the drawings that had been provided by U of MD. In order to accelerate testing of the new boards at U of MD, the ETU was reassembled and returned to U of MD before completing the comparison of drawings and parts. The SIT ETU will be returned to GSFC to complete this task.

The HET flight model 1 (FM 1) PC board is now fully populated, including the flight Actel chip. A variety of changes were made in the Actel designs for both HET and for SIT in order to try to compensate for ground-bounce problems. A socket, which was originally in place for commercial Actels, was removed and the flight Actel was then installed. The first attempt to burn a FM2 Actel was unsuccessful, but a subsequent attempt worked fine. Testing of the HET FM1 board is complete.

Population of the 2 flight SIT energy boards will be completed as soon as a problem is resolved with an inductor which is physically larger than the space that was allocated on the board.

Two sets of flight LET boards were (mostly) populated and returned to Caltech.

Finalized design and drawings for the SEP-LVPS housing, shield, and spacers and sent out for fabrication.

Completed SIT electronics box fabrication drawings.

Continued work on SEP Central Enclosure design, including the HET, HV bias shield, and internal spacers.

Have requested an additional quote for the SEPT and SIT heaters since the first 2 were very expensive.

3.2.1. Next Month-

Complete definition of the HET and SIT housekeeping packets.
Complete fabrication and testing of the HET FM2 board.
Begin writing a Comprehensive Test Procedure for HET.
Continue efforts to fabricate LET foils.
Complete cross-check of drawings and SIT ETU parts.
Continue testing flight detectors for HET and SIT.
Fabricate the SIT electronics box.
Finalize the design of the SEP Central enclosure and submit for fabrication.
Update ICD with APL to include mounting hole diameters and correct LET FOV.
Update mass of SEP Main.
Work on defining the HET and SEPT radioactive sources to be supplied by GSFC.

3.3. *Design Updates*

None.

3.4. *Outstanding Problems*

3.5. *New Problems*

HET detector leakage currents growing in vacuum. At most 2 good SIT detectors. See previous discussion.

Continued slow schedule slipping. This has been addressed in the re-baselined schedule.

3.6. *Top Risks*

Inadequate numbers of good HET detectors. The whole HET telescope can easily be retrofitted late in the game if necessary.

3.7. *Problem/Failure Quick Look*

4. Kiel/ESTEC (SEPT) Status

SEPT Monthly Technical Progress Report
February 2004

4.1. *Summary of Status*

a) SEPT flight is ready for environmental tests.
b) SEPT Test Readiness Review held on 13-FEB-04.
c) SEPT vibration test performed.

4.2. *Major Accomplishments*

a) Four SEPT flight units and two brackets assembled, bench tested, and readied for environmental tests.
b) Comprehensive performance tests (CPTs) and door opening tests prior to vibration successful.
c) Vibration test of SEPT-NS (FM1 and FM2) with CPTs between axes successful.
d) Vibration test of SEPT-E (FM1 and FM2) with CPTs between axes successful.
e) CPT after vibration successful. Door opening test after vibration showed failure: 1 out of 16 doors did not swing fully open. Problem Report (IMPACT PFR 7001, SEPT-DoorOpening, 2004-02-20) submitted to Project on 01-MAR-04.
f) FRB held on 27-FEB-04. Recommendations carried out: rework of door hinges by cleaning with reamer, fabrication of new titanium hinge-bolts, lubrication of sliding surfaces, determination of spring margin: use only one spring to open.
g) Preparation for Thermal Vacuum Test, bake-out of non-flight harness.

4.3. *Design Updates*

4.4. *Outstanding Problems*

4.5. *New Problems*

1. Failure of SEPT-NS FM2 door to fully swing open. Decision to dismount all doors, replace hinge-bolts by new ones with smaller diameter, lubricate sliding surfaces with MoS2, clean hinges with reamer.
2. When disassembling the doors, another hinge-bolt got stuck (SEPT-E FM2), pointing to galling/cold welding of bare titanium surfaces (door-hinge and hinge-bolts). Proposed solution: use tiodize process. This makes disassembly of sensor and later re-vibration necessary.

4.6. *Top Risks*

4.7. *Problem/Failure Quick Look*

ID #	Description	Assignee	Opened	Closed
7001	SEPT-DoorOpening	Mueller-Mellin	2004-02-20	

5. Caltech/JPL (SEP) Status

5.1. *Summary of Status*

Activities centered on the detector development, electronics development, and flight and GSE software development.

Major Accomplishments:

- A few LET detectors were exposed to heavy ions in a beam at the 88" Cyclotron at LBNL and performed well.
- A boot code walk-through occurred for LET and SEP Central code.
- Integrated FM1 Analog/Post-reg and SEP Central Logic boards and they worked flawlessly together, including flight Actel.
- Delivered two flight PHASICs to GSFC for HET FM 2.

Critical Milestones status:

- Milestone 18 (HET-All Flight Detectors Received) has not been accomplished. All HET detectors should be received by sometime in March 2004. However, some already received have failed in testing and replacement detectors will be needed. The replacements are expected in May.
- Milestone 19 (LET-All Flight Detectors Received) was accomplished. However, the leakage current growth problem will mean some detectors will be replaced under warranty.

Detectors:

- Micron Semiconductor delivered 6 additional flight H3 detectors, bringing to 16 the total of such devices delivered out of the 20 ordered. They are completing testing of several more H3 detectors and expect to ship several more in the first week of March.
- Measurements were carried out to better characterize the leakage current growth problems that were originally observed on a number of the flight L3 detectors and have now also been seen on a sizable fraction of the other 1-mm-thick detectors (H1 and H3) in testing at GSFC. The current versus voltage (I-V) characteristic of the bad detectors develops a sharp upturn above approximately 100 V bias when operating biased in vacuum. The time scale for this change is several hours at a temperature of 40 C, and apparently longer at lower temperatures, although the lower-temperature behavior has not yet been thoroughly investigated. The I-V characteristic also recovers after a few hours unbiased in vacuum at 40 C.
- The prototype L3, H1, and H3 detectors were made from silicon with higher resistivity than most of the flight detectors. Of the two such devices that have gone through our thermal-vacuum life test, neither exhibited leakage current growth problems like the flight devices. Of the most recently delivered H3 detectors, one is made from this same high-resistivity material, and Micron has a few more such H3 detectors to be delivered in March. Thermal-vacuum testing of these detectors should help to determine whether the devices made from the prototype material are, as now suspected, all free of the leakage current growth problem.
- Micron has started producing additional 1-mm-thick detectors as replacements for the devices that failed the thermal-vacuum life test. At the moment they are concentrating their efforts on making H3 detectors, since that is where we have the greatest shortage

of flyable devices. They will also be producing some replacement L3 and H1 detectors (which are fabricated together on the same silicon wafers). The replacement detectors are being made from silicon wafers obtained from an entirely different crystal than that used for the detectors that have had leakage current growth problems. We are hopeful that this unusual behavior is material-related and will not be present in the replacement devices. It should be possible to quickly determine whether this is the case as soon as we receive the first of the replacement detectors.

- A test of the response of a few LET detectors to heavy-ion beams was carried out using the 88-inch cyclotron at the Lawrence Berkeley National Laboratory (LBNL) with help from colleagues at the Aerospace Corporation. Preliminary analysis of our measurements of pulse-height spectra of heavy ions ranging from B (Z=5) to Xe (Z=54) at 4.5 MeV/nuc indicated that the detectors are responding nominally.

Electronics:

- Work continued on LET flight software. Andrew Davis' latest software has been integrated but not yet tested in context of Rick's. Main items remaining are: testing of priority system for events, implementation of science frame, and real-time aspects of science frame building and sending. Goal is to have these items working (with Andrew's routines) prior to late March trip to LBNL accelerator.
- A boot code walk-through occurred for LET and SEP Central code with Jerry Hengemihle and Lillian Reichenthal.
- Agreement was reached on how to proceed with the further analysis of the failed Actel gate array. We have remounted the bad part and verified it still malfunctions with same symptoms. An Actel engineer will be visiting to learn how to stimulate the part to elicit the symptoms, and then he will take the part with him back to Actel in a known agreed-upon condition.
- Integrated the flight Analog/Post-Reg and SEP Central Logic boards in order to power up the flight Logic boards for the first time, initially with EM Actel device. Both FM sets of boards worked flawlessly on the first power-up.
- Successfully programmed the first flight Actel part (RT54SX72S) and tested it on the flight Logic board FM1. The device worked fine and was subjected to the temperature tests between -40 and +40 C while being connected to SEP Sensor Simulator. The flight Actel part passed all tests.
- Sent flight kits and assembly instructions for LET boards FM 1 & 2 to GSFC.
- Finished burn-in and functional testing on 18 flight PHASIC hybrids. Formed the leads on two devices for delivery to GSFC for HET FM2 in early March.
- Worked on automated conversion of "as-built" flight parts lists into the final parts list with the preferred format. The list will be ready when the last of the select resistor values are decided upon.
- Started preparations for ESD and clean room certification of the I&T facility.
- Started work on defining all test procedures that will be needed throughout I&T.
- Decided to turn on bias voltages in flight after the main power has been applied.
- Requested a second copy of IDPU simulator and made plans to purchase second GSE computer in anticipation of testing two FM units in parallel during environmental tests.
- Started preparations for accelerator run at LBNL, scheduled for late March.

Software (Davis):

- Completed and delivered 3rd and 4th fully-featured and working versions of LET event processing software to Rick Cook.
    - version 3:
        - window-correction for L1 detectors implemented
        - event formatting is now MSB-first
        - re-organization of variables and tables in RAM, per Rick's instructions
    - version 4:
        - further improvements to code that handles events with multiple hits
        - improvements to code that formats events for telemetry
- Implemented some changes/updates to SEP instrument simulator software to support temperature-testing of SEP-Central.

GSE:

- Finished writing software to display LET counter data with new LET format. Displays have been generated for all LET counter variables. Awaiting information on counter efficiency to produce rate display. The displays reflect the LET format as of February 29, 2004. Software tested only with test data.
- Added software to extract and display SEP beacon data. As of February 29, only the LET part of the beacon data has a defined format. Software tested only with test data.
- Started work on the display of LET events.

5.2. *Design Updates*

- No resource updates this month.

5.3. *Outstanding Problems*

- The problems with the two flight ACTELs are being investigated by ACTEL and by Rich Katz at GSFC.
- Higher than expected thermal vacuum run failures of the L3 detectors and HET detectors will require Micron to provide a few additional flight devices. This may require retrofitting sometime in the summer.
- Preliminary analysis suggests that the nominal fairing release time will cause excessive heating to the L1 detectors (to 65C) based on the heating levels specified, which may have considerable margin (factor 3) over what might actually be experienced. The lower heating level would only heat the detectors to 45C. In the meantime, partly for other reasons, an additional window is being added to LET and perhaps that will mitigate the problem. More calculations are underway.

5.4. *New Problems*

- None.

5.5. *Top Risks.*

- ACTEL parts may not be reliable. This would affect many NASA projects.
- 1-mm detectors may have a serious leakage current growth problem. However, enough good LET detectors have been identified to populate both flight instruments. HET detectors may be more of a concern, perhaps requiring swapping out detectors later than desired.

- Higher than expected free molecular heating might require a re-design of the LET sensor head.
- The budget is very tight with no reserve being held at Caltech.

5.6. *Problem/Failure Quick Look*

- None.

5.7. *Lien List*

- At the time of this writing (3/11/04) a new budget has been submitted. It features delivery of both flight units to APL in October 2004, an additional year of Phase E, an additional 3 months of Phase C/D, and covers all liens listed in this section in previous reports. We have been asked to list in this section the amount of money required to keep testing the flight units in case it is decided that we deliver in January 2005 instead of October 2004. According to the new budget, this amount is $118,089.

6. SIT MONTHLY TECHNICAL PROGRESS REPORT

6.1. *SUMMARY of STATUS*

a. SIT TELESCOPE – Prototype at UMd for HVPS testing. Flight SSDs are still under test at GSFC.
b. SIT TOF System - FM1 was downgraded to ETU and is part of the ETU electronics under test at UMd. A new FM1 unit was delivered to UMd and is waiting testing.
c. SIT Energy System – ETU is integrated in the ETU electronics at UMd. Flight units are under construction at GSFC.
d. SIT Logic System – The updated ETU logic board and updated motherboard have been integrated with the remaining electronics.. Testing is underway at UMd.
e. SIT HVPS - Flight HVPS FM1 is undergoing test at UMd.
f. Flight Software – Version 11/20/03 is installed in the ETU 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

Logic Board: The logic boards have been released for fabrication. Delivery is expected in March. Work was begun on producing a new ETU actel which avoids the ground bounce problem (staggering alternate output pins by 10 nS) and which incorporates a new function for the HV Enable line.

Energy board: Continuing problems with the coax terminators have delayed the completion of flight board assembly. We fervently expect the boards to be ready next month.

Mother Board: The motherboard was fabricated and coupons were sent to GSFC for approval. Approval was received and we are working on putting together the traveler for these boards.

Telescope: The prototype telescope was returned from GSFC and was re-integrated with the ETU. An alpha test with lab supplies was performed to verify correct operation. The solid state detectors are still undergoing thermal-vacuum testing at GSFC along with the HET and LET detectors. There is indication of excess current in several of the detectors. We need to keep a close eye on this and be prepared to purchase another SSD if necessary to maintain three working units (2 flight, one flight spare).

HVPS – Cabling was fixed – adding coax for the HVPS Control voltage and the HVPS Sync lines - and pickup problems were resolved. The HVPS was tested alone

in vacuum with control from the ETU and then was tested with the telescope and the alpha source. Good voltages were observed with the telescope load attached to the HVPS and an acceptable alpha peak was observed. UCB was notified of the positive results so they can begin work on FM2.

6.2.2. Next Month

Next month we will (God willing) receive the assembled energy boards for trimming, and test the TOF boards.

6.3. *DESIGN UPDATES*

6.3.1. Resources

	Last Month	This Month	Change
Mass (kg) *	1.46	1.46	0
Power (W)	1.56	1.56	0.0
Telemetry (bps)	418	418	0

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

6.4. *OUTSTANDING PROBLEMS*

We are continuing to work Energy parts issues.
Excess current in as many as three of our SSDs.

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

7. CESR (SWEA) Status

CESR- TOULOUSE- France **Author : Claude Aoustin / Project Manager**

SWEA PROGRESS REPORT # 29
(March 14, 2004)

February 2004

CESR is in charge of :
- Electrostatic analyzer with deflectors, grids and Retractable Cover
- Detector consisting of two MCP rings
- Amplifiers and discriminators
- 3 High voltages

7.1. *Summary of Status*

7.1.1. ETU1

Delivery to UCB was planned for 12/07/2002 : done 26/09/2002

7.1.2. ETU2

- Mechanical fabrication 100 % done
- Integration done for the vacuum test configuration.
- Electronic boards tested (100 %).

7.1.3. FM1 / FM2

Mechanical fabrication 100 % done.
Electronics boards fabrication : 100% done

7.2. *Major accomplishments*

7.2.1. FM1 :

Delivered to SSL : 8 December 2003.

7.2.2. FM2:

- MCP characterization performed in the vacuum chamber started on the 19 February 2004.
- Boards modifications to be in accordance with FM1 (see Outstanding Problems) will follow and then the final assembly.
- Calibrations will be finished in the second half of April.
- Delivery to SSL UCB by end of April.

7.3. *Design Updates*

Mass : 967 g (EM is 950g without cover opening mechanism)
Power : 446 mW min ; 662 mW max

7.4. *Outstanding Problems*

- HV resistors life test 1000 h. finished. Good results.
- LT1024 radiation test performed by GSFC. It shows drift of the bias current. This has an impact on the deflectors HV. The 1 Mgohms resistors R18 and R31 have been changed by 5.1 Mgohms resistors. This is minimizing the impact of the radiation and is acceptable for the science data quality up to 12 krads. Furthermore a sheet of 1mm of copper has been added on the top of all the LT1024.

7.5. *New problems*

7.6. *Top Risks*

7.7. *Problem Failure Quick Look*

HV multiplier from VMI HM 402 P 10 failed at -70°C !
Problem Failure report 6001 updated by Dave.
Failure analysis done by GSFC. It is showing a bad bonding inside the component.
Two parts from the same lot sent to Lilian for testing.

8. GSFC (MAG) Status

There have been some QA issues with the MAG boards, in particular with conformal coating.

The MAG heater boards have been conformal coated and touched up; a temp/humidity test is being considered for these boards.

The first MAG electronics board has finished conformal coating and is in test (2 weeks of test remain before delivery). The second board is ready to coat as soon as preliminary tests indicate that the process worked on the first board.

The mag heater boards have been touched up and the gross contamination that was laying across traces was removed. In the meantime, I'm trying to push with the ETU Mag Heater board temp/humidity tests as described in an earlier email.

MAG will get onto the boom suite critical path if they cannot be delivered by early April. We are working hard to avoid that.

9. EPO at UCB

Monthly E/PO Report February, 2003

Formal Education:

We held a Space Physics Teacher Professional Development workshop at SSL in Berkeley on February 7th after the GEMS Associate training at the Lawrence Hall of Science. Twenty-nine teachers attended the workshop, half with an emphasis on K-4 and half with an emphasis on 5-12 grade levels. We presented the GEMS *Living with a Star* and *Real Reasons for the Seasons* Teacher's Guides as well as NASA STEREO (IMPACT) on magnetism and CHIPS materials on the interstellar medium.

L. Peticolas tested Activity 1 and 3 in the STEREO (IMPACT) Teacher's magnetism guide in Libby Dalcamo's 8th grade classroom at Stanley Middle School in Lafayette, CA. We spent two days on this activity in four different 8th grade physical science classes as part of their astronomy section.

Informal Education:

We began the STEREO sounds project with Dr. Bale of the STEREO-SWAVES team and graduate student, Roberto Morales Manzanares, of the Center for New Music and Audio Technologies (CNMAT). S. Bale provided a computer and monitor and R. Manzanares came to the Space Sciences Laboratory at UCB to download the appropriate software needed to convert data to sound. S. Bale and L. Peticolas sent R. Manzanares Helios and Wind data to begin working with. STEREO/IMPACT E/PO supported the required software package. We do plan to see the first demo in March and plan to submit an abstract for the Denver AAS Meeting in June.

STEREO E/PO in general:

We continued our discussions with B. MacDowall, of the STEREO-SWAVES team, to collaborate on the web-based project to map music to sound. We also will be participating in the STEREO EPO team telecons that will start in March.

Respectfully Submitted,
IMPACT E/PO scientists Nahide Craig, Laura Peticolas