

STEREO IMPACT Technical Progress Report

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

Lil:

Enclosed is the monthly technical progress report for the STEREO IMPACT project for the month of October 2003.

Sincerely,

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CC:

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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 mid-November is in the pipes. 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 Lien. 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.

UCB:

No.	Cause	Amount	Date
1	LVPS schedule delays extend manpower (Risk UCB29). Cost a 1-month delay at full LVPS team spending rate.	\$35,000	01/04
2	Late failure in thermal vac requires rework/retest (Risk UCB27, etc).	\$30,000	02/04
3	Testing failure requires rebuild/retest a board (using existing spare parts)	\$20,000	~02/04
4	EMC rework and retest required (Risk UCB11). Assume rework can be done in a week or two.	\$30,000	05/04
5	Schedule delays cause the consumption of boom suite schedule contingency (various risks). Cost 35 days of contingency at UCB I&T team rate.	\$50,000	07/04
6	STE calibrations sources. \$12,500 Quote is over the earlier ROM of \$10K.	\$2,500	11/04

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. The amounts and timing of these types of expenditures are largely unknown. Board re-makes are in the \$6,000 to \$12,000 range, per board type. The budget does contain funding for board reworks, including adding haywires, etc.	\$12,000	12/03
2	Unfunded schedule reserve (if we deliver in September 2004 as required rather than July 2004 as currently planned).	\$25,000	8/04
3	Bakeout plans need to be firmed up. May result in more time in JPL bakeout chambers	\$50,000	7/04

STEREO IMPACT Technical Progress Report

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			
6			

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	\$20,000	12/03
3	Travel for accelerator end-to-end test	\$5,000	12/03?
4	Tom Nolan flight software support	\$15,000	2/04
5			
6			

1.2. **Significant System-Level Accomplishments**

- Participated in Contamination Control Committee telecom
- Participated in EMC Committee telecom
- Participated in MAG workshop
- Participated in discussions of Verification Plan
- Held a telecom to discuss bakeout plans
- Held Parts Control Board meeting to review and approve parts lists for boards ready for flight build
- Performed compatibility tests between SEP suite ETU.
- Performed compatibility tests between IMPACT, SWAVES, and Spacecraft ETU and MOC/POC, including timing tests.
- Started fabrication of flight harnesses on spacecraft mockup.

1.3. **System Design Updates**

- None

1.4. **System Outstanding Issues**

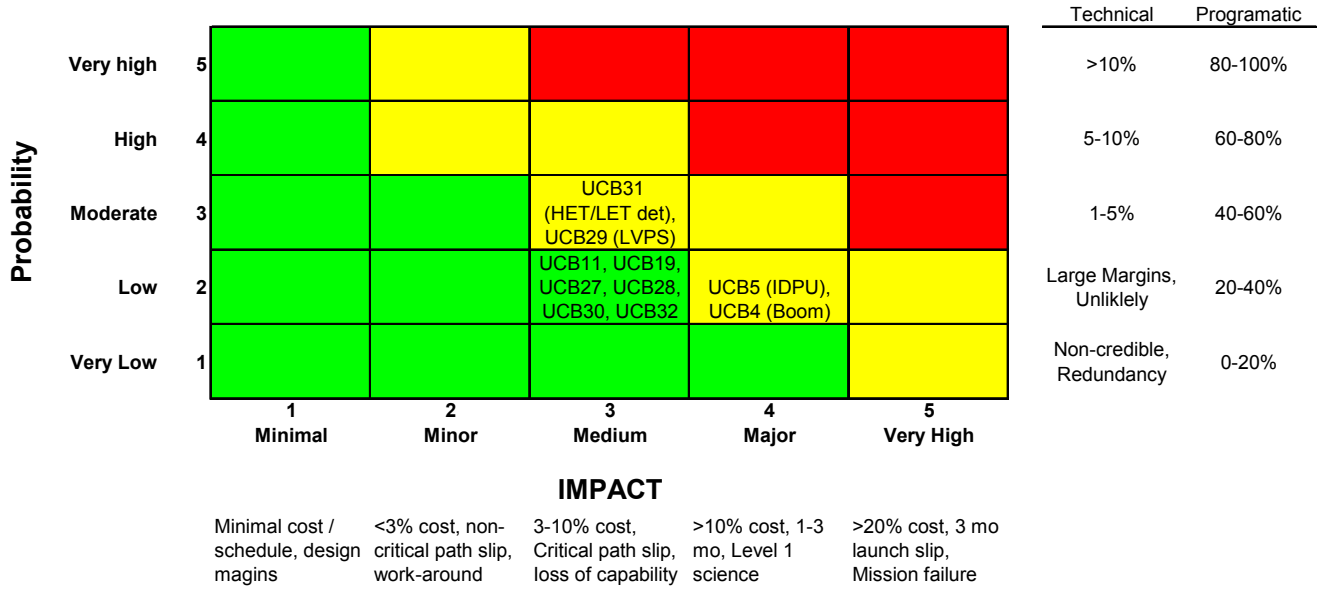
- New boom cork contamination waiver submitted, test results submitted for review.
- SWEA VMI Multiplier failure (MRB pending outcome of part failure analysis)

1.5. **Top 10 Risks**

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

STEREO IMPACT Technical Progress Report

Risk Matrix



STEREO IMPACT Technical Progress Report

IMPACT Top Ten Risks 8/2003

No.	Risk Item	Score	Mitigation	Mitigation Schedule							
				PDR	EM Test	CDR	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	MEDIUM	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	MEDIUM	MEDIUM	MEDIUM	MEDIUM
UCB_31	HET/LET ETU detector mounting difficulties impacting schedule	MEDIUM	Identify and solve problems; bring in outside experts to evaluate process, continue with flight detector fab in parallel	MEDIUM	MEDIUM	MEDIUM	MEDIUM	LOW	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	MEDIUM	MEDIUM	MEDIUM	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	MEDIUM	MEDIUM	MEDIUM	LOW	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 & thermal cycle.	MEDIUM	MEDIUM	MEDIUM	LOW	LOW	LOW	LOW	LOW
UCB_28	Thermal limitations of detectors result in a low bakeout temperature which might require a very long bakeout impacting delivery schedule	LOW	Bakeout subsystems prior to detector integration to reduce time of instrument-level bakeout; early bakeout	MEDIUM	MEDIUM	MEDIUM	LOW	LOW	LOW	LOW	LOW
UCB_19	Concern about fragility of ITO surfaces required to meet ESC requirements; failure will impact SWEA science	LOW	Replace ITO with more robust solution where possible; test ITO surfaces during I&T and replace when required	MEDIUM	MEDIUM	MEDIUM	LOW	LOW	LOW	LOW	LOW
UCB_32	Parts Review Boards & Parts Waiver process could delay flight fabrication	LOW	Work to get parts lists approved, waivers into system where PCB cannot agree.	MEDIUM	MEDIUM	LOW	LOW	LOW	LOW	LOW	LOW
UCB_30	SECCHI magnetics (especially filter when motor) may exceed magnetics requirement, impacting MAG science	LOW	Testing completed, shielding implemented.	MEDIUM	MEDIUM	MEDIUM	MEDIUM	LOW	LOW	LOW	LOW

STEREO IMPACT Technical Progress Report

2. Berkeley Status

2.1. *Summary of Status*

Schedule status through June has been provided separately.

2.2. *Major Accomplishments*

SWEA/STE:

- SWEA/STE flight boards re-layed out and in review.
- STE flight Preamp PWB delivered, coupons to be sent to GSFC
- STE flight detector boards in fabrication.
- STE, SWEA Pedestal, and STE-U preamp housing in flight fab

IDPU:

- Second flight DCB unit tested.
- Flight Software: PROM software acceptance test completed. Also sparecraft ETU interface test completed. Working on Build 3 for IMPACT.
- PROMs programmed, burned in, ready to install in flight DCBs.
- PLASTIC software Build #2.3 completed, ready for IDPU/PLASTIC ETU interface test.

LVPS/HVPS:

- SIT HVPS FM #1 in test. A trim part is missing, needs to be ordered.
- SWEA/STE-D LVPS in re-layout for flight
- PLASTIC LVPS flight PWBs in fab
- SEP LVPS ETU tested. Flight layout modifications in progress.
- IDPU LVPS Layout modifications for flight in progress
- Second layout person contracted, doing IDPU layout mods
- Additional test engineer lined up

Boom:

- Most flight parts have been released and are out for manufacture. Rings are delayed pending measurements of flight tubes.
- Tube problem solved, first full batch of flight tubes delivered and being measured for rings.

GSE:

- Continued additions to C&T GSE, SWEA/STE GSE.

2.3. *Design Updates*

- None.

2.4. *Outstanding Problems*

2.5. *New Problems*

2.6. *Top Risks.*

- LVPS schedule tight

STEREO IMPACT Technical Progress Report

2.7. ***Problem/Failure Quick Look***

ID #	Description	Assignee	Opened	Closed
1001	Qual boom deployment failure in Thermal Vac	McCauley	2003-08-15	

STEREO IMPACT Technical Progress Report

3. GSFC (SEP) Status

3.1. *Summary of Status*

The current delivery dates of the HET flight units are 2/28/04 and 3/15/04.

3.2. *Major Accomplishments*

- Considerable effort went into a full-up interface test at Caltech with all the SEP engineering units. Both HET and SIT were shipped to Caltech and Larry Ryan (HET) and Peter Walpole (SIT) went out to Caltech for the test. The interface test was overall quite successful. However, problems were encountered with attempts to upload on-board tables to SEP Central via the internet and the Caltech GSE. These problems appear to be somewhere after receipt at the Caltech GSE and are being investigated at Caltech. A second such test is planned for the second week of January.
- The HET flight model 1 PC board is awaiting flight PHASICs and the flight Actel. These will be available in about another week. We have been able to make good use of the resulting additional time to test the engineering unit during the last month.
- All detector mounts have been sent to Micron except 15 H3 mounts. These remaining H3 mounts are currently undergoing mechanical inspection. Micron has 25 H3 mounts already.
- The LET housing design has been significantly revised. Extra electrical shields and coaxial cables between the two LET PC boards were added to reduce cross-talk. These have made mechanical assembly more complex. To address this, the LET housing has been broken into more parts. Fab of EM side plates and internal shields was completed. PHASIC shields for LET were fabbed and shipped to Caltech.
- The SEPT S/C bracket design has been sent out for fab.
- Set up shop numbers (\$) for internal inspection and plating.
- Worked out remaining design details with U of Md for SIT hardware.
- Population of the SIT energy board (which we have had for ~ 3 months) is still awaiting final resolution of the SIT parts list.
- Processing the thermal coatings/surfaces for SEPT parts is way behind schedule. This was in part because FY03 \$ were withdrawn by the Project at the Fiscal Year boundary and partly because GSFC has gone over to a whole new financial system which is not working well. This was a frustrating experience for all concerned.
- The detector life-test thermal vacuum system is now up and running reliably. SIT solid-state detector testing has begun.

3.2.1. Next Month-

- Support the upcoming Pre-Environmental Review, SWT, and IMPACT team meetings at Berkeley.
- Complete processing of the last 15 H3 detector mounts and ship to Micron.
- Complete an engineering version of the LET mechanical assembly and ship to Caltech.
- Complete thermal coatings of the SEPT parts.
- Deliver the SEPT brackets.
- Update ICD with APL to include mounting hole diameters and correct LET FOV.

STEREO IMPACT Technical Progress Report

- Update mass of SEP Main.
- Populate the HET flight boards and the SIT flight energy board.
- Work on defining the HET and SEPT radioactive sources to be supplied by GSFC.
- Close out remaining RFAs from CDR.

3.3. ***Design Updates***

Work being shifted from UofMD and from Caltech may require some additional funding.

3.4. ***Outstanding Problems***

3.5. ***New Problems***

Mostly continued slow schedule slipping.

3.6. ***Top Risks***

- No significant risks at GSFC? Need to ensure that manpower becomes available per the current plan.
- We are running behind schedule with respect to detectors and the HET final electronics design. The HET delivery dates have been revised accordingly.

3.7. ***Problem/Failure Quick Look***

4. Kiel/ESTEC (SEPT) Status

Octoberber 2003

4.1. Summary of Status

1. Detector incoming inspection ongoing, so far 20 out of 28 PIPS tested.
2. All mechanical parts fabricated.
3. FM1 electronics fully tested.

4.2. Major Accomplishments

1. Detector vacuum tests ongoing. Criteria: leakage current and noise performance. 18 out of 20 detectors meet the criteria, 2 will be returned to Canberra.
2. Radioactive source tests and muon runs ongoing. Some problems to achieve low-noise laboratory environment. Investigation in progress. Source tests and muon runs will be repeated.
3. SEP EM test at Caltech supported with two SEPT units: SEPT-EM and SEPT advanced breadboard. Problem identified with LVPS power rail turn-on delays.
4. Four sensor housings sent to GSFC for application of black paint and Goddard Composite.
5. Budget problem solved: ESTEC accepted to pay for vibration, thermal vacuum, and bakeout tests. Kiel will pay for acoustic test.
6. Special TV harness manufactured to allow simultaneous TV test of two units.
7. Pinpuller GSE and TV harness manufactured to allow actuation of pinpuller during TV.
8. Final purge inlet drawing submitted to project (via Dave C). Approval received.
9. Structural re-analysis performed to assess effect of weight increase by 104 g. Modal frequencies as well as quasi static load factors dropped and are found in allowed range. Bracket design need not be changed, manufacturing of brackets can proceed.
10. FM1-E and FM1-NS fully tested: the new feature in the FPGA is operational. It was implemented to improve the (anti)coincidence window performance.
11. FM2-E and FM2-NS digital boards manufactured.
12. PDFE LAT final report pending. Commercial part life test completed, report pending.

4.3. Design Updates

4.4. Outstanding Problems

Application of thermal coating at GSFC delayed. According to present information, new time slots for environmental tests in January 2004 need to be negotiated with facility provider. New delivery dates to Caltech: not before mid February 2004.

4.5. New Problems

Request initiated for waiver to power thermal circuitry during instrument level vibration test.

4.6. Top Risks

4.7. Problem/Failure Quick Look

5. Caltech/JPL (SEP) Status

5.1. *Summary of Status*

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

5.2. *Major Accomplishments:*

- The EM interface test occurred and was a revealing and useful get together. Although judged a success, a follow-up test is now planned for January 2004.
- The coupons for the flight Logic board passed inspection.
- A bunch of detectors were received.
- Micron now has mounts for all detector types.
- The harness measurement task was accomplished.

5.2.1. Critical Milestones status:

- Milestone 13 (SEP-ETU LVPS Available) was accomplished.
- Milestone 18 (HET-All Flight Detectors Received) has not been accomplished due to detector mount problems. All detectors are now expected by 25 December 2003.
- Milestone 19 (LET-All Flight Detectors Received) has not been accomplished. Mount problems also delayed progress although LET mounts are no longer an issue and good progress is being made. All detectors are now expected by 25 December 2003.
- Milestone 20 (SEP Package-EM I&T Complete) has not been accomplished. Great progress was made in the EM interface test but it was deemed another test is needed in mid-January 2004.

5.2.2. Detectors:

- Micron Semiconductor delivered two prototype L2 detectors that are replacements for two previously delivered ones that were incorrectly installed in their mounts. In addition they delivered the first four flight L2 detectors and all nine of the flight L3 detectors.
- Micron has now has mounts for H1 and H3 detectors (provided by GSFC). They have assembled 15 H1 detectors in mounts and will be mounting H3 detectors in early November. They are planning a vibration test of these detectors, plus additional LET detectors, around the middle of November. Additional tests to be carried out after the vibration typically require 2 weeks. Micron reports that they expect to ship flight H1 and H3 detectors around the end of November. Assuming that the fraction rejected based on their test results is not unusually high, they should be able to deliver all of the HET detectors needed for flight.
- The following table summarizes the delivery status of silicon detectors for LET and HET as of 31 October 2003.

STEREO IMPACT Technical Progress Report

	Needed for Flight	Ordered	Received	Notes
	-----	-----	-----	-----
L1 proto		5	6	(1,2)
L1 flight	20	30	9	(3,4)
L2 proto		2	2	(5)
L2 flight	4	9	4	
L3 proto		2	2	(5)
L3 flight	4	9	9	
H1 proto		2	2	
H1 flight	4	9	0	
H3 proto		2	2	
H3 flight	14	20	0	

Notes:

- 1.) Micron delivered one more L1 prototype detector than was ordered so that we could test all of the available devices.
- 2.) Measurements at Caltech showed that the prototype L1 detectors are thicker than specified (typically about 28 microns vs. the specified range of 18-22 microns. If necessary these are flyable devices.
- 3.) One of the flight L1 detectors is cracked and will be replaced by Micron.
- 4.) In addition to the flight L1 detectors listed, Micron delivered 3 additional "B-grade" L1 detectors for evaluation. These devices have higher leakage currents than specified, but may still be useful for flight.
- 5.) Of the two L2 and two L3 prototypes, one of each kind is classified as "B-grade"

5.2.3. Electronics:

- SEP ETU test of LVPS and Bias Supply compatibility was performed successfully. All sensors and IDPU participated in the test. Some minor issues have been discovered and have since been worked on. Next ETU gathering of SEP sensors will take place mid-January 2004. See attached photos of SEP ETU hardware.
- SEP intra-instrument harness fit-check and measurements carried out on two S/C mock-ups at APL. Our harness specialist from JPL brought flight harness bundles (w/o connectors) and laid them out on the mock-ups for actual; the termination and will take place at JPL. UCB will bake out the flight harnesses.
- Started assembly of SEP Analog/Post-Reg flight boards S/N 1 & 2, received QA feedback on workmanship and paperwork, and then worked on improving the latter. Upon visit by Ron Jackson we adopted the UCB format for Assembly Instructions and As-Built Parts List for all of the flight boards that we'll be assembling.
- SEP Central Logic flight board test coupons passed GSFC inspection. The assembly has not started due to delay with QA paperwork issues for the previous assembly (Analog/Post-Reg).

STEREO IMPACT Technical Progress Report

- PHASIC hybrid burn-in finished on 6 more units, which were then taken back to JPL for final screening and subsequently delivered to us. Two of them were selected for HET flight board S/N 1 and sent to JPL for lead forming. Unfortunately, the glass seals got damaged during lead-bending operation and the units did not pass the leak tests. They have been downgraded to EM use and two new flight units have been designated for HET. They are now in leak test.
- Much effort was focused on LET flight software development. The detailed definition of the S/W requirements was nearly completed:
 - A problem with the approach to binning on-board events with regard to their energy was found and an improved approach adopted. However, there still remains the need to define the on-board algorithm for corrections due to particle energy lost in the entrance windows. A simple method was proposed and is being checked for adequacy.
 - The method of buffering and sampling events for T/M was determined. We will be sorting events into about 28 different categories and placed into corresponding FIFO buffers, each about 8 events deep. The buffers will be polled in an order determined by a 240 long table, such that in any minute each buffer is polled at least once and some buffers are given higher priority by being polled multiple times. When polled, if a buffer is found non-empty, an event is taken from that buffer and placed into an accumulating science frame. Polling occurs at a rate of about 4 events per second, distributed throughout the minute.
 - A method was agreed upon for uploading the large tables LET uses in the event categorization scheme. A simple "vectorized" description of the table contents was defined, providing greater than 10x compression and allowing all tables to be uploaded in-flight in less than one minute.
- Progress was made on the LET s/w implementation:
 - The detector leakage current balancing algorithm was completed and works.
 - The periodic readout of LET singles rates and lifetime counters was completed and works.
 - Periodic operation of the housekeeping ADC to readout temperatures was completed and works.
 - Work proceeds on implementation of background stim pulser operation, data formatting, heater control, and event processing.
- Minor modifications to the LET MISC ACTEL design continue to be made.
- Progress was also made toward simplifying the boot process for LET, HET and SIT from SEP Central. The booting of each instrument will proceed in a single step, rather than multiple steps requiring SEP Central to know the details of each sensor's table initialization needs. Now a single binary block of self-initializing code will be sent at boot time to each sensor, which will expand and initialize its own tables. The boot processes and automatic power-on booting of all the sensors will be checked at a pre-integration get together in mid January of 2004.
- The first of the NVR witness plates (from T/V chamber used for detector testing) was sent to GSFC for analysis.
- Resource updates will be sent separately.

STEREO IMPACT Technical Progress Report

5.2.4. Software (Davis):

- Worked on LET flight software and PHASIC temperature testing software.

5.2.5. GSE:

- The SEP GSE communicates with the sensor GSE (HET & SIT) GSEs using Payload Telemetry Packets and Supplemented Command Messages sent using TCP/IP. Also the SEP GSE has a similar communication scheme with the IMPACT GSE but its role is the reverse of its role with the sensor GSE. The following was observed during the EM test and its preparations.
 - Telemetry
 - The SEP GSE had no problems in receiving Payload Telemetry Packets from the IMPACT GSE.
 - During the early part of the EM tests, it was noted that not all of the Payload Telemetry Packets were being displayed on the HET and SIT GSEs. The two possible causes were either the SEP GSE was failing to service the TCP/IP connections for the HET and SIT GSE correctly or the HET and SIT GSE were dropping packets. By the end of the EM test, both GSFC and Caltech agreed that the SEP GSE appears to be servicing its TCP/IP connections correctly. GSFC also seems to have isolated the problem in their GSEs.
 - Commanding
 - The SEP GSE was not able to forward Supplemented Command Messages to the IMPACT GSE. Indications are the problem is in the IMPACT GSE. Resolving the problem will involve additional tests between the SEP GSE and the IMPACT GSE.
 - The HET and SIT GSE were able to forward commands contained in a single Supplemented Command Messages thru the SEP GSE to their sensors. This commanding works both from their local (on the Caltech subnet) GSE and their remote GSEs. On command sequences that span multiple Supplemented Command Messages, some of the Supplemented Command Messages were being dropped. Whether the problem is in the SEP GSE or the sensor GSEs is not obvious. On the SEP side, we will be setting up tests with the SEP GSE, the SEP Engineering Unit, and the Caltech Sensor Simulator system to help isolate the problem. Some additional (remote) testing with the sensor GSEs will be needed to verify that the problem is solved.
- After the EM test the firmware in the IDPU simulator was updated. The updated software solved the annoying problem of not having the most significant bits of the UT. This will simplify tracking of data in the pre-delivery environment.

5.3. **Design Updates**

- Resource updates will be sent separately.

5.4. **Outstanding Problems**

- The problems with the two flight Actels are still being investigated by Actel.

STEREO IMPACT Technical Progress Report

5.5. ***New Problems***

- Some hybrid lead forming problems emerged that caused two units to fail leak test. The cause was determined and the process has been corrected.

5.6. ***Top Risks.***

- The budget is very tight with no reserve being held at Caltech.

5.7. ***Problem/Failure Quick Look***

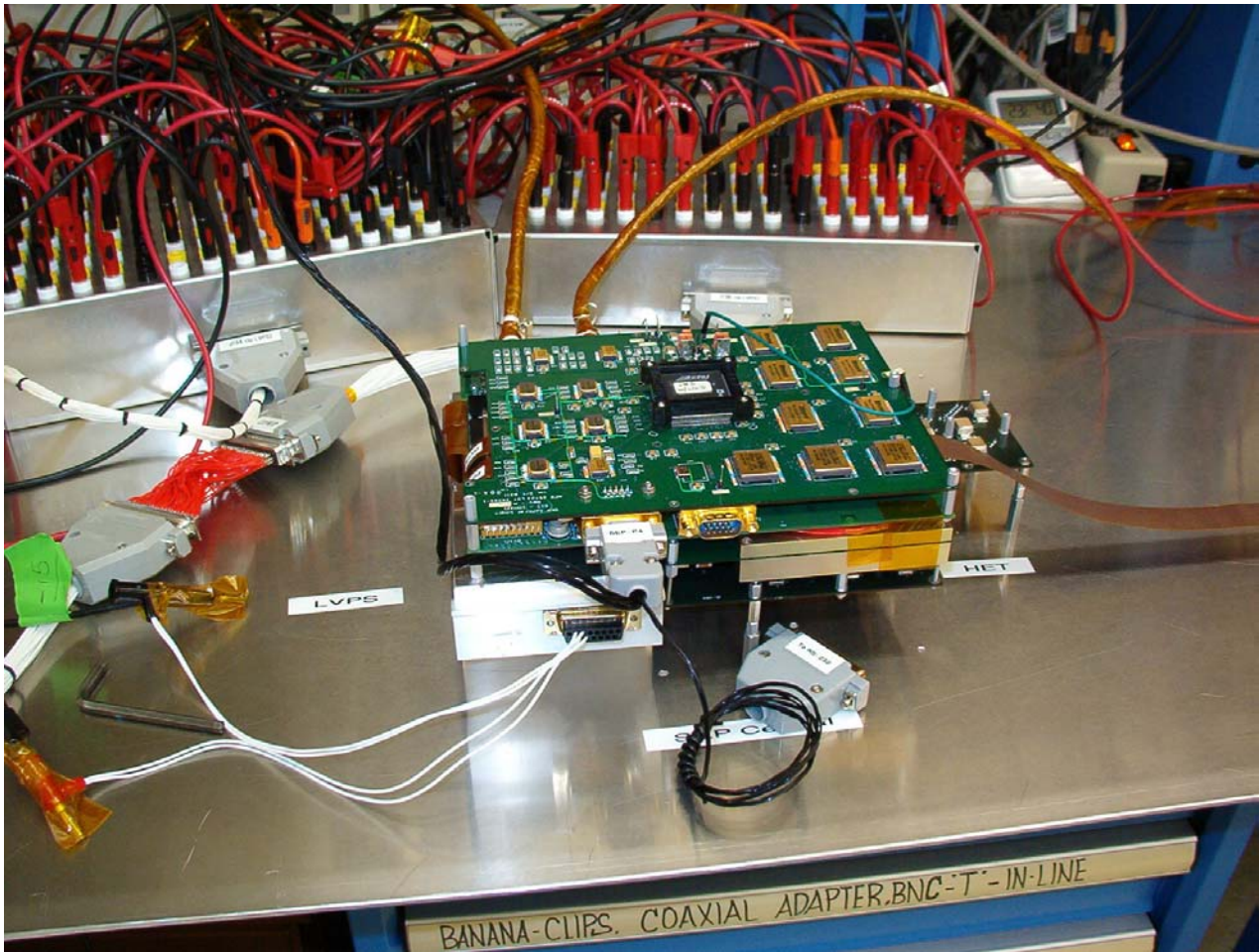
- None.

5.8. ***Lien List***

- Budget does not contain funding for investigations of part failures or contamination failures, re-makes of boards if coupons fail, etc. During the month, problems with the hybrids may have already caused some extra expenditure of funds at JPL and we are investigating the impact.
- Unfunded schedule reserve: ~\$25,000 (if we deliver in September 2004 as required rather than July 2004 as currently planned).
- 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.

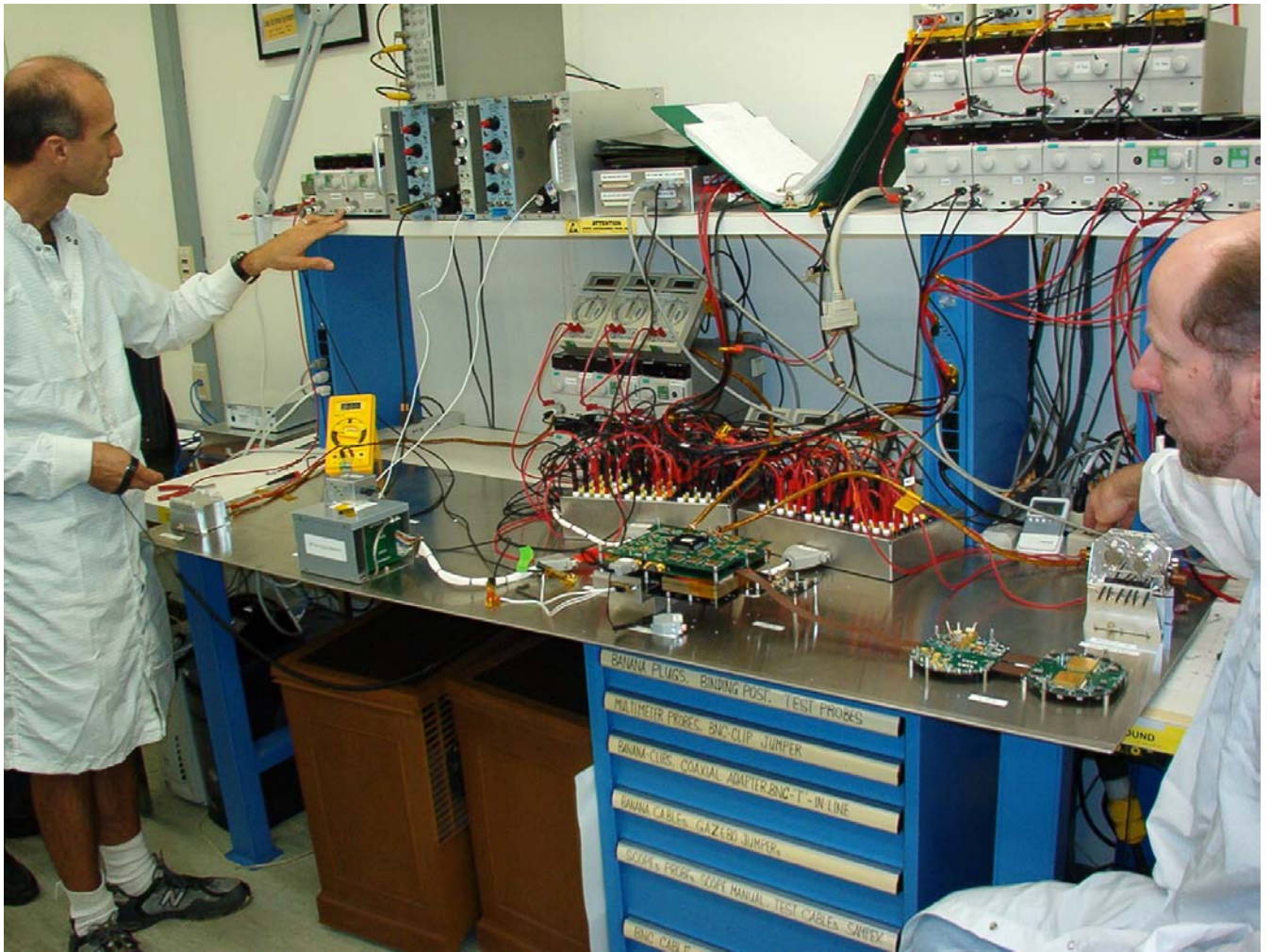
SEP EM test – SEP Central

STEREO IMPACT Technical Progress Report



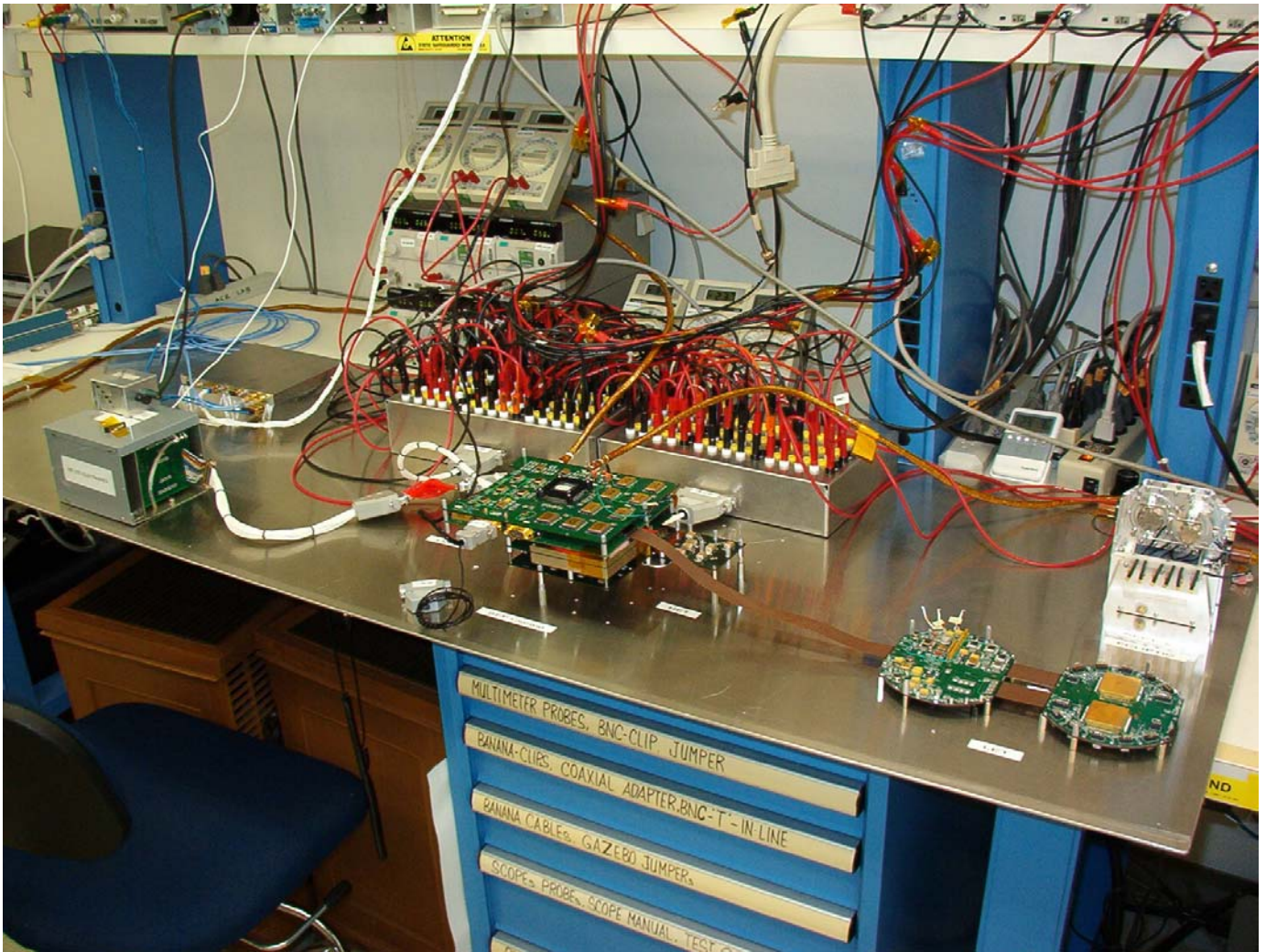
SEP EM test – Turn-on (Branislav Kecman on the left; Rick Cook on the right)

STEREO IMPACT Technical Progress Report



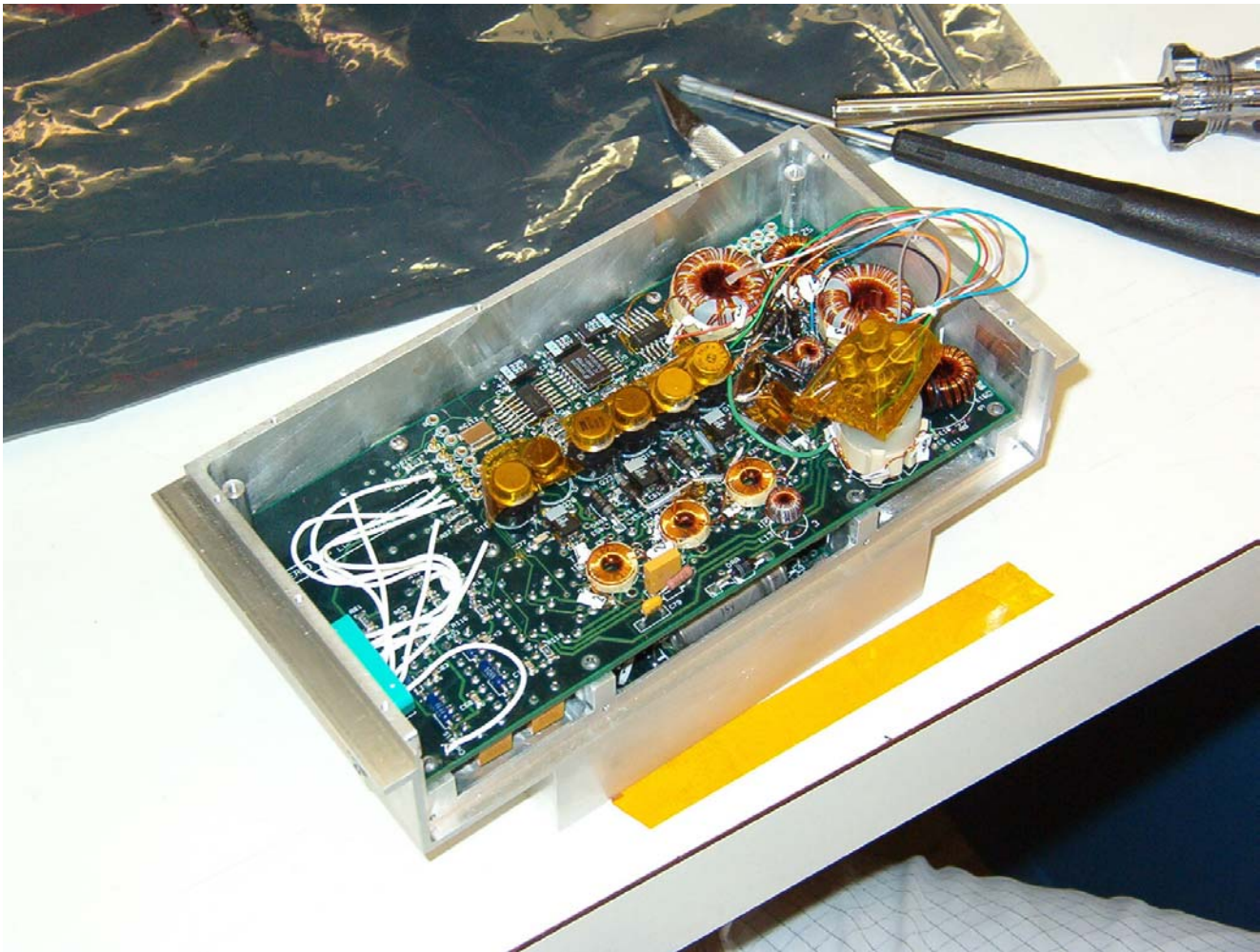
SEP EM test – without LVPS

STEREO IMPACT Technical Progress Report



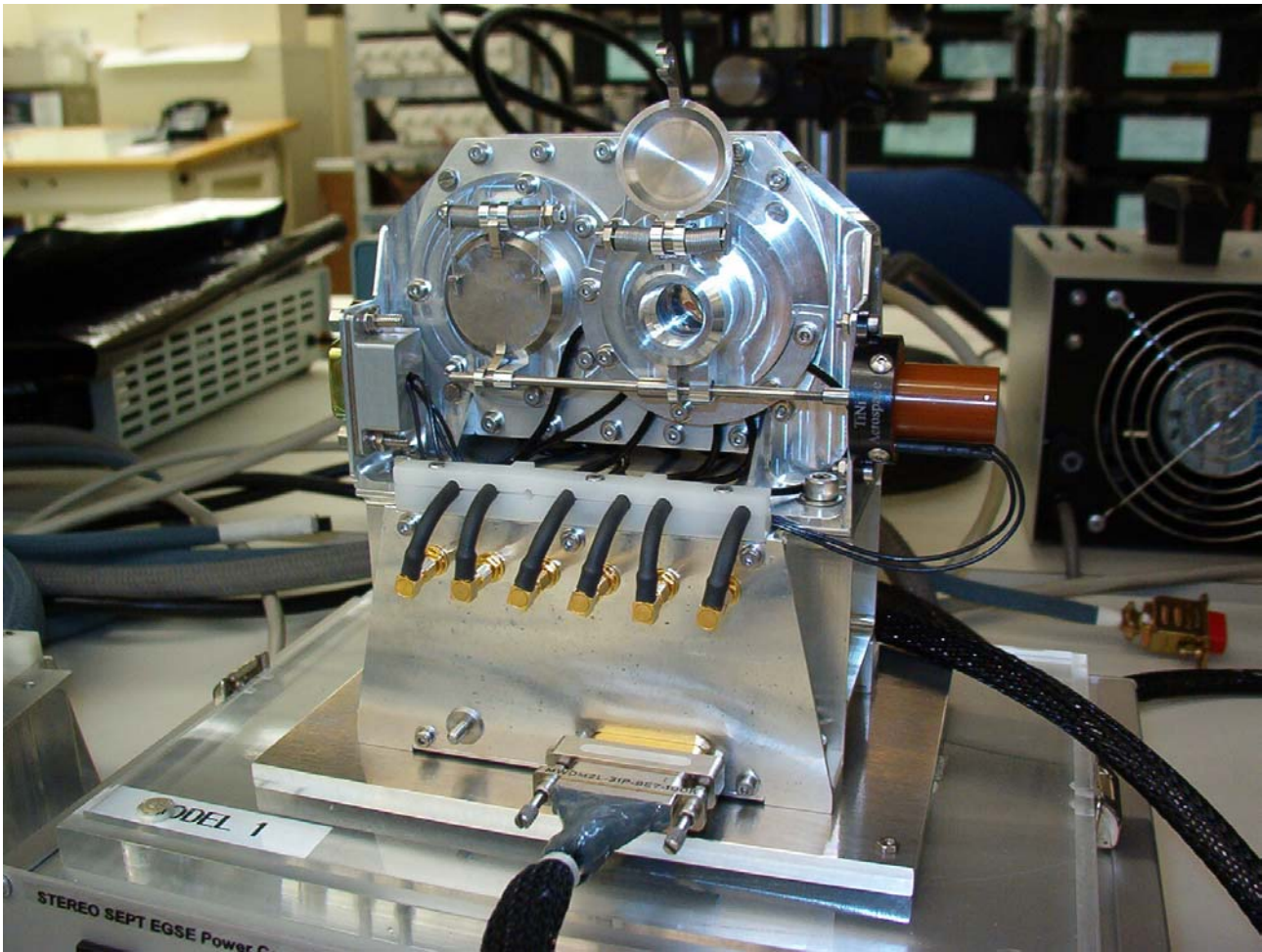
SEP EM test – innards of LVPS

STEREO IMPACT Technical Progress Report



SEP EM test -- SEPT

STEREO IMPACT Technical Progress Report



6. SIT MONTHLY TECHNICAL PROGRESS REPORT

6.1. SUMMARY of STATUS

- a. SIT TELESCOPE - Prototype is at GSFC to act as model for flight unit components. Flight foils are at GSFC undergoing test. Flight MCPs were tested at UMD and are being stored at GSFC. Flight solid state detectors are at GSFC undergoing test.
- b. SIT TOF System - FM1 was downgraded to ETU and is part of the ETU electronics under test at UMD. Work is proceeding at MPAAE to generate a new FM1 and FM2.
- c. SIT Energy System – ETU is integrated in the ETU electronics at UMD
- d. SIT Logic System – The updated ETU logic board and updated motherboard have been integrated with the remaining electronics.. Testing is underway at UMD.
- e. SIT HVPS - Flight HVPS ETU is being built at UCB.
- f. Flight Software – Version 10/13/03 is installed in the ETU under test at UMD.

6.1.1. Schedule Changes

The current SIT schedule is available from Jim Rogers

6.2. MAJOR ACCOMPLISHMENTS

6.2.1. This Month

- ETU: The new ETU logic board and mother board started last month were assembled and integrated into the remaining ETU electronics.
- Energy board: Parts were received and FETs submitted to Ron Jackson at UCB for DPA and PIND were returned.
- SEP ETU Integration at Caltech – SIT was taken to Caltech and integrated with ETU versions of SEPT, LET, HET, SEP Central, LVPS, Bias Supply, and IDPU. Quiet and Noisy tests were performed to look for interactions between sensors. No problems were detected between SIT and the remaining elements. Problems were discovered in the procedures for loading the SIT data processing tables in the SIT MISC through SEP central. Work continues to find fixes for these.

6.2.2. Next Month

Next month we will install a new ETU Actel which has been modified to meet the new flight memory timing requirements as well as to fix a timing problem in the front end logic and the polarity of the HV_DAC control signals. We will continue flight software development and testing with GSFC.

STEREO IMPACT Technical Progress Report

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

A new estimate of Actel power for the flight units indicates that power will increase. Previous estimates had neglected the effect of the triple gates in the flight units for single-event upset protection.

6.4. **OUTSTANDING PROBLEMS**

We are continuing to work Energy parts issues.

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

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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.
- Grids for FM1 delivered on July 31, FM2 delivered on September 12.
- Surface treatment of the analyzer spheres done.
- Surface treatment (gold, alodine) done.
- Pin Puller integrated and tested.
- Electronics boards fabrication:
 - Done for HV coupling boards
 - Done for amplifiers boards
 - Done for the HV boards

7.2. *Major accomplishments*

7.2.1. FM1 :

- Experiment fully integrated in vacuum.
- We got in trouble with the calibration system (rotation and translation).
- Automatic calibration software needed to be corrected as well. Calibration needs to be repeated. On going.
- Delivery to SSL planned mid December.

STEREO IMPACT Technical Progress Report

7.2.2. FM2 :

- FM2 integrated : 2 parts
 - bottom with the inner sphere ready for MCP characterization test;
 - top with grids, external sphere and pin puller.

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. setting preparation.

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 sent to SSL / Project.

8. GSFC (MAG) Status

- EMC testing of MAG Heater board performed. Additional filtering designed to meet the EMC requirements.
- Flight PWBs being loaded
- Supported Magnetics workshop, magnetics testing

STEREO IMPACT Technical Progress Report

9. EPO at UCB

Monthly E/PO Report

October, 2003

Formal Education:

We have worked with the NASA's Sun Earth Connection Education Forum (SECEF) to improve the Magnetism lesson. This lesson will also be incorporated into the SECEF Student Observation Network (S.O.N) which has complimentary magnetism lessons.

We held two workshops entitled: "The Sun: Spots, Flares, and Mass Ejections – Oh My!" at the Society for the Advancement of Chicanos and Native Americans in Science (SACNAS) National Conference October 3rd and 4th. A total of 18 teachers attended the two workshops. Several of these teachers will teach other teachers and we have estimated that the content and activities taught in this workshop will reach 120 teachers and 3234 students. At the workshop we presented the "Measuring Magnetism" Activity and handed out 80 copies of the Teacher's Magnetism Guide and discussed the STEREO mission. We also taught about the EM spectrum, the solar cycle in two activities. And we gave a PowerPoint presentation about the Sun and the Sun-Earth connection using what we have learned from NASA missions. The teacher's evaluations of the workshops and activities indicated that they will use the materials in their classroom and will recommend the materials we presented to their teaching colleagues.

Informal Education and Public Outreach:

We worked more on the IMPACT boom web page to explain the design, testing, and building of the boom.

We met with Edmund Campion at the Center for New Music and Audio Technologies at UCB and with Matt Lebofsky, a programmer at SSL, to plan our sounds project for the coming year.

Cross Cutting:

The IMPACT E/PO FY04, FY05 and L+30D proposal with Budgets was submitted to the NASA STEREO E/PO personnel (Leslie Cusick) at Goddard.

STEREO:

L. Peticolas met (via the phone) with a group of STEREO outreach folks who met at the Goddard Space Flight Center to discuss ideas for presenting the STEREO mission to the public.

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