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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 March 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 May has been received. 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.~~	~~$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
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	?

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	$25,000	7/04

	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).		
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)	$10,000	5/04

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	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	$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*

- SEPT vibration and thermal vac tests (unfortunately with failures)
- Participated in Project EMC committee meeting
- Developed and submitted replan budget

1.3. *System Design Updates*

- None

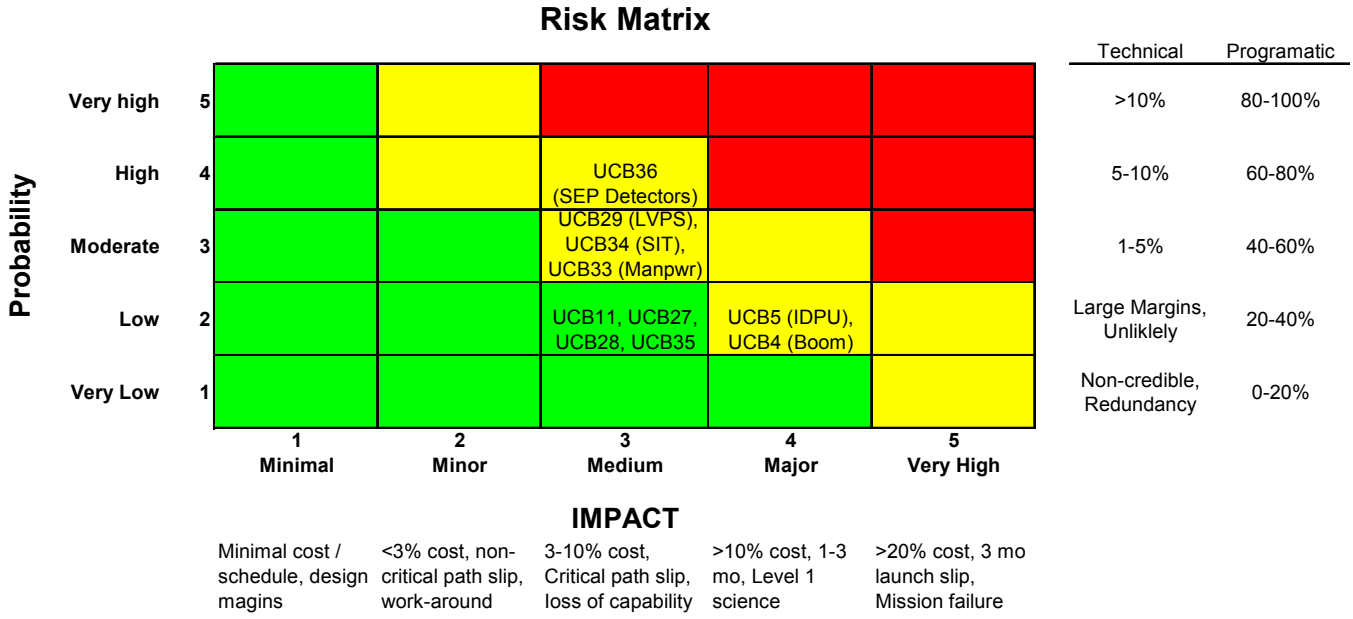
1.4. *System Outstanding Issues*

- IMPACT harness shielding waiver approved by EMC committee, pending CCB approval
- SWEA door activation transient waiver approved by EMC committee, pending CCB action.
- A number of waivers against the environmental test specification submitted (Acoustics for SEPT, STE and SWEA, Thermal balance on one unit only, and SWEA vibration off the boom).
- SEPT environmental test failures, and how to pay for re-test after repair

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:

- Most FM1 SWEA/STE boards delivered from assembly at J&T.
- Second (last) batch of loaded flight STE Flight Detectors boards delivered.
- STE doors with radiation sources installed delivered, tested.
- STE-U FM1 in assembly (note from April 12: failure during test, PFR1002)

IDPU:

- IMPACT Build 3 essentially complete (some desired enhancements still under consideration).
- PLASTIC software Build #2.5 ready for test at UNH.

LVPS/HVPS:

- SIT HVPS FM2 in assembly.
- SWEA/STE-D FM1 LVPS assembled and in test at UCB.
- PLASTIC FM1 LVPS bench test complete, ready for thermal test.
- SEP FM1 boards complete, in test. Some layout errors resolved by MRB, reworked, in final test.
- IDPU LVPS PWB delivered, coupons passed, in assembly at J&T.

Boom:

- Top level assembly in progress
- Some issues with some parts deformed in the assembly process being worked

GSE:

- All GSE delivered. Some added features in progress. Still waiting for definition of SEP housekeeping so appropriate displays can be added.

2.3. *Design Updates*

- None.

2.4. *Outstanding Problems*

2.5. *New Problems*

A detector bond wire was broken during assembly of FM1 STE-U (PFR1002 filed). The detector board will be replaced with a flight spare and the broken board returned for repair for possible use on a different STE unit.

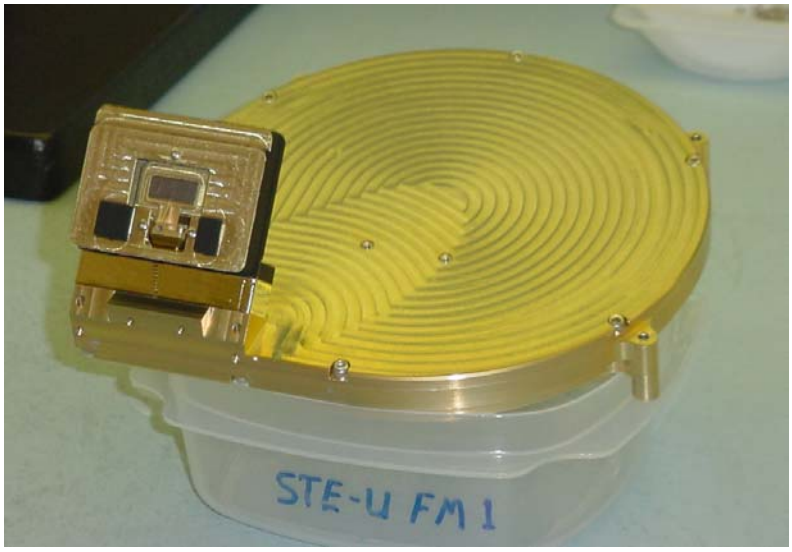
2.6. *Top Risks.*

- LVPS schedule tight
- Open Actel problems

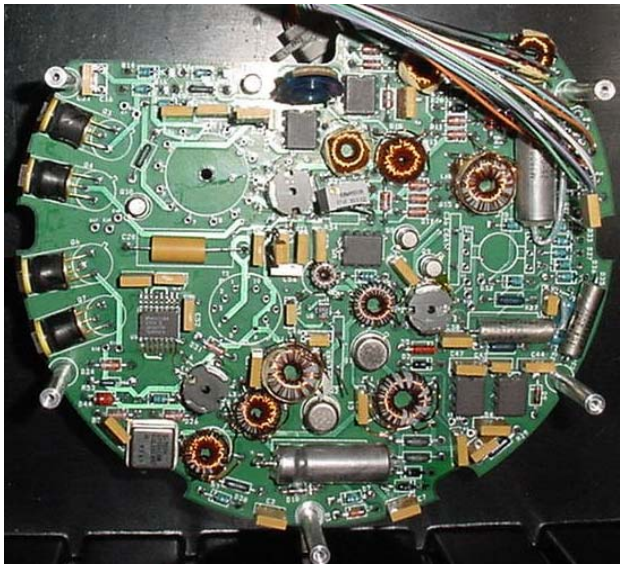
2.7. *Problem/Failure Quick Look*

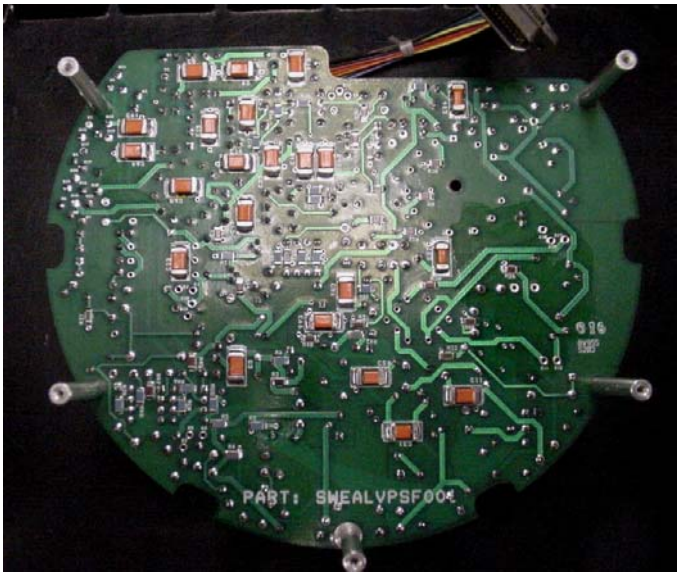
ID #	Description	Assignee	Opened	Closed
1001	Qual boom deployment failure in Thermal Vac	McCauley	2003-08-15	2004-01-07
1002	STE-U Assembly problems (broken bond wire)	Curtis	2004-04-12	

FM1 STE-U



FM1 SWEA LVPS





3. GSFC (SEP) Status

STEREO/IMPACT/SEP/GSFC Progress Report for March, 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 the end of June.

3.2. *Major Accomplishments*

Fabrication and testing of the HET FM2 board was completed, although not without incident. In removing a commercial Actel from the board, some pads were lifted; in some instances traces run from the lifted pad. The lifted pads were repaired (glued down with an epoxy containing a fluorescent additive which permitted seeing under a UV light where the glue had flowed) and the strained traces were supplemented with parallel haywires. The board was thoroughly tested after the new Actel was installed and was found to be working perfectly. In addition, the Actel design was reviewed relative to ground-bounce and other possible problems induced by trace inductances. An active high-frequency probe was used to study the improvements which resulted from design changes in the Actel. The Actel chip was not programmed using new software which Actel has developed but has not yet released. The schedule for this was too uncertain as were the possible benefits of waiting. Both of the two HET FM boards are now ready for conformal coat.

LET foil material has been successfully made by the GSFC Thermal Coatings group and preparations are being made for a LET ETU acoustic test.

The second HET/SIT detector lifetest was started on March 29 and will be allowed to continue until a sufficient number of new H1 and H3 detectors has been received to warrant starting a new test. The current run includes the only good H3 detector from the first lifetest. As reported earlier, our outstanding problem remains the low yield of detectors with stable leakage currents (particularly of H3 detectors). One of the two 'good' SIT detectors from the first test had shown some increased noise and subsequent recovery and so has been included in the second lifetest. It has performed well so far in the new test. 10 L3, 20 H1, and 40 H3 detector mounts have been obtained, had connectors mounted, and were shipped to Micron, the HET/LET detector manufacturer. Micron is working on making additional L3, H1, and H3 detectors. From the results of the second lifetest so far, it appears that we have 2 good H1s, a possibly OK H1, 4 good H3s + one good prototype H3. We need a total of 4 flight H1s and 14 H3s.

The SEP-LVPS flight housings, shields, and spacers have been received, inspected, and sent to UC Berkeley.

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

Definition of the HET housekeeping packet was completed. Any further changes to the SIT housekeeping packet are waiting on direction from the UofMD.

3.2.1. Next Month-

Begin writing a Comprehensive Test Procedure for HET.
Complete cross-check of drawings and SIT ETU parts.
Continue testing flight detectors for HET and SIT.
Complete fabrication/inspection of the SIT electronics box.
Order purge outlet filters, SIT door springs, 15 MHz TQCM head, and scroll pumps.
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*

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

3.5. *New Problems*

None.

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

March 2004

4.1. *Summary of Status*

a) SEPT flight units in environmental tests.
b) Failures during TV resulted in two additional Problem/Failure Reports.
c) There is a need for repair/rework and partial repetition of environmental tests.

4.2. *Major Accomplishments*

a) SEPT FM1 Test Readiness Review held with ESTEC TV test facility.
b) SEPT FM1 time-temperature bake-out for 60 hours at + 50 °C.
c) SEPT FM1 TV test with CPTs prior to chamber closure, during hot/cold soaks, and after chamber opening.
d) SEPT FM1 cover opening (4 covers at hot soak, 4 covers at cold soak).
e) SEPT FM1 power rails at min and max voltage during hot soak and during cold soak.
f) SEPT FM1 Post Test Review
g) Same tasks (steps 1 - 6) for SEPT FM2 with time-temperature bake-out for 64 hours at +50 °C.
h) 1 out of 8 detectors in FM1 showed high leakage current during cold soak, okay at hot soak.
   2 out of 8 detectors in FM2 showed high leakage current during cold soak, okay at hot soak.
   Problem/Failure report (IMPACT PFR 7002, SEPT-Detector, 2004-03-05) sent to Dave C.
i) Failure Review Board with detector manufacturer Canberra held at Olen/Belgium. Decision: further temperature tests in Kiel and Olen to identify failure cause. Most likely: either bonding wire or mismatch of thermal expansion in silicon, glue, PCB mounting. Existing detectors cannot be recovered from their mount without risk of damage. New detectors will be fabricated.
j) 1 out of 4 pinpullers failed to fire at hot soak, but could be fired at cold soak. Cause of failure: contact problem, resistance between pin 1 and 2 should be 5 Ohms, was > 10 MOhms. During ramp down to cold soak, 5 Ohms resistance had re-established itself. Problem/Failure Report (IMPACT PFR 7003, SEPT-Pinpuller, 2004-03-10) sent to Dave C.
k) 1 out of 8 covers failed to open at cold soak although the associated pinpuller performed nominally. Failure mode is similar to the one reported after vibration tests. The respective Problem/Failure Report (IMPACT PFR 7001, SEPT-DoorOpening, 2004-02-20) was updated accordingly and sent to Dave C.

4.3. *Design Updates*

4.4. *Outstanding Problems*

4.5. *New Problems*

a. Detector failure during cold soak (see 8. above).
b. Pinpuller failure during hot soak (see 10. above).
c. Door opening failure during cold soak (see 11. above).

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	

5. Caltech/JPL (SEP) Status

5.1. *Summary of Status*

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

Major Accomplishments:

- The LET EM, fully populated with detectors, was exposed to heavy ions in a beam at the 88" Cyclotron at LBNL and performed reasonably well. GSE software performed well.
- Thermal-vacuum testing of all ordered LET detectors (L1, L2, and L3) has been completed at Caltech.

Critical Milestones status:

- Milestone 18 (HET-All Flight Detectors Received) has not been accomplished. All HET detectors should be received by sometime in April 2004. However, some already received have failed in testing and replacement detectors will be needed. The replacements are expected in May.

Detectors:

- Micron Semiconductor delivered one additional H1 detector and 3 additional H3 detectors, including 2 H3 detectors made from the high-resistivity silicon that was used for the 1-mm-thick prototype detectors. Based on our tests of L3 detectors made from this material we think these devices should not be subject to the leakage current growth problems observed for many of the flight H1, H3, and L3 detectors.
- Micron has also fabricated a number of H1, H3, and L3 detectors made from wafers taken from an entirely new silicon crystal. They cannot deliver these replacement detectors in significant quantities until they receive detector mounts from Goddard. However, they have successfully removed a few bad detectors from mounts so that those mounts can be reused. At the end of the month Micron was just completing their tests of some mounted H1 detectors and expect to be able to ship us a few the first week in April. They also have a few H3 detectors ready for testing as soon as the H1's are completed.
- We have requested that Micron omit vibration testing of the replacement 1-mm-thick detectors in order to get them delivered as soon as possible. Our past experience on both STEREO and ACE indicates that detectors this thick never fail this vibration test. The detectors selected for flight will, of course, go through vibration both at the instrument level and on the spacecraft.
- Thermal-vacuum testing of all the LET detectors (L1, L2, and L3) has been completed at Caltech. An additional thermal-vacuum run is planned for testing replacement L3 detector when they are received from Micron.

Electronics:

- With a major push, Andrew Davis' event processing software was successfully integrated with Rick Cook's real-time and operating system code to produce a version of LET S/W adequate to support the check/calibration of the LET ETU at the Berkeley 88 inch cyclotron. That check went well and produced lots of data, which are currently

being analyzed in an effort to identify any subtle problems. While the S/W and LET generally worked, there were a few "crashes" which are now being investigated. Fortunately similar crashes can be induced with the test pulser, allowing debugging in the lab. The SEP Central ETU was used to support LET throughout the Berkeley run and it performed without any anomaly.

- Performed tests on SEP Logic EM1 board with the failed Actel 72S device that was reinstalled on the board in order to acquaint the visiting Actel engineer with the failure mechanism in preparation for the failure analysis that will be conducted by Actel. The Actel engineer took notes and learned how to operate the board, which was then shipped to Actel. Failure symptoms were reproducible to a large extent. The part was reimbursed later this month before the failure analysis was completed.
- Received semi-complete flight LET boards from GSFC and continued the assembly at Caltech. Selected 8 flight PHASIC hybrids and delivered them to JPL for lead bending/leak testing. There is a minor issue with SRAM by-pass capacitors that were mounted on the underside of the I.C. package by soldering as opposed to using epoxy. The issue is under investigation and will be resolved in mid-April. It also affects the SRAMs on SEP Central Logic boards.
- Completed assembly of Bias Supply boards and delivered them to Space Instruments for functional testing. During a short-circuit test on FM1 board, one of the components was damaged do to excess current. It will be replaced, along with select current-limiting resistors, in mid-April. The anomaly report is in the final stage of preparation. Bias voltage settings are not final due to the detector schedule; so bias-setting resistors won't be conformally coated in order to allow us to replace them at a later date.
- In reviewing the bias voltage settings we realized that the current-limiting resistors that we are using on the LET board could fail if a detector were to short out. The voltage rating is not high enough in that case. We are investigating several options to solve the problem.
- Prepared LET/SEP Central ETU and supporting fixture and cables for the accelerator run at LBNL, which went very well.
- Continued preparations for ESD and clean room certification of the I&T facility.
- Confirmed that recent Uralane conformal coating concerns are not an issue at JPL where 4 layers are typically applied and thickness is maintained within the spec.

Software (Davis):

- Found and corrected some bugs and deficiencies in LET event-processing software, as follows:
    - Corrected algorithm for applying thickness corrections.
    - Re-factored MFIX- subroutines to make code more modular.
    - Some multi-hit events were not being fixed properly – needed to select all but the brightest in a given layer if the brightest was below CRXTALKTH.
    - Upgraded software for event formatting. If FCULL is true, we now cull all ADCs that are probably cross-talk hits. The number of ADCs telemetered per event is limited to FNMAX. The event header now has bits 26-28 set (number of ADCs not telemetered due to exceeding FNMAX).
- Wrote tool to calculate LET PHA offsets from PHASIC testing reports.
- Achieved agreement with Mark Wiedenbeck on the correct cosine correction factors for all LET detector combinations, given the new detector locations.

GSE:

- Worked with the system engineer to get ready for the LBNL accelerator run. Tested and verified that the LET rates and events were being correctly put in the telemetry, sent to the IDPU simulator, and displayed on the GSE.
- Wrote display software for LET Events. Software can do plots of (L1, L2), (L2, L3), (L1+L2, L3). Software plots both in PHA and energy. Angle corrections and thickness corrections were not included in this version of the software.
- Participated in the accelerator run at LBNL. GSE displays for rates and events worked; all the runs were logged to the GSE computer's disk for further analysis. Some operational changes dealing with the time lags and ease of use should be added before the MSU accelerator run.

5.2. *Design Updates*

- Resource updates will be sent separately.

5.3. *Outstanding Problems*

- Actel and Rich Katz at GSFC are investigating the problems with the two flight Actels.
- 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 of HET 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*

- Some S/W crashes occurred during the LBNL run and are being investigated.
- SRAM by-pass capacitors were mounted on the underside of the I.C. package by soldering as opposed to using epoxy. This issue is under investigation.
- Current-limiting resistors on the LET board need to be changed to ones rated higher in voltage.

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 (4/13/04) 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

March 2004

6.1. *SUMMARY of STATUS*

a. SIT TELESCOPE – Prototype at UMd for ETU/FM testing. Flight SSDs are still under test at GSFC.
b. SIT TOF System – FM1 is at UMd and has passed functional test. FM2 is under construction at MPAe. The old FM, which we are using as ETU, is at UMd and being used in ongoing testing.
c. SIT Energy System – FM1 and FM2 are at UMd, waiting trimming. ETU is at UMd available for ETU testing.
d. SIT Logic System – Flight board is at vendor for fab. The updated ETU logic board and updated motherboard have been integrated with the remaining electronics. Testing continues at UMd.
e. Motherboard – The flight MB is at the vendor for fab.
f. SIT HVPS - Flight HVPS FM1 is undergoing test at UMd.
g. Flight Software – Version 02/26/04 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

New Personnel: We have an additional full-time engineer assigned to SIT beginning in March. Chris Waterman comes to us from the Hubble project and is helping to keep things moving.

Logic Board: The logic boards were received from the vendor but failed coupon testing. A new set of boards was sent from the manufacturer and these coupons were submitted to Goddard for test. The 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 was delivered and tested. A confusion about command bits within the chip was discovered and fixed by changing the bit definitions.

Energy board: The energy boards were delivered to UMd for trimming, planned for next month.

Mother Board: An error was discovered in the motherboard layout, before assembly. A corrected layout was generated and the board is being re-fabricated at Rigiflex.

Telescope: Solid state detectors are still under test at GSFC. Three of those that failed have been returned to UMd. We are in the process of working with Ortec (Ametek) to get replacements for some of the failed units

TOF Boards – The FM1 unit was successfully functional tested and the Germans were notified of the positive result to allow them to proceed on FM2.

Flight Software – A new version of flight software (0402) was generated which incorporates the new commands to ramp the HV up and down automatically – to prevent/minimize human error in commanding the HV. The new release also accommodates the changed command bit definitions caused by the new Actel design.

6.2.2. Next Month

Next month we will trim the energy boards, assemble the logic boards and motherboards.

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*

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 # 30
(April 13, 2004)

March 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 ended on the 4 of March 2004.
- Boards modifications to be in accordance with FM1 done on the 12 and 13 March 2004.
- HV board bake out 24h at 60°C done on the 15 March.
- Final assembly done on the 19 March.
- Calibrations are on going and 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

- FM1 electronics board is finishing up its post conformal coat testing after harness staking.
- FM2 electronics board has been conformal coated and is ready for test.
- FM1 and FM2 heater boards that were improperly coated and dirty have been cleaned and touched up. A test board was subjected to thermal tests and it passed. It did not go through a humidity test, as originally planned. Decided not to continue with these tests since they no longer displayed exposed or contaminated regions. An MRB on this is pending.
- FM1, FM2 filter boards are fabricated but have a number of fabrication issues that are being worked.
- FM1 MAG sensor need date at UCB April 26. Hopefully accompanied by FM1 MAG flight electronics, though testing can proceed with ETU electronics for a while.

9. EPO at UCB

Monthly E/PO Report March, 2003

Formal Education:

We prepared for the National Conference of the National Science Teachers Association in Atlanta, Georgia. There are two workshops we are involved in: a three hour teacher's workshop on Magnetism and the Sun-Earth connection in space and a four hour teacher's workshop with the Sun-Earth Connection Forum on Great Explorations in Math and Science (GEMS) guides – Living With a Star_that were developed with NASA E/PO funds. L. Peticolas updated the magnetism lesson. We printed 60 and distributed at the NSTA Conference.

Informal Education:

We provided data and data consultation to the programmer and web page designer working on the STEREO-IMPACT/SWAVES music project (STEREO incandescence) with the Center for New Music and Audio Technologies (CNMAT).

Public Outreach:

L. Peticolas participated in the celebrations of the Sun-Earth day (Solstice) at the Chabot Science Center and presented magnetism and STEREO spacecraft boom science to the public using materials and ideas from the magnetism guide.

STEREO E/PO in general:

Stereo E/PO partners had a teleconference and N. Craig and L. Peticolas participated. Long-term collaborative planning for future conferences such as AGU and STEREO Project Web site were discussed.

L. Peticolas took part in the STEREO-visualization Goddard teleconference meeting.

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