

# STEREO IMPACT Technical Progress Report

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

Lil:

Enclosed is the monthly technical progress report for the STEREO IMPACT project for the month of January 2005.

Sincerely,

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IMPACT Project Manager  
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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 June 2005 has recently been received and subcontracts will be augmented.

#### 1.1.1. Liens

This is a list of Liens. Liens for activities at other institutions are sometimes repeated in their subsections of this report. These liens are estimated additional costs that might be incurred if problems happen. Only problems with a significant likelihood of occurrence are tracked. These liens are usually associated with risks in the risk list (see section 1.5), and you can see the predicted likelihood of occurrence there. Some of these liens have been requested to be encumbered by Project, marked (\*). Items included in the POP04 budget 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	<del>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 &amp; thermal vac. (see also item 17)</del>	\$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>	\$2,500	11/04
7	SEP Thermostats. These were over the budgeted amount. Budget was \$10K at Caltech. Parts were actually \$21,200, paid by UCB. New budget takes this into account.	\$11,200	11/03
8	Subcontract J&T for board assembly work to maintain schedule	\$50,000	1/04
9	Calibration and thermal vac chambers at UCB use oil roughing pumps. Replace those pumps with dry scroll pumps to reduce risk of contamination	\$14,000	3/04
10	Increase travel to cover staffing requirements at APL during I&T	\$40,000	10/04-1/06
11	Launch delay costs (launch 2/06)	\$226,000	12/05
12	Redesign & rework costs should Actels need to be replaced due to reliability problems. Depends strongly on what kind of replacement is selected.	\$500,000	?
13	PLASTIC Software extended effort to complete to 10/04, with continuing effort at a lower level through March 2005;	\$130,000	9/04

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

### Caltech:

Provided separately

### UMd:

No.	Cause	Amount	Date
1	SIT foils fail acoustic test	\$20,000	2/04
2	SIT Vibration (currently planned to be combined with HET instruments, but may not work out)	\$15,000	2/04
3	Parts screening (some parts not yet Oked by PCB and may need addition screening)	\$10,000	9/03
4	Particle Calibration at BNL.	\$20,000	8/04
5*	Engineering Support to maintain schedule (Risk UCB033)	\$60,000	1/04
6	Replacement SSD detectors (only 2 of 5 detectors passed)	\$10,000	5/04
7	Extend Peter Walpole due to late delivery	\$17,800	11/04

### GSFC (Tycho):

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

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

- Participated in Project EMC and Contamination Control committee meetings
- Participated in various MRB/FRB meetings
- Participated in several SEP thermal vac test planning meetings
- Participated in several PLASTIC Flight Software meetings
- IDPU FM1 repeat thermal vac complete.
- SWEA FM1 thermal balance test complete

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

- None

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

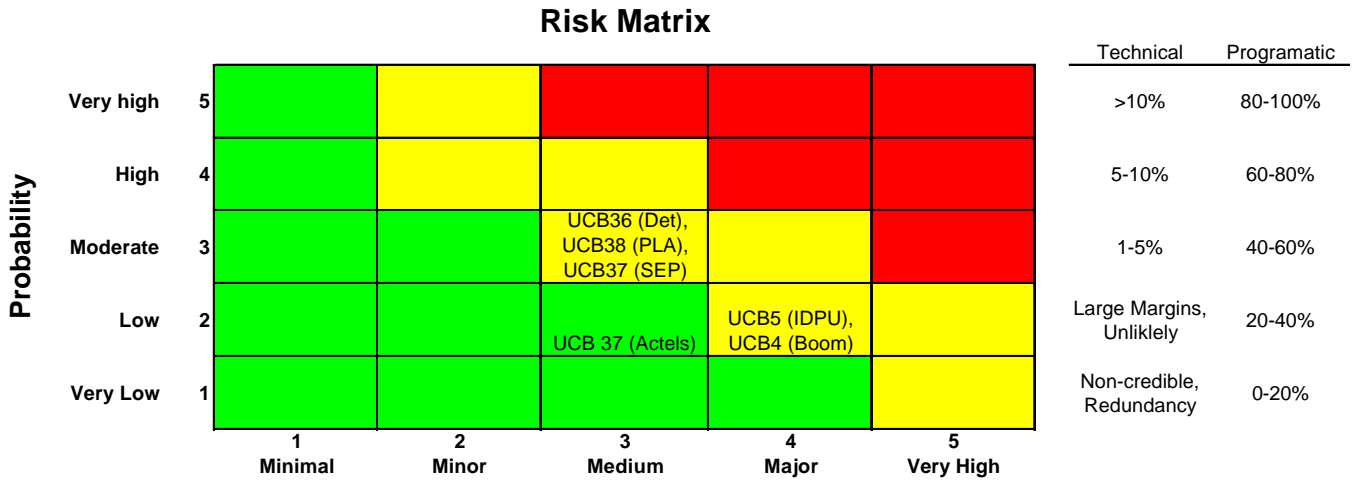
- SIT spare detector issues
- PLASTIC Flight Software chronically behind schedule, beginning to impact PLASTIC test schedule

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

Top risks are attached. Many have fallen out now that we are in test, and a few new risks against schedule have been added.

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## IMPACT Top Ten Risks 10/2004



### IMPACT

Minimal cost / no schedule, design margins	<b>&lt;3%</b> cost, non- critical path slip, work-around	<b>3-10%</b> cost, Critical path slip, loss of capability	<b>&gt;10%</b> cost, 1-3 mo, Level 1 science	<b>&gt;20%</b> cost, 3 mo launch slip, Mission failure
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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. Few or no spares for SIT and HET. New detectors being obtained, but there is a schedule risk	MEDIUM	Work to get spare detectors	MEDIUM	MEDIUM	MEDIUM	LOW
UCB_38	PLASTIC Flight Software is behind schedule	MEDIUM	Additional manpower to improve schedule	MEDIUM	MEDIUM	MEDIUM	MEDIUM
UCB_39	Continued problems with SEP (LVPS, connectors) risks delaying test schedules	MEDIUM	Identify and solve problems	MEDIUM	MEDIUM	MEDIUM	MEDIUM
UCB_37	Some Actels have been programmed with the old algorithm. Recent data from RK indicates the possibility of failure of these parts	LOW	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

# STEREO IMPACT Technical Progress Report

## 2. Berkeley Status

### 2.1. *Summary of Status*

Schedule status through December has been provided separately.

### 2.2. *Major Accomplishments*

SWEA/STE:

- STE-U FM1 and FM2 environmental tests complete
- FM1 SWEA/STE-D Thermal Balance complete, Vibration Complete, Thermal Vac in progress. Serial interface glitch problem (PFR1033) found and fixed.
- FM2 SWEA/STE-D ready to assemble

IDPU:

- IDPU FM1 completed tests, but fix for PFR 1032 (reverse biased capacitor) requires retest, which is in progress.
- IDPU FM2 passed vibration, failed thermal vac (PFR1031, PFR1032). Fix complete, Retest required.
- PLASTIC software continues to be late. No problem with IMPACT Flight Software during Suite I&T.

LVPS/HVPS:

- All units delivered.
  - FM2 PLASTIC needs rework as soon as it is returned from UNH
- SEP LVPS repaired for reverse-biased tantalum (PFR1032/ PFR1025)
  - In February it was found that the FM2 supply sometimes fails to power up properly, going into a high current state with low output voltages. Supply returned to UCB for diagnosis/rework. ETU sometimes exhibits similar problems; it is currently supporting SIT/SEPT Thermal Balance testing at GSFC.
- IDPU LVPS repaired for reverse-biased tantalum (PFR1032). FM2 supply repaired for missing resistor (PFR1031).

Boom:

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

GSE:

- All GSE delivered. Some added features in progress.

### 2.3. *Design Updates*

- None.

### 2.4. *Outstanding Problems*

- PLASTIC LVPS rework
- PLASTIC flight software behind schedule

### 2.5. *New Problems*

- IDPU FM2 Cold Start problems (including reverse-biased capacitor issue which also impacted PFR1025, SEP intermittents)
- FM1 SWEA Interface Errors

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### 2.6. *Top Risks.*

- Open Actel problems
- PLASTIC IDPU software late

### 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	2005-02-16
1002	STE-U Assembly problems (broken bond wire)	Curtis	2004-04-12	2005-02-16
1004	SEP LVPS Middle FM1 Problem	Heavner	2004-04-23	
1005	SEP LVPS Top FM1 Problem	Heavner	2004-04-27	2005-02-16
1006	STE-U FM1 Mis-wire (thermal vac feed-through)	Curtis	2004-04-30	2005-02-16
1007	SWEA LVPS FM1 LTC1877 Failure	Curtis	2004-05-10	2005-02-16
1008	STE-U FM1 Door failure (cold)	Curtis	2004-05-10	2005-02-16
1009	STE-U FM1 preamp oscillations	Curtis	2004-06-14	
1011	STE-U FM1 Door failure (post-vib)	Curtis	2004-06-28	2005-02-16
1012	IDPU FM1 LVPS part failure	Curtis	2004-07-15	
1013	STE-U FM2 door failure (status sense switch)	Curtis	2004-07-27	
1014	STE-U FM2 door failure, actuator burn-out	Curtis	2004-07-30	
1015	SEP FM1 LVPS Middle Board, pin damage	Heavner	2004-07-28	
1016	FM2 Boom Lock Pins, epoxy in the hole	McCauley	2004-08-02	
1017	SEP FM2 LVPS Middle board, wire damage	Heavner	2004-08-05	
1018	SIT FM2 HVPS stack broke	Berg	2004-08-25	
1020	FM2 Boom Actuator Harness	McCauley	2004-09-13	
1021	FM2 SWEA/STE-D Temp Sensor	Curtis	2004-09-27	
1022	SIT FM1 HVPS Stack broke	Curtis	2004-09-28	
1023	SWEA FM1 LVPS Transformer	Curtis	2004-10-04	
1024	SEP FM1 LVPS flex problem	Curtis	2004-10-08	
1025	SEP Intermittents during Suite I&T	Curtis	2004-11-05	
1026	FM2 PLASTIC LVPS short	Heavner	2004-12-1	
1027	FM1 IDPU Thermal Vac D5 Failure	Curtis	2004-11-23	
1028	FM1 SWEA/STE-D Cold Start problem	Curtis	2004-12-13	
1029	FM1 SWEA, One anode fails when warm	Curtis	2004-12-20	
1030	FM1 SWEA too cold	Curtis	2004-12-28	
1031	FM2 IDPU Cold Start	Curtis	2004-12-28	
1032	FM2 IDPU Cold Start 2	Curtis	2005-01-14	
1033	FM1 SWEA Interface Errors	Curtis	2005-01-18	

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## 3. GSFC (SEP) Status

STEREO Progress Report for January, 2005 (GSFC: Tycho von Rosenvinge, Sandy Shuman, Kristin Wortman, and John Hawk)

During the past month we have delivered HET Flight Model 2 (FM2) to Caltech and we have completed the assembly of SIT FM1. High voltage breakdown problems in SIT have been solved by modifications to the SIT telescope assembly (the addition of Kapton tape in strategic positions). It was also observed that epoxy which holds the SIT solid-state detector in its mount was extending above the surface of the mount on both sides, necessitating some design changes to eliminate mechanical interference between the epoxy and the surrounding housing. Vacuum tests of 2 new spare surface barrier detectors for SIT showed that their leakage currents became excessive in vacuum, making it all the more important that we adapt SIT to the two existing detectors. Assembly of the SIT collimator/door was completed for the first time and the door was successfully opened using the flight TiNi pin-puller. Assembly included mounting thermistors, thermostats, and heaters.

Sandy Shuman made a trip to Caltech to deliver HET FM2 and to assist with the assembly of HET/LET/SEP Central. He also delivered the flight foils for LET.

Support was provided for a Technical Readiness Review (TRR), a supplement to the earlier IMPACT Pre-Environmental Review. We also underwent a brief review of the SIT door design.

Subsequent to the TRR, Kristin Wortman found the cause of occasional crashes of the on-board software for HET. This error crept in when modifications were made to the HET on-board particle processing algorithm to handle cross-talk problems. We now plan to use this version of the HET software during environmental test.

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

We also supported planning for the SIT/SEPT Thermal Balance (TB) and Thermal Vacuum (TV) tests taking place at Goddard. An important part of this support is the ability to monitor the instruments remotely over the internet (e.g. from Germany). This required setting up a Virtual Private Network (VPN) which is accessible through the Goddard firewall. Any penetration of this firewall from outside Goddard is achieved with difficulty due to fear of network attacks by hackers. One advantage of the slipping schedule was that we were eventually able to get approval for the VPN.

The TB tests have now started and we are assisting the Kiel and U of MD teams as needed (the Kiel team has in fact now departed for Germany). The FM1 SIT door was successfully opened cold during the on-going TB Phase I (2 SEPT-Ecliptic telescopes and the FM1 SIT telescope). Prior to this opening we discovered that the SIT pin-puller cable was miss-wired; we were able to work around this miss-wiring without having to open the chamber, however we will need to correct this problem after removing SIT FM1 from the vacuum chamber. When the chamber is opened we also need to verify that the SIT door opened fully (it's hard



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to verify this through the limited viewing ports on the chamber). Interference by a thermal blanket prevented the opening of one of the SEPT-E doors hot. The SIT door appears to be open, but similar interference could be keeping the door from being completely open.

### Next Month

We are now working on delivering a fully-assembled SIT FM2 for Phase II of the SIT/SEPT TB. We will also provide an assembly procedure with extensive photographs documenting the SIT final assembly. We will continue to support the ongoing SIT/SEPT TB and TV tests.

We will support the acoustic/vibration tests, TB, and TV tests of LET/HET/SEP Central at JPL.

We will deliver new detector mounts for L1 detectors to Micron. These will be free of previous problems due to embrittlement of traces in the mount flex-circuit. This embrittlement occurred as a result of (unnecessary) gold-plating the traces.

We are investigating possible accelerator exposures to verify the new HET on-board processing algorithm mentioned earlier.

# STEREO IMPACT Technical Progress Report

## 4. Kiel/ESTEC (SEPT) Status

### SEPT Monthly Technical Progress Report January 2005

#### 4.1. *Summary of Status*

- a) Calibration runs on all four SEPT units using radioactive sources.
- b) Transport of all four units to GSFC, permanent import into US.
- c) Preparation for thermal balance (TB) test.

#### 4.2. *Major Accomplishments*

- a) Energy calibration was continued using conversion electrons from radioactive sources Bi-207, Cd-109, Ba-133, and muons.
- b) The instruments were cleaned, packed for transportation, checked by customs officials for permanent exportation, hand-carried to GSFC and imported to US. Now they are GSFC property and subject to ITAR.
- c) Onsite preparation for thermal balance test in GSFC Building 4.

#### 4.3. *Design Updates*

#### 4.4. *Outstanding Problems*

- 1. IMPACT PR-7005 SEPT-Counting needs Failure Review Board approval in order to continue repair work of the flight spare electronics. Unresolved situation delays the proton accelerator calibration activities. Next step by ESTEC person in charge of Non-Disclosure Agreement.

#### 4.5. *New Problems*

#### 4.6. *Top Risks*

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

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

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## 5. Caltech/JPL (SEP) Status

### 5.1. Summary of Status

Activities were primarily devoted to preparing and delivering the LET and SEP Central presentations at the Test Readiness Review. The LET/HET/SEP Central FM 1 and FM 2 units were assembled and tested in preparation for the review, which was held on 1/20/05 on the Caltech campus.

#### Major Accomplishments:

- Successful completion of Test Readiness Review at Caltech on 1/20/05.
- HET/LET/SEP Central FM 1 & 2 assembled and tested in nearly final flight configuration.

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

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

#### Detectors:

- Flight detectors were installed in LET FM 1 and FM 2 units.
- New mounts (80) were ordered from Rigiflex (at GSFC).
- Decided not to proceed on order to replace all L1 detectors in LET. Instead, the situation will be reviewed after the acoustics tests. There are 6 new detectors on order and that order will proceed.

#### Electronics:

- SEP Central FM 1 ran over the holidays without incident until early January when it suffered several reboots. The problem was eventually traced to tantalum capacitors in the LVPS units, which were installed in the wrong polarity configuration. Capacitors were replaced in all supplies: EM, FM 1, and FM 2.
- LET/HET/SEP Central FM 1 and FM 2 were assembled with only a few issues remaining to be resolved at month's end.
- Remaining issues:
  - install accelerometers on cubes and on both FM units using super glue
  - tape over small holes where pins/screws are missing (EMC/EMI concern)
  - install #6 screws and MDM jack posts upon arrival from Sandy
  - file down Ultem bushing shoulders
  - install MLI blanket buttons on both FM units
  - make one more T/V test cable at JPL
  - run all test procedures on both FM units
  - assemble LET EM for acoustic test
  - rebuild flight harnesses
  - start hybrid qualification
  - splice L1 spares
  - update Analog/Post-Reg EM board and fix short for GSFC TB/TV test
  - ship SEP Central EM and spare GSE to GSFC

#### Finished:

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- install LET FM2 outer window foils (sides A & B use different material)
- trim extra foil material on LET FM1 outer windows
- trim extra foil material on LET FM2 outer windows
- elongate some holes on both LET brackets to better fit screws
- modify swage screw head due to interference with external wall ribs
- replace tantalum cap in LVPS FM1
- replace tantalum cap in LVPS FM2
- replace tantalum cap in LVPS ETU
- insert two heli coils on LVPS FM1 box
- mount HET FM1 telescope in its place (now with purge line)
- mount HET FM2 telescope in its place (now with purge line)
- mount LET FM1 in its place and attach purge line
- mount LET FM2 in its place and attach purge line
- button up and stake SEP FM1 unit
- button up and stake SEP FM2 unit
- modify dynamics test plan for sine vibrate
- order GSE purge tube fittings and more tubes
- order MDM jack posts with proper length (for use after env. tests)
- perform dynamics analysis w/o 4 screws on LET FM1 bracket

### Software:

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

### GSE:

- Worked on the User's Guide.

### 5.2. *Design Updates*

- Resource updates will be sent separately.

### 5.3. *Outstanding Problems*

- The L1 haywire repair did not leave enough strain relief and several wires were broken or stretched thin upon installation into FM 1. A new repair cycle is underway. Most were repaired by moving the epoxy blobs that provide strain relief. A procedure for splicing the broken wires is in development.

### 5.4. *New Problems*

- None

### 5.5. *Top Risks.*

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

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## 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	

## 5.7. *Lien List*

- The lien list will be transmitted separately.

## 6. SIT MONTHLY TECHNICAL PROGRESS REPORT

January 2005

### 6.1. SUMMARY of STATUS

- a. a. FM1 unit - At GSFC complete and ready except needs installation of sunshade/acoustic cover.
- b. FM2 - Electronics – conformal coated and baked out and tested. At GSFC waiting installation of shield board and thermal hardware.
- c. Telescope is assembled but missing sunshade/cover and thermal hardware. It is assembled to the coated and baked FM1 HVPS.
- d. Spare SSDs – In test at GSFC.
- e. Flight Software – Current version is 09/03/04 and is under test at UMd .

#### 6.1.1. Schedule Changes

The current SIT schedule is available from the project scheduler.

### 6.2. MAJOR ACCOMPLISHMENTS

#### 6.2.1. This Month

- PER – Participated in test readiness review for SIT as part of IMPACT PER.
- FM2 Telescope – finished testing and returned to GSFC for installation of thermal hardware and sunshade/cover.
- FM1 Telescope – Added thermal hardware to telescope and retested at UMd.
- FM1 Electronics – baked out and added shield and thermal hardware.
- FM1 Unit – Integrated telescope, HVPS and electronics, and cut cables to flight length. Do not plan to open again though sunshade/cover and a few more external parts need to be added before environmental testing. The integrated unit was tested in vacuum at UMd and a very good alpha track was obtained. A detailed electronic calibration was obtained.
- SIT sunshade and acoustic pieces were coated for flight.
- Spare SSDs (2) were received from Ortec and were put into testing at GSFC. Preliminary indications are that they are not acceptable and will have to be returned to Ortec.

#### 6.2.2. Next Month

Finish assembling the two flight units and begin environmental 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

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

## 6.4. **OUTSTANDING PROBLEMS**

We still have not succeeded in procuring any flyable SSD spares.

## 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
PR3001	Failure of PH300 chip U4 of FM1 energy board	PHW	4/27/04	
PR3002	Failure of FM1 ATOF START front end	PHW	4/29/04	
PR3003	Failure of FM2 ATOF START and STOP front end	Waterman	8/10/04	
PR3004	Failure of FM1 ATOP start and stop front end	Waterman	8/30/04	
PR3005	Oscillation of FM2 HVPS output	Waterman	9/1/04	
PR3006	Fit problem of SSD in telescope	PHW	1/7/05	

**7. CESR (SWEA) Status**

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



**8. GSFC (MAG) Status**

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

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## 9. EPO at UCB

Monthly E/PO Report

January, 2005

### Formal Education:

L. Peticolas and N. Craig began a lesson to use sonification and data analysis to explain solar wind particle data, using an analogy with marathon runners and data on marathons accessible on the wind called “Running from the Sun to Earth.”

Jan 10<sup>th</sup>: L. Peticolas presented an invited talk at the American Association of Physics Teachers (AAPT) to high school teachers about the STEREO sonification project, emphasizing the new marathon-solar wind particle lesson, “Running from the Sun to Earth.” The name of the talk was “NASA's STEREO-IMPACT brings you space weather through sound” with authors: L. M. Peticolas, R. Morales Manzanares, D. Bithell, N. Craig, I. Sircar, B. J. Méndez, J. G. Luhmann, and S. D. Bale

D. Bithell and R. Morales Manzanares made updates to the classroom sonification software for the STEREO sounds project to better accommodate the “Running from the Sun to Earth” lesson. R. Morales Manzanares met with L. Peticolas to make further changes to this program on Jan. 27<sup>th</sup>.

170 *Magnetism and Electricity and Magnetism in Solar Wind* guides was requested to be used for Teacher professional Development programs and shipped to AZ, IL, UT, TX, Ohio and PR.

### STEREO in general:

N. Craig, T. Kucara and D.Christopher’s continued to promote their Spring AGU SH02 session: *Bringing the Sun to Earth: Solar and Sun-Earth Science Education and Public Outreach Efforts*.

170 *Magnetism and Electricity and Magnetism in Solar Wind* guides was requested to be used for Teacher professional Development programs and shipped to AZ, IL, UT, TX, Ohio and PR.

We have not yet received the FY05 E/PO funds from GSFC and inquiries are made.

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