

# STEREO IMPACT Technical Progress Report

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

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

Lil:

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

Sincerely,

**Draft**

David Curtis  
IMPACT Project Manager  
University of California, Berkeley

CC:

[Julie.A.Janus.1@gsfc.nasa.gov](mailto:Julie.A.Janus.1@gsfc.nasa.gov)  
[Debra.G.Dusterwald.1@gsfc.nasa.gov](mailto:Debra.G.Dusterwald.1@gsfc.nasa.gov)  
[Lillian.S.Reichenthal@nasa.gov](mailto:Lillian.S.Reichenthal@nasa.gov)  
IMPACT Team

# STEREO IMPACT Technical Progress Report

## 1. IMPACT Overview

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

### 1.1. Contracting / Funding

Funding through October has been received and subcontracts have been augmented. Additional funding will be sent to UMD to cover the unbudgeted accelerator tests at Brookhaven.

#### 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.              | \$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   | <del>STE calibrations sources.</del>  | <del>\$2,500</del> | <del>11/04</del> |
| 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          | ?                |

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|    |   |           |      |
|----|---|-----------|------|
| 13 | PLASTIC Software extended effort to complete to 10/04, with continuing effort at a lower level through March 2005; 100% probability | \$130,000 | 9/04 |
| 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 |

### 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  | \$10,000 | 3/04  |

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|    |  |           |       |
|----|--|-----------|-------|
|    | 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%   | \$50,000  | 08/04 |

### 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 |

### GSFC (Tycho):

| No. | Cause  | Amount   | Date  |
|-----|--|----------|-------|
| 1   | Revise SEP Central/LET/HET vibration analysis if required  | \$5,000  | 11/03 |
| 2*  | Extra Solid-state Detector Lab manpower support to accommodate late detector delivery (Risk UCB033)                                    | \$20,000 | 12/03 |
| 3   | Travel for accelerator end-to-end test, 100%   | \$5,000  | 6/04  |
| 4   | Tom Nolan flight software support (Risk UCB033)  | \$15,000 | 5/04  |
| 5*  | Engineering support to maintain schedule (Risk UCB033)   | \$40,000 | 1/04  |
| 6   | Tycho's thermal vac chamber is planned for SIT and SEPT tests. If that fails we will have to rent a chamber. Probability low-moderate. | \$25,000 | 8/04  |
| 7   | Late HET Detector delivery resulting in additional acceptance tests for one instrument   | \$40,000 | 7/04  |
| 8   | LET foils fail acoustic testing (unlikely since ETU tests passed)  | \$10,000 | 5/04  |
| 9   | HET Actel additional testing   | \$20,000 | 6/04  |

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|    |  |          |      |
|----|--|----------|------|
| 10 | SEPT re-test if Kiel cannot pay for it | \$30,000 | 5/04 |
|----|--|----------|------|

### 1.2. **Significant System-Level Accomplishments**

- Participated in Project EMC & Contamination Control committee meetings
- Participated in various MRB/FRB meetings
- LET detector rework plan generated
- New batch of HET detectors in test, looks good
- FM2 STE-U through environments (except EMC)
- FM2 Boom/MAG/STE-U vibrated, FM2 boom/MAG thermal vac started

### 1.3. **System Design Updates**

- None

### 1.4. **System Outstanding Issues**

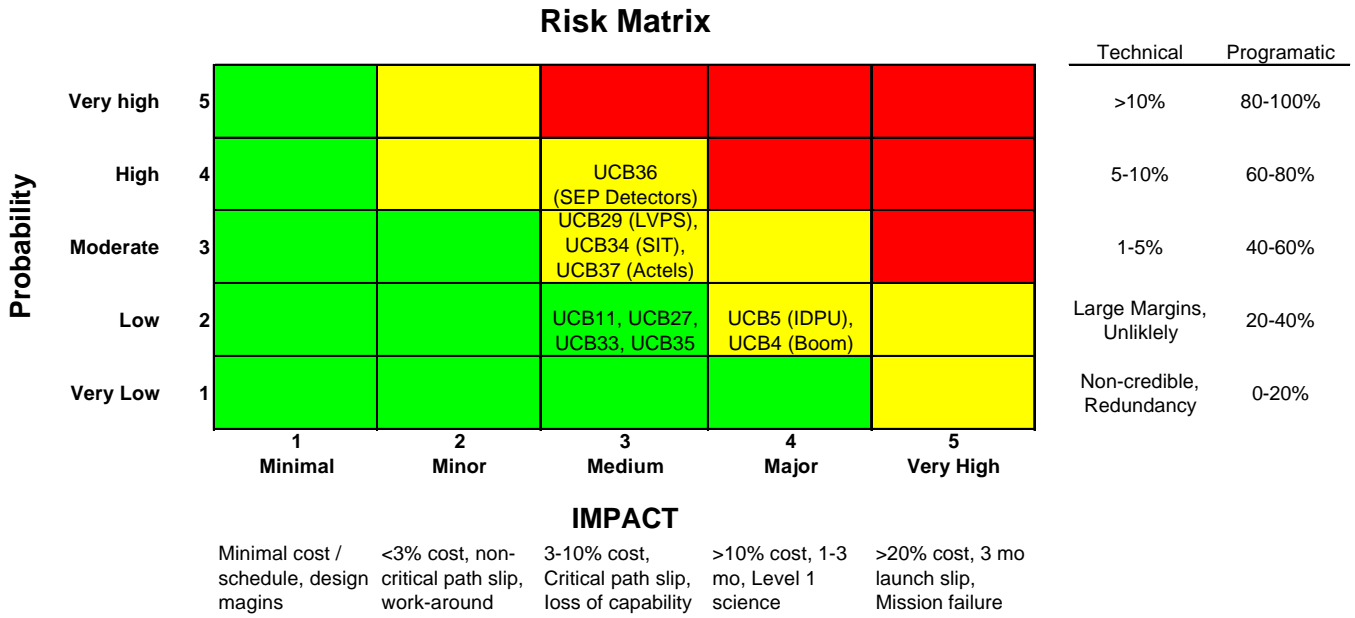
- Persistent SEP mechanical issues impacting schedule.

### 1.5. **Top 10 Risks**

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

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## IMPACT Top Ten Risks 7/2004



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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              |

# STEREO IMPACT Technical Progress Report

## 2. Berkeley Status

### 2.1. *Summary of Status*

Schedule status through August has been provided separately.

### 2.2. *Major Accomplishments*

SWEA/STE:

- All SWEA/STE boards complete and tested.
- All STE Detector boards tested.
- STE-U FM1 environmental tests (except EMC) complete
  - Door problem in calibration requires replacement of actuator wires, followed by workmanship vibration and 1 cycle thermal vac, to be completed in September.
- STE-U FM2 environmental tests complete

IDPU:

- LVPS below, rest of the boards in conformal coat.

LVPS/HVPS:

- SIT HVPS FM2 in test.
- SWEA/STE-D FM1 LVPS pending conformal coat. FM2 needs 1877 replacement, conformal coat.
- PLASTIC FM1 LVPS delivered; needs to be returned to get LTC1877 replaced, conformal coat.
- PLASTIC FM2 LTC1877 replaced, pending conformal coat
- SEP FM1, FM2 LTC1877 replaced, in conformal coat
- IDPU FM1 LTC1877 replaced, pending conformal coat. FM2 needs 1877 replacement, conformal coat.

Boom:

- FM1 unit complete, through vib & thermal vac, mated with MAG.
- FM2 unit completed vib, in thermal vac with MAG.

GSE:

- All GSE delivered. Some added features in progress.

### 2.3. *Design Updates*

- None.

### 2.4. *Outstanding Problems*

### 2.5. *New Problems*

- STE-U FM1 actuator failure (see above).

### 2.6. *Top Risks.*

- Open Actel problems
- PLASTIC IDPU software late



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## 2.7. Problem/Failure Quick Look

| <b>ID #</b> | <b>Description</b>                            | <b>Assignee</b> | <b>Opened</b> | <b>Closed</b> |
|-------------|---|-----------------|---------------|---------------|
| 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    |               |
|             |   |                 |               |               |
|             |   |                 |               |               |

**3. GSFC (SEP) Status**

## 4. Kiel/ESTEC (SEPT) Status

August 2004

### 4.1. *Summary of Status*

- a) Rework activities on all four failure cases mentioned in May report finished.
- b) Decision taken to accept humidity dependent leakage current, as purging will establish nominal leakage currents.
- c) Decision taken to mount thermal hardware in Kiel instead of GSFC or Caltech.
- d) Thermal balance test at GSFC to be delayed until after EMC, Vibe, and TV tests.

### 4.2. *Major Accomplishments*

- a) All eight flight detector stacks mounted into sensor housing. TiNi Pin-pullers received from UoB with new cables. Sensors re-assembled with doors and pin-pullers in place.
- b) Electronic calibration of spare electronics, which shall serve as new FM2 SEPT-NS electronics. This closes IMPACT PR 7004.
- c) New ACTEL FPGA burned with old burning algorithm, now awaiting check-out before being soldered into digital board of old FM2 SEPT-NS electronics to serve as new flight spare.
- d) Company Axon delivered 24 outstanding coax-cables in week 35. Cables were shipped to Canberra to complete the remaining 5 detector stack assemblies. Canberra will deliver the stacks to Kiel in week 39. The stacks are needed to assemble the flight spare sensor and to have spare detectors if needed. They will undergo the same assembly procedure as the flight stacks, i.e. with glue for stress relief.
- e) Sensor calibration with radioactive sources started. First results look good, i.e. no deviation from calibration performance done in January 2004 prior to environmental tests.
- f) Preparation for TB test started. Many details still TBD. Test configuration not yet known: which chamber, availability of SEP\_Central, participation of Caltech staff to operate SEP\_Central, SEP\_Central inside or outside chamber, who is responsible for harness, when will MLI be ready, when will chamber be available?
- g) Discussion on MLI manufacturing started. Critical areas around apertures identified. Methods to avoid mechanical interference proposed.
- h) Discussion on application of thermal hardware resulted in decision: Kiel will install thermostats, foil heaters, and EMC shields. UoB to send 12 Klixon thermostats to Kiel, GSFC to send 12 foil heaters to Kiel.

### 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.

### 4.5. *New Problems*

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## 4.6. *Top Risks*

## 4.7. *Problem/Failure Quick Look*

| <b>ID #</b> | <b>Description</b>   | <b>Assignee</b> | <b>Opened</b> | <b>Closed</b> |
|-------------|----------------------|-----------------|---------------|---------------|
| 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    | 2004-08-31    |

## 5. Caltech/JPL (SEP) Status

### 5.1. Summary of Status

Activities centered on developing a repair plan for the L1 detector mounts, preparing the electronics boards for conformal coat and bake out, beginning preparations for environmental testing, continued analysis of MSU accelerator test data, and software development.

#### Major Accomplishments:

- Developed repair plan for the L1 detector mounts.
- Replaced and tested two Actel 72S parts on SEP Central Logic FM1&2 boards, which have been programmed with new algorithm from Actel.
- Finished work on the SEPT flight software routines that will pack the SEPT science, housekeeping, and beacon data into packets for telemetry.

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

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

#### Detectors:

- Micron Semiconductor delivered 9 new H1 detectors and 10 new H3 detectors as replacements for devices that failed thermal-vacuum testing because of excessive leakage-current growth. After inspection at Caltech these devices were sent to Goddard for testing. No additional detector deliveries for HET or LET are expected.

#### Electronics:

- Held MRB for L1 detector mount repair. Refined the L1 recovery plan based on the comments from the reviewers. Started implementing the plan on the polyamide daughter board, which tested positive for good wire-bondability and had arrived from its manufacturer before the ceramic one did. Evaluated mechanical fixtures made for L1 repair purposes and started making more identical fixtures to enable parallel processing of multiple flight detectors later on. The rework done on the dummy mounts was reviewed and two EM units have been scheduled for the repair next.
- Replaced and tested two Actel 72S parts on SEP Central Logic FM1&2 boards. The new devices have been programmed with the new algorithm from Actel.
- Started paperwork to rectify the floating unused connector pins and floating IC lids. The rework and QA inspection will be done at JPL before staking and conformal coating.
- Received SEPT ETU back from APL and connected it to the SEP Central ETU in order to test SEP Central flight firmware developed for SEPT control. The testing has been impeded by personnel being out of town on another project, but will resume early next month.
- Located optimum T/V chamber at JPL for LET/HET/SEP Central thermal balance and T/V test. Contamination control and test requirements are being addressed in order to prepare for the PER and the testing this fall.

#### Software (Davis):

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- Finished work on the SEPT flight software routines that will pack the SEPT science, housekeeping, and beacon data into packets for telemetry (these routines run in SEP-Central).
- Continued analysis of MSU accelerator test data.
- Updated LET Level 1 Data Format Document.

### GSE:

- Activity was limited to examining and explaining the MSU data.

### 5.2. *Design Updates*

- Resource updates will be sent separately.

### 5.3. *Outstanding Problems*

- The HET detector supply problem appears to be resolved. The initial test results from GSFC of the new H1s and H3s suggest we will have enough good detectors to populate two flight units without having to do a retrofit later.
- The issue concerning the possible overheating of L1 detectors due to free molecular heating when the fairing is released appears to be resolved. This is the information received from John Hawk: Our coatings group made several test foils and measured the optical properties. They successfully deposited a Goddard composite coating with an emissivity of 0.67 and an absorptivity of 0.1 Using these optical properties, and the nominal free molecular flow heating rate profile, a transient analysis shows L1 detectors behind a single foil remain below the 35C survival limit.
- 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.

### 5.4. *New Problems*

- A requirement that there be no floating conductors unless they are behind 100 mils equivalent Al shielding prompted a review which produced several violations. These are being addressed.

### 5.5. *Top Risks.*

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

### 5.6. *Problem/Failure Quick Look*

| <b>ID #</b> | <b>Description</b>                          | <b>Assignee</b> | <b>Opened</b> | <b>Closed</b> |
|-------------|---|-----------------|---------------|---------------|
| 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    |               |
|             |   |                 |               |               |
|             |   |                 |               |               |

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## 5.7. *Lien List*

- Additional monies have been verbally appropriated by the STEREO Instrument Manager and there are no identified liens at present. Possible liens for the future: 1) The L1 repair procedure at JPL could exceed the budget. 2) Fixing the floating conductors at JPL was not in the budget the Instrument Manager approved; however, it is thought to be a small effort.

## 6. SIT MONTHLY TECHNICAL PROGRESS REPORT

### 6.1. **SUMMARY of STATUS**

- a. SIT TELESCOPE – Prototype at GSFC to act as a pattern for flight units.
- b. SIT TOF System – FM1 and FM2 are built and tested. FM1 being readied for conformal coat in September.
- c. SIT Energy System – FM1 and FM2 have been trimmed and tested. FM1 is being readied for conformal coat in September.
- d. SIT Logic System – FM1 are built and tested. FM1 is being readied for conformal coat in September.
- e. Motherboard – FM1 and FM2 MBs are at UMd and have been functionally tested. FM1 being readied for conformal coat in September.
- f. SIT HVPS - Flight HVPS - FM1 at GSFC to be connected to the FM1 telescope.
- g. 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 Electronics – The FM1 electronics were tested with the FM1 HVPS and the ETU telescope. HVPS and telescope were in vacuum, electronics was on bench. A good alpha track was produced. On two occasions damaging signal levels were transmitted into the TOF electronics START and STOP inputs, causing the TOF system to stop functioning. These signals were found to be caused by making and breaking connections between the TOF and the telescope at inappropriate times. Safeguards were put in place to prevent a repetition. Replacing the first stage transistors and protection diodes fixed the problem in each case.

BNL Calibration – The SIT components: FM1 electronics, FM1 HVPS and ETU telescope were taken to BNL for a particle beam calibration. The calibration exposed SIT to oxygen and iron beams at low and high energies and at low and “high” (4000 events/sec) event rates. The electronics and software performed well. At the end of the run, a HV event in the vacuum chamber – later determined to be an arc or severe corona in one of the non-flight connections between the HVPS and telescope – caused damaging signals to be sent to the TOF inputs, and stopped the TOF system from functioning. We have replaced all of the connections between the HVPS and the telescope, and using the ETU electronics, have operated the HVPS in good vacuum at UMd for a day at its highest operating level, and for 3 days and nights at a level somewhat higher than the planned operation in space. There were no further incidents.

Software – In investigating the HV problems above we discovered an error in the HVRAMP command controlling the automatic stepping up and down of the SIT HV. This was fixed in version 0903 which is currently under test.



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## 6.2.2. Next Month

Next month get assembled FM1 Telescope, conformal coat electronics boards and test complete FM1 SIT in preparation for EMC testing.

## 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      |

The power change now reflects measured power of flight hardware. There may be some further small changes when the flight telescope is installed since the flight plates draw less current than the ETU ones and a slightly lower operating voltage may be required.

\* 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 |
|------|---|----------|---------|--------|
| SIT1 | Apparent failure of PH300 chip U4 of FM1 energy board | PHW      | 4/29/04 |        |
|      |   |          |         |        |
|      | TBD   |          |         |        |
|      |   |          |         |        |
|      |   |          |         |        |
|      |   |          |         |        |
|      |   |          |         |        |
|      |   |          |         |        |
|      |   |          |         |        |
|      |   |          |         |        |

**7. CESR (SWEA) Status**

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

**8. GSFC (MAG) Status**

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

# STEREO IMPACT Technical Progress Report

## 9. EPO at UCB

Monthly E/PO Report

August, 2004

### **Informal Education:**

L. Peticolas, N. Craig, and Janet Luhmann met with D. Bithell at SSL on August 5<sup>th</sup>. At this meeting we heard for the first time the data from the two Helios spacecraft in stereo. In addition, D. Bithell showed us a software prototype for a simple model of sonification for classroom use as well as for use to introduce the concept of sonification. We have decided to support D. Bithell and R. Morales Manzanares partially for the Fall to continue working on the sounds of space program.

### **Public Outreach**

I. Sircar worked with N. Craig and L. Peticolas to create a new Sounds of Space webpage that reflects the new work done with the UCB CNMAT group. This is still being developed.

Todd N. worked with N. Craig and L. Peticolas on a STEREO flyer to be completed in September.

Todd N. worked with N. Craig and L. Peticolas on “Mapping the Magnetic Field”, an inquiry-based activity from the “Exploring Magnetism” teacher’s guide. This activity will be placed on the back of the STEREO Poster that is being planned by GSFC.

Respectfully Submitted,  
IMPACT E/PO Lead, Nahide Craig