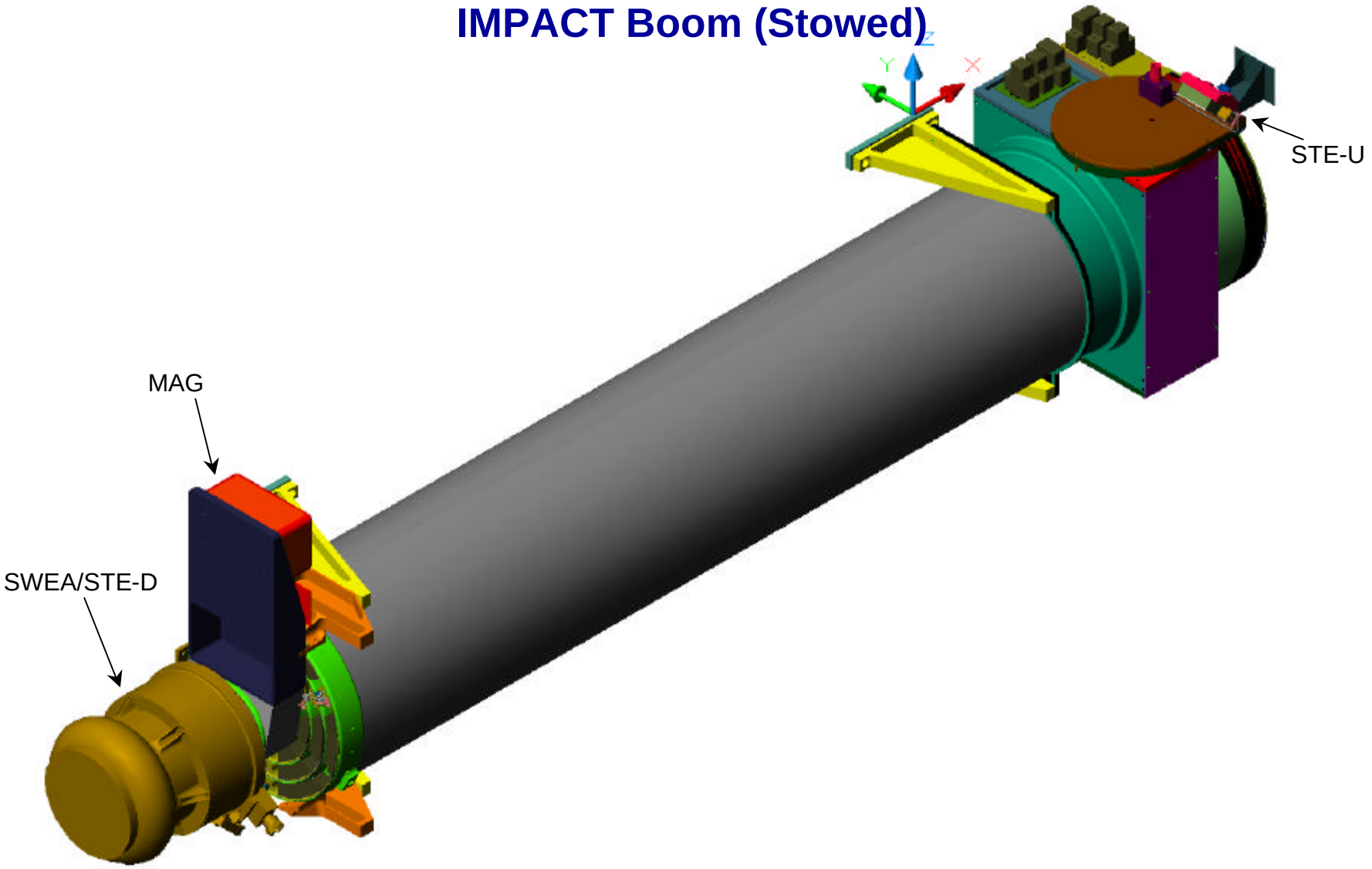

STEREO
IMPACT
UCB - NASA/GSFC- Caltech - U of MD - LANL - JPL - UCLA - SAIC - NOAA/SEC
U of MI - JHU/APL - MPAe - U of Kiel - CESR/CNRS - ESA/ESTEC -
DESPA/OBSPM - KFKI/RMKI

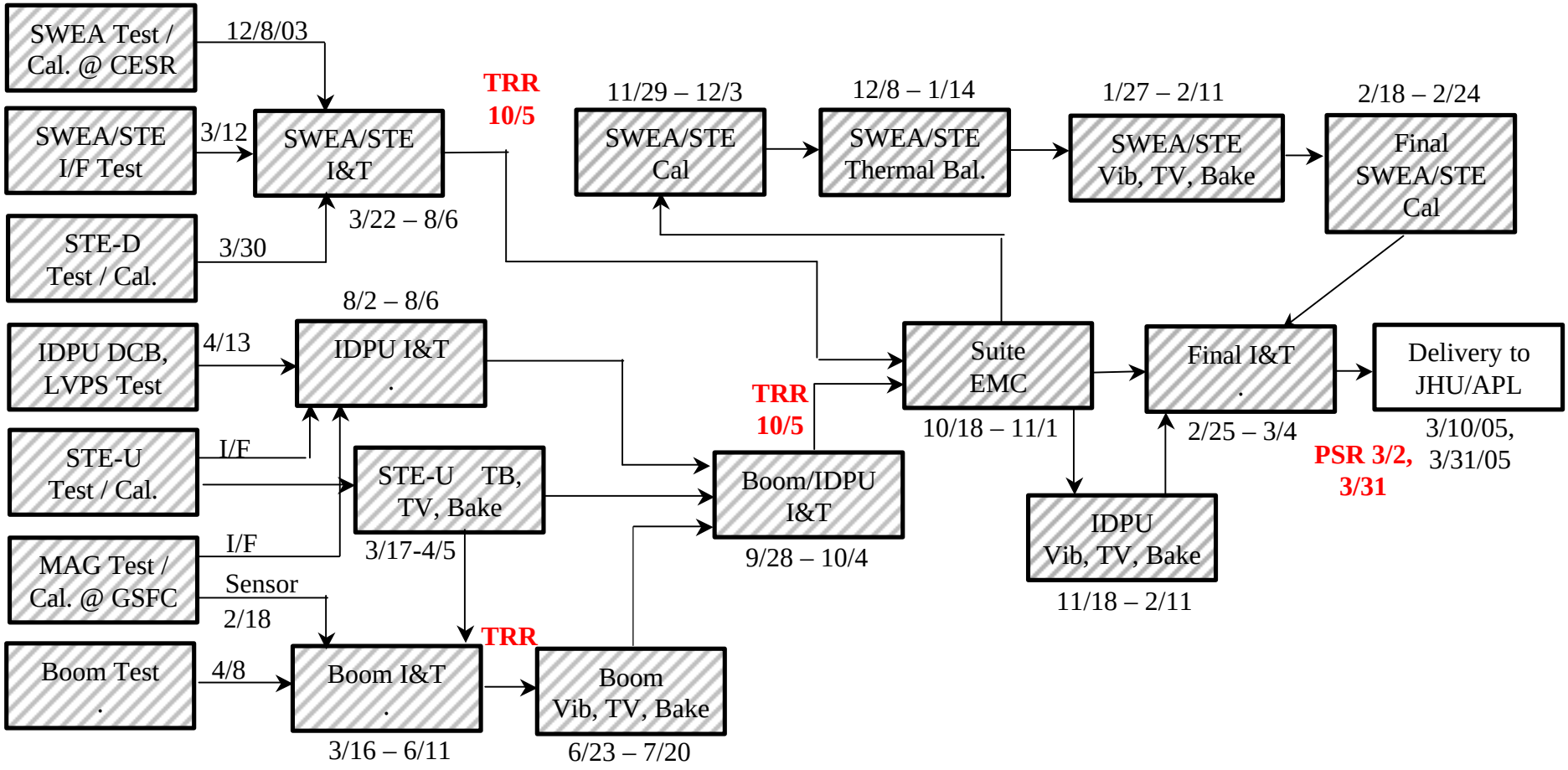
IMPACT Boom (Stowed)



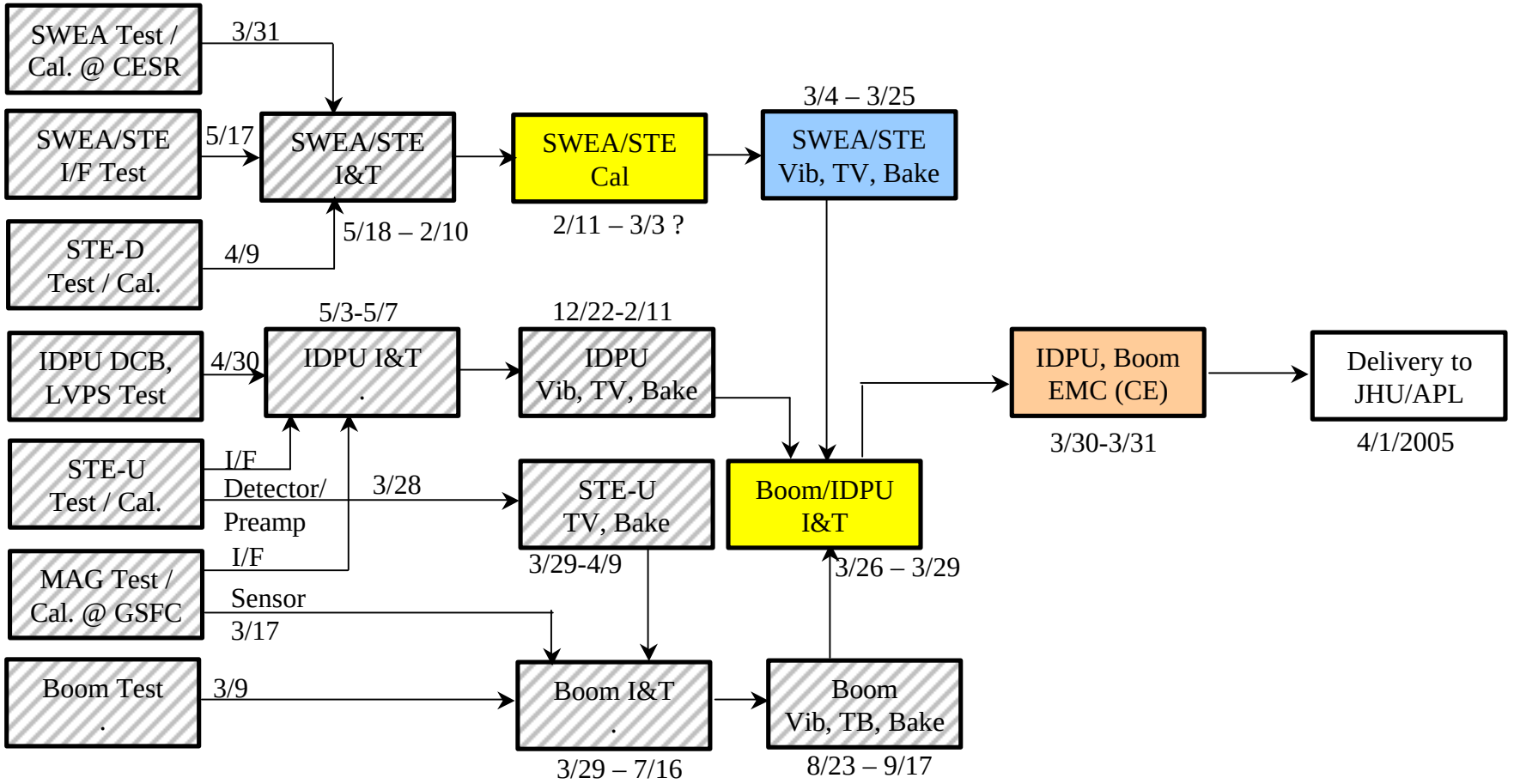
Review History

- IMPACT held a suite-level PER in January 2004 to cover general plans and the detailed plans of the first instruments (SEPT)
- A more detailed Technical Readiness Review was held for each IMPACT subsystem as it became ready to start environmental tests
  - The TRR for the IMPACT Boom (and MAG, STE-U) was held on April 19 2004
  - The TRR for SWEA (and the IDPU) was held on October 5 2004
- This PSR covers just the FM1 Boom Suite (includes Boom, MAG sensor, STE-U, and SWEA/STE-D), which has completed testing and is ready to ship to APL for integration with the spacecraft staring April 4.
  - FM1 IDPU is already on the spacecraft
  - The SEP suite and FM2 boom suite are still in test
- Subsequent PSRs will be held for the remaining hardware when it is through testing and the spacecraft is ready to install it.

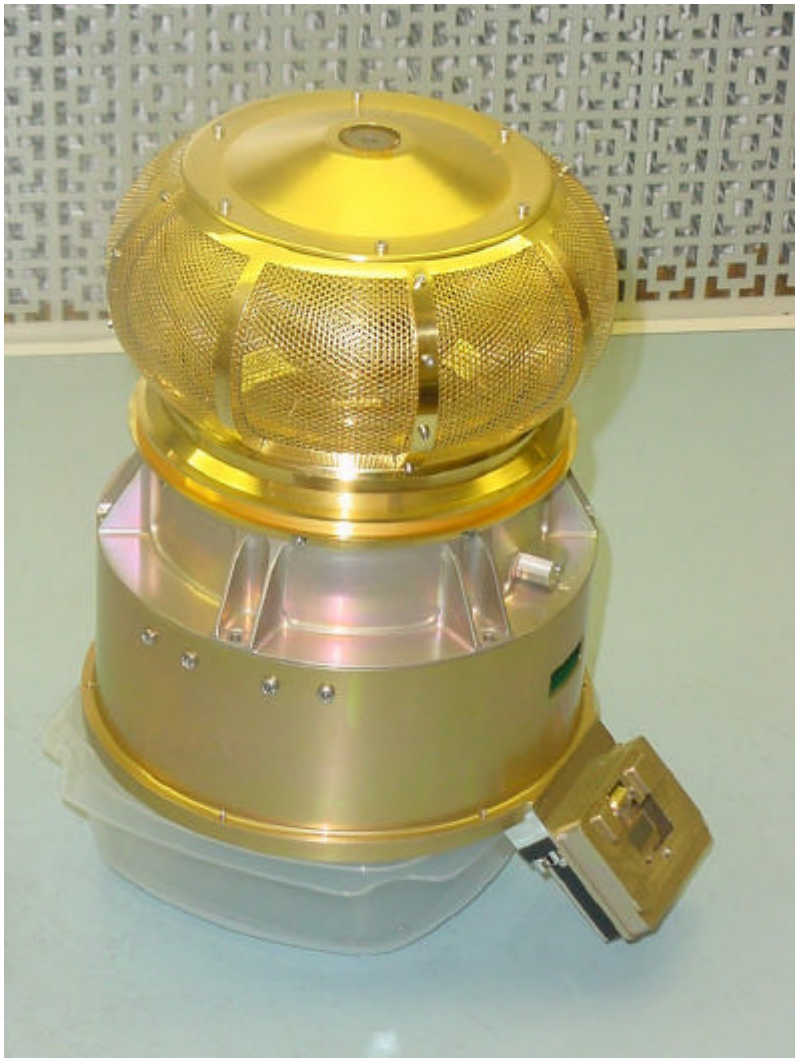
Boom Suite FM1 Test Flow (3/22/05)



Boom Suite FM2 Test Flow (3/22/05)



IMPACT FM1 SWEA/STE-D



FM1 SWEA/STE-D Test History

- **10/18 – 11/1 EMC test with the full IMPACT Suite**
  - **EMC test exceedances have been accepted by the EMC committee; the official waiver is in process.**
- **11/29 - 12/6 Calibrations**
  - **One anode failed during test at high temperature (40C) (PFR1029)**
  - **Replaced after first Thermal Balance run.**
- **12/8-12/10 Thermal Balance Test, failed (too cold)**
  - **See PFR 1030. Fixed by added thermal isolation, improved blankets, increased heater**
  - **Cold-start problem with SWEA LVPS (PFR1028), fixed**
- **1/7-1/14 Repeat Thermal Balance. Passed**
  - **Good correlation to thermal model.**
  - **IDPU to SWEA Interface problem (PFR1033), fixed**
- **1/27 Vibration, Passed**
- **2/3 – 2/12 Thermal Vac, passed**
- **2/13 Integrated with flight boom, accumulate operating hours**
  - **Problem with intermittent boom harness continuity, PFR1038, fixed (Boom).**
- **3/17 SWEA Magnetics Test, passed**

SWEA Verification Matrix

			Verification Matrix for STEREO/IMPACT/SWEA																	Revision Date: 3/22/2005
																				Revision Number: 4
	Hardware Description		Test																	
Level of Assembly	Item	Pedestal Interface Tes	Elect. test, rm. Temp	Voltage margins	Bench Calibration	Beam Calibration	Elect. Test, hot	Elect. Test, cold	Vibration, Sinusoidal	Vibration, Random	Self Shock	Acoustics	Thermal Vacuum	Thermal cycle	Thermal balance	Life Test	EMC/EMI	Magnetics	Bakeout	Contamination Inspection	Comments
C	MCP, F		C			C															
C	Preamp, F		C		C																
C	Optocouplers, F		C		C																
S	Electronics, EM		C	C	C		C	C													
S	Electronics, F		C	C	C		C	C											C		
I	Instrument, EM1	C	C	C		C												C			UCB test unit
I	Instrument, EM2		C	C		C						A									CESR test unit
I	Instrument, PF (FM1)	C	C	C		C			C	C	C		C	C	C	C	C	C	C	C	
I	Instrument, PF (FM2)	C	C	C		C			X	X	C		X	X		X	X	X	X	X	
Legend:																					
	Level of Assembly		Unit Type										X = Test required								
													A = Analysis								
	C = Component		BB = Breadboard										H = Test at higher level of assembly (at UCB)								
	S = subsystem		EM = Engineering Model										C = Test Completed								
	I = Instrument		PF = Protoflight																		
			F = Flight																		

Full IMPACT Verification Matrix at:
http://sprg.ssl.berkeley.edu/impact/dwc/Verification/IMPACTVerificationMatrix_2005-3-25.pdf

SWEA FM1 Problem/Failures, pre-PER

- FM2 SWEA HV Multiplier part failure (PFR6001)
  - Problem showed up during thermal cycling at low temperature, well below expected on-orbit temperatures (all flight units subjected to this test)
  - GSFC Part failure analysis indicates bonding problem
  - Part replaced and board retested, including thermal test
- All power converters had a problem with the LTC1877 regulator used to generate 2.5V (PFR1007)
  - Part was over-stressed in screening
  - Some parts failed in circuit
  - The burn-in fixture used by the screening house was reworked and a new lot of parts was screened
  - All flight parts have been replaced with parts from this new lot and retested
- All IMPACT TiNi P5 Actuators (including SWEA door actuator) were returned to manufacturer for inspection after failure of SEPT door actuator die to assembly tolerance issue (PFR7003)
  - Passed, returned, re-integrated
- SWEA LVPS Transformer failure (PFR1023)
  - Discovered after board-level bakeout, probable short in transformer induced by thermal stress. Replaced
- These PFRs have been signed-off and closed.
  - 1023 is considered a “Red Flag” PFR since the root cause of the transformer problem is not clear.

SWEA/STE-D FM1 Problem/Failures since PER

- **PFR1028:**
  - **The SWEA LVPS failed to start up properly below –16C**
  - **Discovered during thermal balance, before qualification tests (except EMC)**
  - **Caused by Actel turn-on transient current exceeding supply capability**
    - **Trips over-current detect, Actel will not start up**
  - **Slowed down over-current detect time so the supply can provide the Actel turn-on transient without hitting current limit.**
  - **Worked fine in subsequent Thermal Balance and Thermal Vac tests**
- **PFR1029:**
  - **One of the 16 SWEA Anode signals failed when warm (>40C)**
  - **Discovered in Calibrations, prior to start of qualification tests (except EMC)**
  - **Caused by bad Amptek A111F module**
    - **Failure analysis indicated bad bonding**
    - **Possible implications for remaining parts in flight units**
  - **Part replaced with a spare from the same lot, no further problems with the channel through qualification tests.**

SWEA/STE-D FM1 Problem/Failures since PER continued

- **PFR1030:**
  - **SWEA was found to run too cold during Thermal Balance tests**
    - **Prior to Qualification tests, except EMC.**
  - **Problem identified as worse than expected conduction down the boom and worse than expected thermal blanket characteristics**
  - **Solved problem with improved isolation between SWEA and Boom (added G10 isolator), improved blanket design, and increased heater power**
    - **Solution should not impact EMC results.**
  - **Repeat Thermal Balance test passed and we have good correlation with the model**
- **PFR1033:**
  - **SWEA was found to have occasional interface errors with the IDPU (outside the chamber) during thermal balance tests**
    - **Prior to qualification tests except EMC**
  - **Partly due to harness extensions required for thermal chamber**
  - **Fixed by adding a small capacitor to the receiving circuit to reduce the susceptibility of the interface to noise**
    - **Solution should not impact EMC results**
- **These PFRs have been signed-off and closed (not “Red-Flag” PFRs)**
  - **except 1029; concerns about reliability of flight lot of A111Fs**

FM1 SWEA/STE-D Waivers

- **Pre-environmental waivers related to the IDPU involve waivers to the EMC requirements, including:**
  - **CCR460-26 and CCR460-41 regarding single-ended interfaces to instruments**
    - **EMC committee approved IMPACT design**
  - **CCR460-42, use of combined signal and power harness**
    - **EMC committee approved IMPACT design**
  - **CCR463-131, SWEA door activation transient exceeds primary current transient spec (1 time)**
    - **EMC committee approved**
- **Also:**
  - **CCR463-130, vibrate SWEA off the IMPACT Boom**
  - **CCR463-135, no acoustics test for SWEA**
  - **CCR460-9, 19, 66, 134 regarding IMPACT Suite power consumption**
- **Waivers can be found at:**
  - **http://sprg.ssl.berkeley.edu/impact/dwc/Waivers/**
- **All Waivers approved by CCB**
- **Post-EMC waiver for IMPACT Suite exceedances in process**
  - **Data has been reviewed by EMC committee, no significant issues**

FM1 SWEA/STE-D Environmental Tests

- **Test Plans/Procedures can be found at:**
  - http://sprg.ssl.berkeley.edu/impact/dwc/TestProcs/
    - **EMC:** http://sprg.ssl.berkeley.edu/impact/dwc/TestProcs/IMPACT-EMC_C.pdf
    - **CPT:** http://sprg.ssl.berkeley.edu/impact/dwc/TestProcs/IMPACT-SWEA-CPT_B.pdf
    - **Vibration:** http://sprg.ssl.berkeley.edu/impact/dwc/TestProcs/IMP-583-DOC--%20SWEA%20Vibration%20Test%20Procedure.pdf
    - **Tvac:** http://sprg.ssl.berkeley.edu/impact/dwc/TestProcs/SWEA%20and%20STE-D%20Test%20Plan.pdf
- **Test Reports can be found at:**
  - http://sprg.ssl.berkeley.edu/impact/dwc/TestReports/
    - **EMC:** http://sprg.ssl.berkeley.edu/impact/dwc/TestReports/02-15-05%20UCBerkeley%20Stereo%20Impact%20Prep%20TR.pdf
    - **Tvac:** http://sprg.ssl.berkeley.edu/impact/dwc/TestReports/IMPACT-SWEA-FM1-TVac-Report.pdf
    - **Tbal:** http://sprg.ssl.berkeley.edu/impact/dwc/TestReports/BOOM_SWEA_Test_Report.pdf
    - **Magnetics:** http://sprg.ssl.berkeley.edu/impact/dwc/TestReports/IMPACT-SWEA-FM1-Magnetics-Report.pdf
    - **Vibration:** http://sprg.ssl.berkeley.edu/impact/dwc/TestReports/IMP-611-DOC%20STEREO%20SWEA%20FM1%20Vibration%20Report%20R-.pdf

IMPACT FM1 Suite EMC Tests

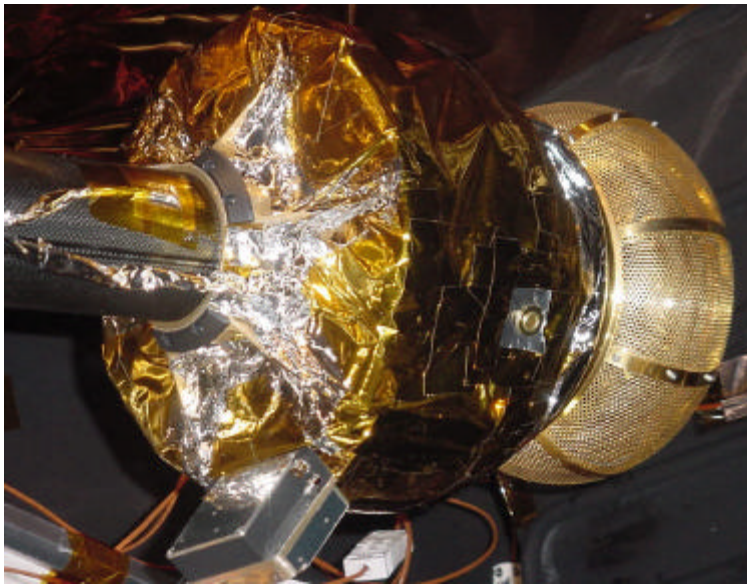
- The IMPACT Suite was integrated and completed EMC tests per the Project EMC Requirements document (7381-9030C) and the IMPACT EMC Test Plan (Rev C)
  - Bonding & Isolation
  - CE01, CE03, CE07 (4 power services)
  - CS01, CS02, CS06 (4 power services)
  - RE01, RE02
  - RS03
- One pre-test waiver involving some hardware that was not quite in flight configuration was approved by Project (CCR 463-179A)
- Testing completed at EMC Tempest in Anaheim
  - Detailed Facility Test Report provided

FM1 Suite EMC Test Results

- A number of exceedances and sensitivities were found and worked with the EMC committee in real time
  - RE01
    - MAG drive frequency & harmonics
    - SEP serial interface clock
  - RE02
    - IDPU, SEP Clock harmonics, 24MHz-1.4GHz, all crystal controlled
  - RS – some detector noise 100MHz-4GHz, eliminated when amplitude was lowered -6dB
    - No damage
    - STE was sensitive near the spacecraft transponder frequency (8.5GHz)
      - only to severe AM modulation, not FM
  - CE
    - MAG and SEP Converter Harmonics
      - Fixed after the test (harness routing); passed retest
    - A few other exceedances seen (clocks)
  - CS - Some detector noise, eliminated when amplitude drops –6dB
    - Some 1553 errors (CS06), handled correctly
    - No damage
- EMC Committee agrees no serious issues. Official waiver in progress.

FM1 SWEA/STE-D Thermal Balance Test

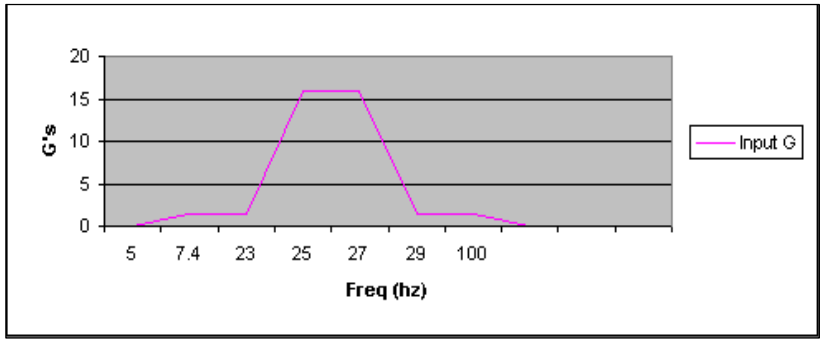
- Thermal Balance at UCB
  - SWEA/STE-D mounted to a spare flight tube section in flight configuration to provide flight-like thermal isolation
  - Shrouds run cold
  - ETU Thermal Blankets provided by APL
- First Test Failed (PFR1030)
  - SWEA too cold (operator prevented over-test)
  - Blankets not as good as modeled
  - Boom isolation not as good as modeled
- Unit modified
  - Blankets improved
  - Boom isolation improved
  - Heater increased
- Second test passed
  - Good correlation to thermal model
  - Electrical problems fixed PFR1028, 1033



SWEA/STE-D Sine Strength Test (per 7381-9003)

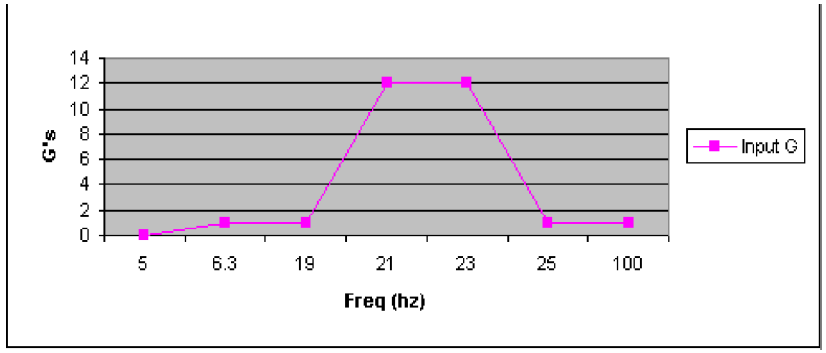
Thrust Axis (X-axis)

Freq	G
5-7.4	[.5" DA]
7.4	1.4
23	1.4
25	16
27	16
29	1.4
100	1.4



Lateral Axes

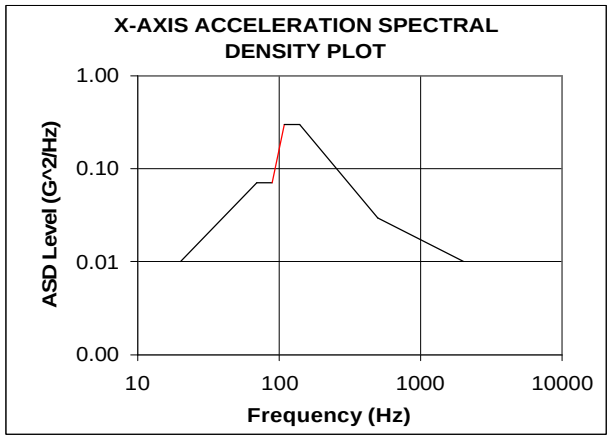
Freq	G
5-6.3	[.5" DA]
6.3	1
19	1
21	12
23	12
25	1
100	1

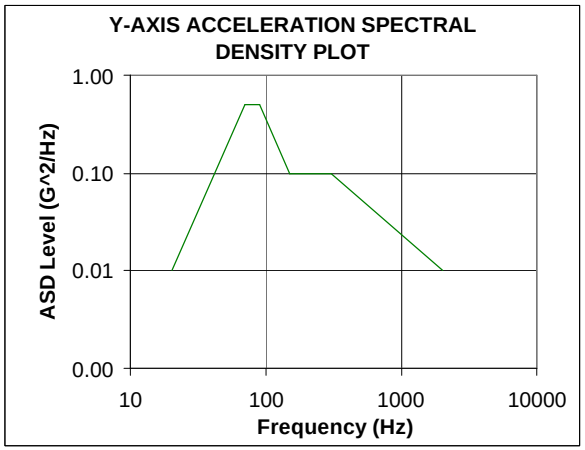


Sine Survey Level

Frequency (Hz)	Acceleration
5-2000	0.1 g

SWEA/STE-D Random Vibration Test (extracted from Boom test)





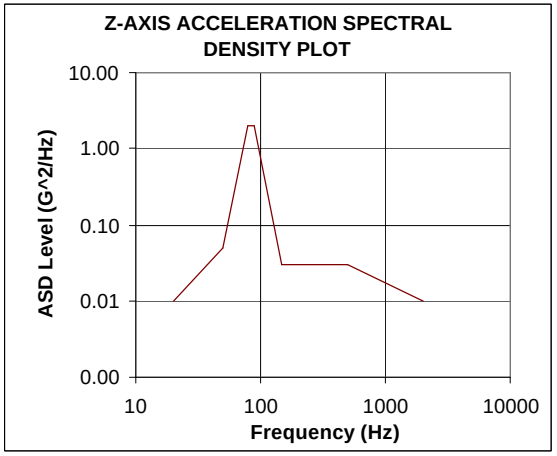


Table 1: Random Vibration Levels X-axis

Frequency (Hz)	PSD Level
20	0.01 g^2/Hz
20 to 70	+4.7 dB/oct
70 to 90	0.07 g^2/Hz
90 to 110	+21.8 dB/oct
110 to 140	0.3 g^2/Hz
140 to 500	-5.5 dB/oct
500	0.03 g^2/Hz
500 to 2000	-2.4 dB/oct
2000	0.01 g^2/Hz

Overall Amplitude = 8.54 g rms
Duration = 60 seconds

Table 2: Random Vibration Levels Y-axis

Frequency (Hz)	PSD Level
20	0.01 g^2/Hz
20 to 70	+9.4 dB/oct
70 to 90	0.5 g^2/Hz
90 to 150	-9.5 dB/oct
150 to 300	0.1 g^2/Hz
300 to 2000	-3.7 dB/oct
2000	0.01 g^2/Hz

Overall Amplitude = 9.70 g rms
Duration = 60 seconds

Table 3: Random Vibration Levels Z-axis

Frequency (Hz)	PSD Level
20	0.01 g^2/Hz
20 to 50	+5.3 dB/oct
50	0.05 g^2/Hz
50 to 80	+23.6 dB/oct
80 to 90	2.0 g^2/Hz
90 to 150	-24.8 dB/oct
150 to 500	0.03 g^2/Hz
500 to 2000	-2.4 dB/oct
2000	0.01 g^2/Hz

Overall Amplitude = 9.88 g rms
Duration = 60 seconds

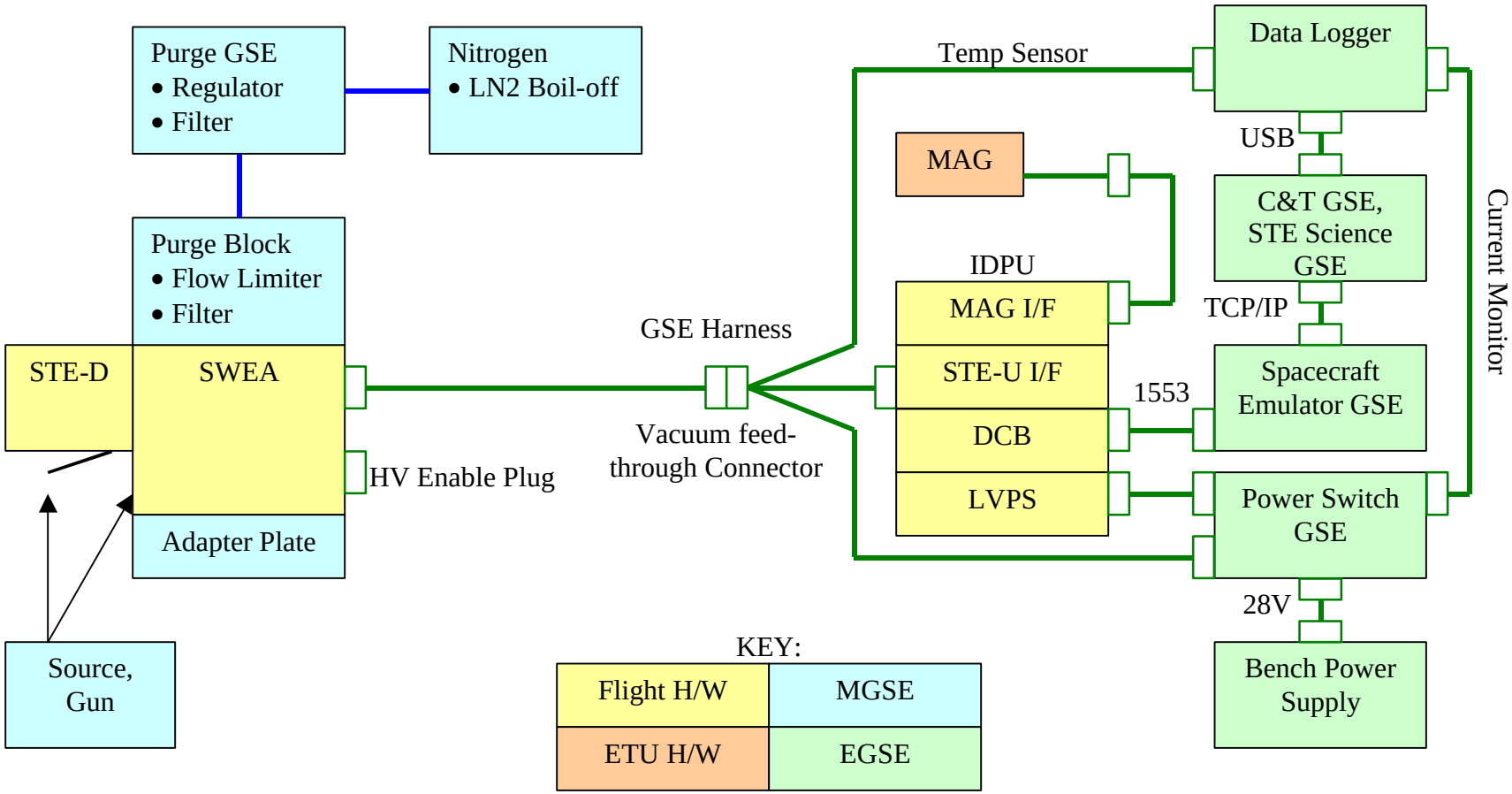
SWEA/STE-D Vibration Testing – Results

- All axes performed
- No notching performed
- No structural degradation or loss of functionality
- Passed post-vib CPT

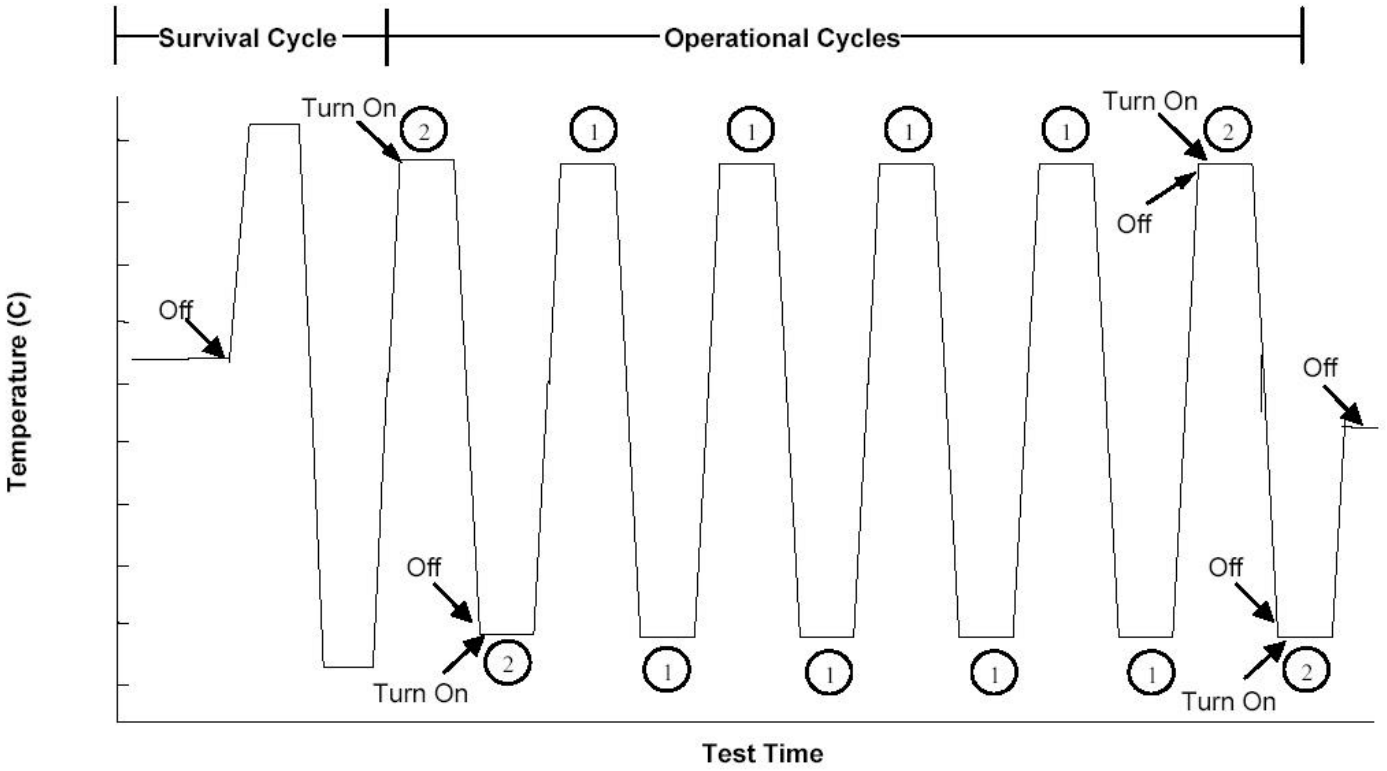
SWEA/STE-D Thermal Vacuum Test

- **Test Plan:**
  - **Preliminary bakeout, up to 48 hours at +40C**
  - **Thermal vac**
    - **6 op cycles: +35C to –35C for SWEA, -35 to –95C for STE-D**
    - **One non-op cycle: +40 to –40 for SWEA, +40 to –100C for STE-D**
    - **Temperatures from verified thermal model, with at least 10C margins.**
    - **SWEA mounted to baseplate, STE-D connected to cold plate by heat strap to provide for separate control of SWEA and STE-D**
  - **CPT on each operational cycle, cold-start in first and last cycles**
  - **Qualification bakeout**

SWEA/STE-D CPT / Calibration Setup



SWEA/STE-D Thermal Cycling



See Table 2.3-1 for component dependant test temperatures.

Stabilization Criteria: Within 3°C Of Plateau And Changing < 1°C/Hr

Six Operational Cycles Required

See Fig 2.3.3.2-2 and -3 for detailed hot and cold transition definitions, resp.

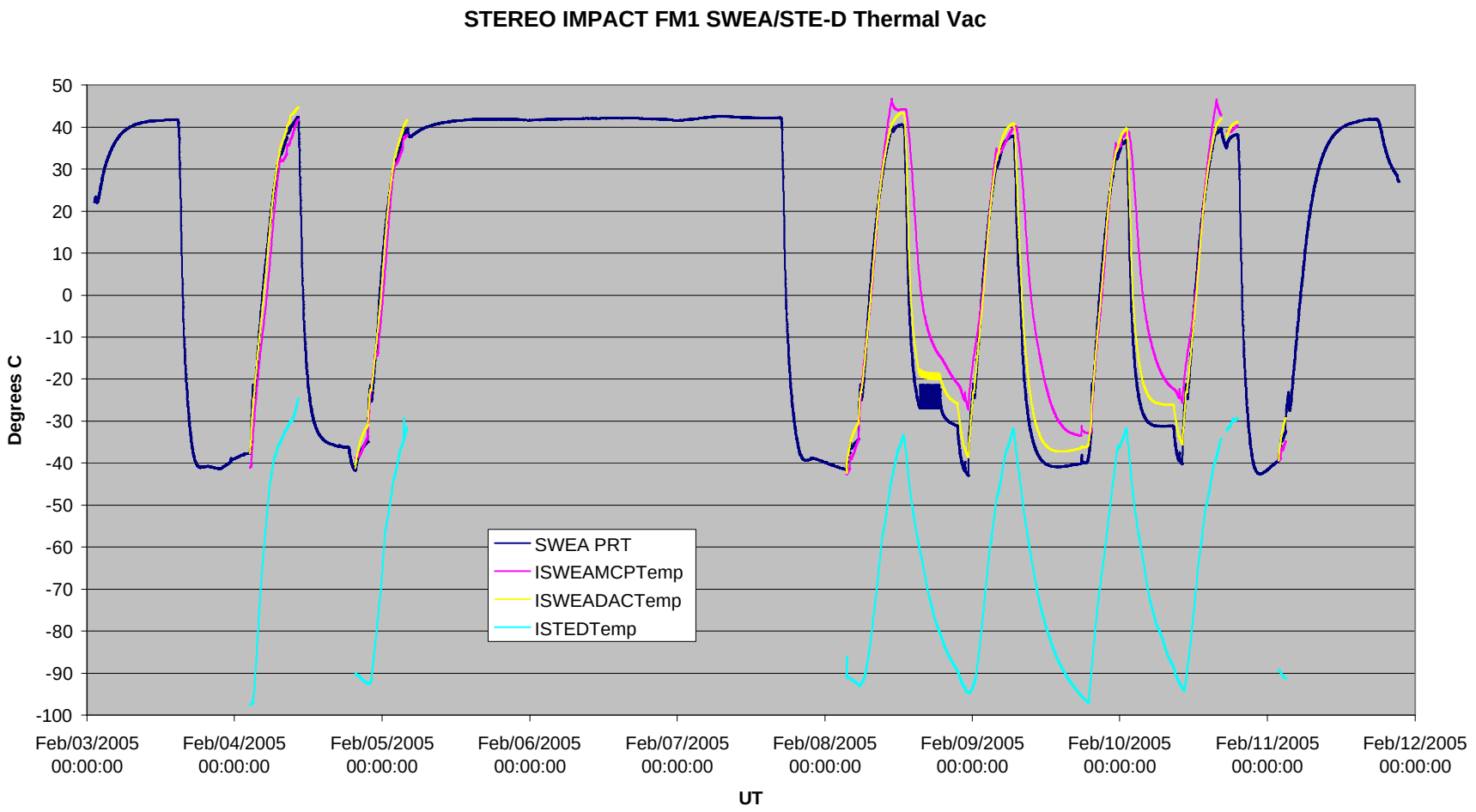
(1) = Stabilize, Print T/C's, Soak 1Hour and Test Concurrently, Print T/C's

(2) = Stabilize, Turn On, Soak 1Hour and Test Concurrently, Print T/C's at End of Soak

FM1 SWEA/STE-D Thermal Vacuum Test Results

- There were no problems encountered
- Temperatures were controlled with Thermocouples attached to the outside of the instrument
  - Internal temperature sensors ran ~10C warmer than the outside when SWEA/STE-D was operational
  - STE-D temperature set using internal temperature sensor
- No significant trends or adverse temperature dependencies were seen

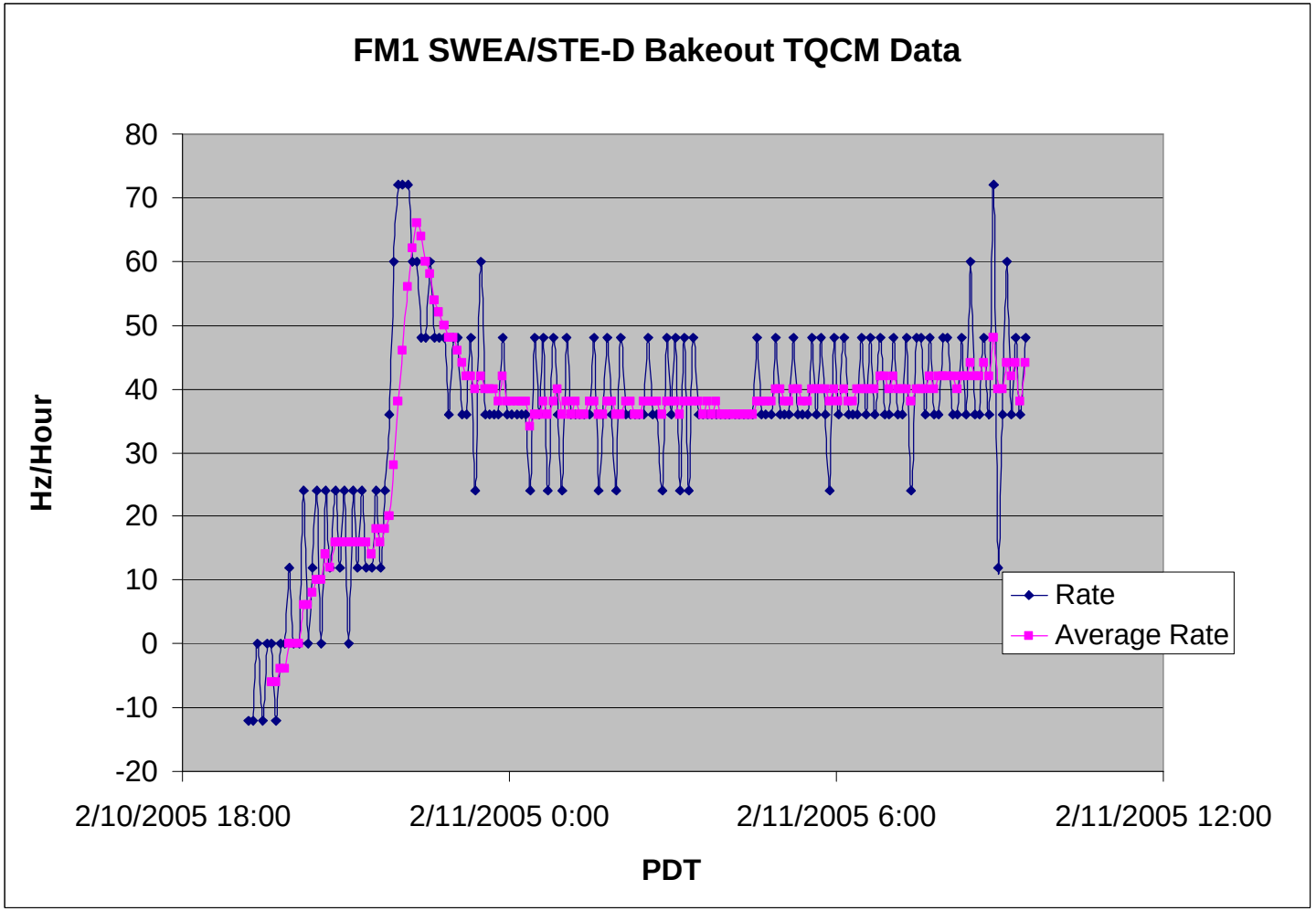
FM1 SWEA/STE-D Thermal Vac



SWEA/STE-D Bakeout Results

- After the last cycle of thermal vac the unit was baked out at +40C while monitoring outgassing with a TQCM at –20C.
- Rates seen were <45Hz/hour (close to chamber background), corresponding to an outgassing rate of TBD, compared to a requirement of < 2.5e-11.

SWEA/STE-D Bakeout TQCM data



FM1 SWEA/STE-D Magnetics Test

- **The SWEA/STE-D was rotated while monitoring the magnetic field 60cm away.**
  - **Repeated for each of 3 axes**
  - **Measured field was ~10nT peak to peak, corresponding to a magnetic moment of 2-5nT-m^3, and a worst case field at the Magnetometer sensor of ~1nT (full spacecraft objective is 1nT DC).**
  - **MAG CoI finds the level acceptable.**
- **SWEA/STE-D was power cycled while monitoring the field 30cm away**
  - **No signature was detectable, meaning less than 2nT, corresponding to an upper limit on the AC field at the sensor (1m away) of <.08nT, compared to a spacecraft-level objective of <0.05nT.**
  - **Mag CoI finds the level acceptable**

Performance Data

- SWEA instrument calibrations at CESR prior to delivery to UCB
  - Geometric factor, FOV, energy resolution, background
- SWEA/STE-D system-level calibrations at UCB
  - SWEA Energy sweep calibration
  - STE-D Geometric factor, FOV, energy resolution, threshold, background
- SWEA, STE-D and Power Supply measurements were trended throughout testing
  - No significant trends were found – see following charts
- All performance measurements met or exceeded the requirements

SWEA Trend Data

SWEA FM1 Performance Trend (Incl SWEA/STE-D LVPS)

Date	File	Test	SWEA Temp	ISWEAM CPTemp	ISWEAD ACTemp	Bus Voltage	Primary Current	2.5V	5VD	5VA	12VA	ISWEAST EDCur	ISWEAV0 @ DAC=128	ISWEANR 5V	ISWEAAn al	ISWEADe fl1	ISWEADe fl2	Open Door?	MCP O
Oct 8 2004	0410080933.tlm	FM1 Boom I&T, with SWEA (shield added)	30.7	31.9	32.8	28	142	2.50	4.99	5.36	12.14	17	-12.49	6.60	66.26	158.60	94.30	Yes	No
Oct 16 2004	0410160000a.tlm	FM1 Suite I&T @ Caltech	30.9	31.9	32.9	28	140	2.50	4.99	5.37	12.16	17.3	-12.49	6.6	66.3	158	93	No	No
Nov 3 2004	0411031353.tlm	FM1 boom suite post-EMC at UCB	30.4	31.6	32.7	28	139.5	2.50	4.99	5.36	12.14	14.8	-12.49	6.62	66	157.8	93.5	No	No
Dec 8 2004	0412081459.tlm	FM1 SWEA pre-Thermal Balance	23.1	23	25.2	28	138	2.50	4.99	5.34	12.10	15.8						No	No
						24	145	2.50	4.99	5.35	12.16								
						35	139	2.50	4.99	5.33	12.04								
Dec 10 2004	0412101830.tlm	FM1 SWEA pre-Thermal Balance	23.1	23	25.2	28	138	2.50	4.99	5.34	12.10	15.8	-12.52	6.6	67.1	160.3	96	Yes	Yes
						24	145	2.50	4.99	5.35	12.16								
						35	139	2.50	4.99	5.33	12.04								
Jan 26 2005	0501270000.tlm	FM1 SWEA Pre-vib				28	140												
						24	155	2.50	4.99	5.37	12.22								
			29.4	31.8		35	140	2.50	4.99	5.36	12.10	16.1	-12.48	6.6	65.8	157.8	93.5	Yes	No
Jan 28 2005	0501290105.tlm	FM1 SWEA Post-vib	21.8	20.7	22.9	28	138					14.6	-12.49	6.55	66.26	157.8	93.5	No	No
Feb 4 2005	0502040000.tlm	FM1 SWEA Tvac Hot #2	37.4	33.6	39.4	28	150.6	2.50	4.99	5.05	11.40	16.7	-12.48	6.73	65.8	156.9	92.6	Yes	Yes
						24	290	2.50	4.99	5.56	12.70								
						35	150.5	2.50	4.99	5.38	12.17								
Feb 4 2005	0502040000.tlm	FM1 SWEA Tvac Cold #2	-38.4	-38.6	-36.9	28	134	2.50	4.99	5.05	11.36	14.5	-12.57	6.37	68.8	162.8	98.6	No	Yes
						24	132	2.50	4.98	5.04	11.35								
						35	133	2.50	4.98	5.03	11.30								
Feb 5 2005	0502050000.tlm	FM1 SWEA Tvac Hot #3	36.9	34.9	39.1	28	156	2.50	4.99	5.40	12.20	15.6	-12.49	6.13	65.8	156.9	93.5	No	Yes
Feb 7 2005	0502080000.tlm	FM1 SWEA Tvac Cold #3	-38.5	-41.8	-37.5	28	125.2	2.50	4.99	5.06	11.40	14.8	-12.55	6.36	68.8	163.7	99.4	No	Yes
Feb 8 2005	0502080000.tlm	FM1 SWEA Tvac Hot #4	40.5	44.1	43.1	28	161	2.50	4.99	5.38	12.20	14.9	-12.48	6.14	65.8	156.9	92.6	No	Yes
Feb 8 2005	0502080000.tlm	FM1 SWEA Tvac Cold #4	-41.6	-24.8	-36.4	28	129.5	2.50	4.98	5.08	11.40	16.6	-12.55	6.13	68.8	163.7	99.4	No	Yes
Feb 9 2005	0502090000.tlm	FM1 SWEA Tvac Hot #5	37.4	37.9	40.1	28	158	2.50	4.98	5.37	12.15	15.3	-12.48	6.14	65.8	157.8	93.5	No	Yes
Feb 9 2005	0502090000.tlm	FM1 SWEA Tvac Cold #5	-40.1	-33.4	-36.4	28	136	2.50	4.98	5.08	11.42	13.9	-12.57	6.11	68.8	163.7	99.4	No	Yes
Feb 10 2005	0502100000.tlm	FM1 SWEA Tvac Hot #6	35	35.7	37.4	28	149	2.50	4.98	5.36	12.10	16.7	-12.49	6.13	65.8	157.8	93.5	No	Yes
Feb 10 2005	0502100000.tlm	FM1 SWEA Tvac Cold #6	-39.3	-24.3	-33.4	28	138	2.50	4.99	5.10	11.45	14.8	-12.55	6.17	68.8	162.9	98.6	No	Yes
						28	148	2.50	4.99	5.38	12.17								
Feb 10 2005	0502100000.tlm	FM1 SWEA Tvac Hot #7	36.9	38.8	39	24	289	2.50	4.99	5.53	12.67	14.7	-12.48	6.71	65.8	156.9	92.6	No	Yes
						35	148	2.50	4.99	5.36	12.10								
						28	125	2.50	4.99	5.05	11.36								
Feb 11 2005	0502110000.tlm	FM1 SWEA Tvac Cold #7	-36.3	-38.8	-35.6	24	125.2	2.50	4.98	5.04	11.39	14.7	-12.55	6.36	68.8	163.7	99.4	No	Yes
						35	141.8	2.50	4.98	5.04	11.34								

STE-D Trend Data

STE-D PM1 Performance Trend

Date	File	Test	SWEA/STE-D Primary Current (mA)	STE-D Temp	SWEA / STE-D DAC Temp	ISTED Cur (mA)	Door Open (sec)	Door Close (sec)	Bias	Fit Rev	Det.	Thresh.	Test Pulser Offset (keV)	Test Pulser Gain (keV/Bin)	Test Pulser Curv. (1/keV)	Test Pulser Gain	Test Pulser FWHM (keV)	Door Source Offset (keV)	Door Source Gain (keV/Bin)	Door Source Curv. (1/keV)	Door Source 6keV c/s	Door Source 22keV c/s	Door Source FWHM	Long Integration Door Source (DoorLUT) AccTime (sec)	LI Offset (keV)	LI Gain (keV/Bin)	LI Curv. (1/keV)	LI 6keV c/s	LI 22keV c/s	LI 88keV c/s	LI FWHM
Oct 8 2004	0410080933.tlm	PM1 Boom I&T, with SWEA (shield added)	14.2	24	32.7	17.3	0.35 / 0.35	0.25 / 0.35	20	10/15/2004	0	13	-0.10	0.3664	7.52E-05	13.4321	1.336	-0.07	0.3911	6e-5 (F)	58.53	29.85	1.404	1720	-0.06	0.3919	3.68E-05	38.34	20.03	1.78E-02	1.385
											1	12	-0.15	0.3672	7.53E-05	12.5100	1.126	-0.05	0.3896	6e-5 (F)	54.12	28.25	1.140		-0.05	0.3891	5.09E-05	38.30	19.84	1.18E-02	1.153
											2	13	-0.23	0.3679	6.29E-05	13.2135	1.239	-0.02	0.3880	6e-5 (F)	43.83	24.84	1.250		-0.04	0.3885	5.80E-05	30.83	17.41	1.13E-02	1.242
											3	13	-0.14	0.3668	7.48E-05	13.6342	1.336	-0.05	0.3902	6e-5 (F)	42.30	24.53	1.355		-0.06	0.3903	6.30E-05	30.34	16.86	1.23E-02	1.350
Oct 8 2004	0410081429.tlm	PM1 Boom I&T, with SWEA (shield added), Ground fixed		22	27	15			20	10/15/2004	0													490	-0.06	0.3909	6.82E-05	56.35	28.40	1.60E-02	0.901
											1														-0.03	0.3887	6.28E-05	57.00	28.96	1.25E-02	0.840
											2														-0.05	0.3895	1.00E-05	44.75	24.69	1.11E-02	0.845
											3														-0.06	0.3902	6.05E-05	43.97	24.55	1.55E-02	0.901
Oct 16 2004	0410160000s.tlm	PM1 Suite I&T @ Caltech		25.2	32.9	16.9	0.35 / 0.35	0.25 / 0.35	20	10/15/2004	0	10	-0.13	0.3668	7.39E-05	13.2872	0.835	-0.07	0.3909	6e-5 (F)	55.77	27.62	0.910	590	-0.06	0.3916	4.07E-05	55.31	27.54	1.47E-02	0.915
											1	9	-0.05	0.3662	9.57E-05	12.4204	0.765	-0.04	0.3882	6e-5 (F)	53.79	27.59	0.847		-0.05	0.3885	5.04E-05	54.77	27.49	1.91E-02	0.854
											2	9	-0.06	0.3668	8.49E-05	13.1305	0.763	-0.04	0.3879	6e-5 (F)	44.93	25.67	0.870		-0.04	0.3880	5.84E-05	43.56	24.13	1.10E-02	0.868
											3	9	-0.09	0.3669	7.70E-05	13.5008	0.834	-0.07	0.3857	6e-5 (F)	42.62	25.03	0.894		-0.07	0.3859	6.28E-05	43.13	22.49	1.51E-02	0.906
Nov 3 2004	0411031353.tlm	PM1 boom suite post-EMC at UCB	139.5	24.5	32.3	17.1	0.35 / 0.35	0.25 / 0.35	20	10/15/2004	0	10	-0.14	0.3672	7.26E-05	13.3000	0.849	-0.06	0.3913	4.70E-05	54.69	26.80	0.918	940	-0.06	0.3906	6.81E-05	55.74	27.27	1.29E-02	0.920
											1	10	-0.06	0.3663	9.35E-05	12.4325	0.801	-0.03	0.3889	4.20E-05	54.45	27.70	0.855		-0.03	0.3888	3.50E-05	54.33	27.35	1.25E-02	0.858
											2	11	-0.12	0.3672	8.08E-05	13.1351	0.867	-0.05	0.3891	3.14E-05	45.39	25.42	0.890		-0.03	0.3878	5.59E-05	43.57	23.64	1.31E-02	0.864
											3	10	-0.10	0.3672	7.62E-05	13.5191	0.834	-0.08	0.3866	5.31E-05	42.47	22.74	0.902		-0.06	0.3859	5.59E-05	42.63	22.71	1.66E-02	0.907
Dec 8 2004	0412081459.tlm	PM1 SWEA pre-Thermal Balance	138	17	25	14.3			20	2/18/2005	0	10	-0.11	0.3668	7.42E-05	13.2987	0.771	-0.04	0.3911	6e-5 (F)	55.15	27.00	0.850	650	-0.03	0.3904	7.86E-05	55.21	26.17	1.66E-02	0.890
											1	9	-0.04	0.3663	9.55E-05	12.4179	0.719	-0.01	0.3888	6e-5 (F)	54.61	26.53	0.830		0.01	0.3876	8.62E-05	53.91	26.57	1.35E-02	0.839
											2	9	-0.07	0.3668	8.58E-05	13.1251	0.706	-0.01	0.3883	6e-5 (F)	44.02	22.73	0.826		0.00	0.3881	7.25E-05	43.54	22.83	1.66E-02	0.854
											3	10	-0.09	0.3669	7.55E-05	13.5100	0.765	-0.03	0.3863	6e-5 (F)	41.50	21.16	0.858		-0.03	0.3890	6.98E-05	42.07	21.72	1.04E-02	0.882
Dec 10 2004	0412101530.tlm	PM1 SWEA Thermal Balance	129	13	-10	13	0.35 / 0.50	0.50 / 0.50	20	2/18/2005	0	14	-0.17	0.3677	7.17E-05	13.4481	1.151	-0.09	0.3914	6e-5 (F)	55.12	28.62	1.171	1330	-0.08	0.3920	5.77E-05	55.91	26.71	1.60E-02	1.119
											1	14	-0.09	0.3664	9.62E-05	12.4911	1.097	-0.04	0.3904	6e-5 (F)	55.48	27.15	1.103		-0.05	0.3914	5.84E-05	55.78	26.91	1.70E-02	1.079
											2	12	-0.13	0.3668	8.58E-05	13.2140	0.924	-0.05	0.3893	6e-5 (F)	44.95	25.17	0.961		-0.05	0.3902	5.58E-05	45.71	23.53	1.65E-02	0.958
											3	13	-0.12	0.3674	7.63E-05	13.6312	0.969	-0.05	0.3876	6e-5 (F)	45.47	22.18	0.997		-0.05	0.3888	6.53E-05	43.89	22.16	1.64E-02	0.954
Jan 26 2005	0501270000.tlm	PM1 SWEA Pre-vib	140	24.3	30.5	13.9	0.35 / 0.35	0.35 / 0.35	20	2/18/2005	0	11								6e-5 (F)											
											1	11								6e-5 (F)											
											2	11								6e-5 (F)											
											3	11								6e-5 (F)											
Jan 27 2005	0501290105.tlm	PM1 SWEA Post-vib	138	18.1	20.2	14.5	0.50 / 0.50	0.35 / 0.35	50	2/18/2005	0	11								6e-5 (F)											
											1	11								6e-5 (F)											
											2	11								6e-5 (F)											
											3	13								6e-5 (F)											
Feb 4 2005	0502040000.tlm	PM1 SWEA Thermal Vac Hot #2	150.6	-33	37.3	15	0.35 / 0.35	0.35 / 0.35	150	2/18/2005	0	5	-0.06	0.3674	7.09E-05	13.1311	0.646	-0.03	0.3903	6e-5 (F)	43.26	25.92	0.763	690	-0.02	0.3927	6e-5 (F)	54.59	24.71	1.10E-02	0.775
											1	5	-0.02	0.3681	8.56E-05	12.2730	0.586	-0.01	0.3903	6e-5 (F)	43.47	19.76	0.721		0.01	0.3900	6e-5 (F)	55.79	25.11	8.73E-03	0.726
											2	9	-0.05	0.3665	8.67E-05	12.8771	0.573	0.01	0.3903	6e-5 (F)	38.91	19.54	0.727		0.02	0.3903	5.10E-05	44.57	21.80	9.33E-03	0.725
											3	5	-0.04	0.3668	8.21E-05	13.3138	0.636	0.01	0.3875	6e-5 (F)	42.62	20.61	0.779		0.01	0.3877	4.59E-05	42.50	20.33	1.20E-02	0.773
Feb 4 2005	0502040000.tlm	PM1 SWEA Thermal Vac Cold #2	134	-80.2	-40.4	11.8	0.75 / 0.75	1.25 / 1.25	150	2/18/2005	0	5	-0.23	0.3674	7.48E-05	13.1835	0.658	-0.11	0.3950	6e-5 (F)	52.80	24.10	0.672	930	-0.11	0.3951	6e-5 (F)	53.59	24.26	1.20E-02	0.672
											1	5	-0.14	0.3666	1.00E-04	12.2419	0.467	-0.09	0.3904	6e-5 (F)	53.20	24.02	0.645		-0.09	0.3903	6e-5 (F)	53.82	24.26	1.00E-02	0.632
											2	9	-0.16	0.3670	8.73E-05	12.9030	0.473	-0.01	0.3944	6e-5 (F)	44.19	21.22	0.611		-0.10	0.3943	6e-5 (F)	43.68	21.46	5.75E-03	0.610
											3	5	-0.18	0.3670	7.48E-05	13.3564	0.529	-0.07	0.3898	6e-5 (F)	41.37	20.65	0.652		-0.08	0.3901	6e-5 (F)	42.49	20.16	8.42E-03	0.666
Feb 5 2005	0502050000.tlm	PM1 SWEA Thermal Vac Hot #3	150	-36.2	37.8	16.3	0.50 / 0.50	0.50 / 0.50	150	2/18/2005	0	5	-0.09	0.3674	7.09E-05	13.1277	0.643	-0.03	0.3931	6e-5 (F)	54.13	24.88	0.780	600	-0.03	0.3930	6e-5 (F)	53.60	24.24	2.05E-02	0.702
											1	5	-0.03	0.3682	9.77E-05	12.2735	0.561	-0.01	0.3907	6e-5 (F)	54.61	25.11	0.716		0.01	0.3897	6.94E-05	54.66	24.84	1.28E-02	0.717
											2	5	-0.06	0.3665	8.82E-05	12.8771	0.568	0.01	0.3903	6e-5 (F)	43.67	21.93	0.722		0.02	0.3897	6e-5 (F)	43.93	21.14	1.23E-02	0.709
											3	5	-0.07	0.3670	8.10E-05	13.3104	0.628	0.00	0.3879	6e-5 (F)	42.53	20.17	0.766		0.01	0.3876	6e-5 (F)	41.96	20.26	1.40E-03	0.761
Feb 7 2005	0502080000.tlm	PM1 SWEA Thermal Vac Cold #3	125.2	-90.5	-40.4	12.3	1.00 / 1.12	1.12 / 1.12	20	2/18/2005	0	5	-0.23	0.3678	7.24E-05	13.2725	0.536	-0.13	0.3966	6e-5 (F)	39.44	17.85	0.663	2650	-0.10	0.3950	6e-5 (F)	52.19	23.64	1.04E-02	0.667
											1	5	-0.13	0.3671	9.05E-05	12.2585	0.477	-0.10	0.3890	6e-5 (F)	52.01	24.36	0.639		-0.09	0.3864	6e-5 (F)	52.49	23.91	1.03E-02	0.639
											2	9	-0.20	0.3672	8.51E-05	13.0002	0.473	-0.11	0.3959	6e-5 (F)	43.82	19.68	0.605		-0.10	0.3945	6e-5 (F)	42.58	20.76	1.21E-02	0.619
											3	9	-0.18	0.3672	7.01E-05	13.4585	0.535	-0.05	0.3914	6e-5 (F)	22.06	10.58	0.675		-0.06	0.3897	7.41E-05	41.54	19.86	1.52E-02	0.660
Feb 8 2005	0502080000.tlm	PM1 SWEA Thermal Vac Hot #4	161	-37.1	42.8	14.9	0.50 / 0.50	0.50 / 0.50	20	2/18/2005	0	5	-0.09	0.3671	7.51E-05	13.1947	0.639							960	-0.02	0.3931	6e-5 (F)	54.28	24.44	1.62E-02	0.707
											1	7	-0.02	0.3663	9.72E-05	12.3245	0.573								0.01	0.3905	6e-5 (F)	54.58	24.90	1.04E-02	0.715
											2	7	-0.06	0.3663	8.79E-05	12.9903	0.584								0.02	0.3903	6.31E-05	43.34	21.26	1.71E-02	0.715
											3	5	-0.07	0.3672	8.06E-05	13.4103	0.625								0.01	0.3877	6.31E-05	42.17	20.26	9.50E-03	0.760
Feb 8 2005	0502080000.tlm	PM1 SWEA Thermal Vac Cold #4	129.5	-91.8	-32.5	14.6	1.25 / 1.25	1.50 / 1.50	150	2/18/2005	0	13	-0.21	0.3675	7.51E-05	13.1795	0.914							230	-0.11	0.3953	6e-5 (F)	53.59	24.45	9.45E-03	0.607
											1	9	No Fit												-0.09	0.3967	6e-5 (F)	54.19	24.36	1.03E-02	0.648
											2	9	-0.21	0.3665	8.58E-05	12.8641	0.493								-0.10	0.3948	6e-5 (F)	43.68	21.33	1.28E-02	0.621
											3	12	-0.18	0.3670	7.66E-05	13.3534	0.527								-0.07	0.3904	5.10E-05	42.56	20.19	2.20E-02	0.743
Feb 9 2005	0502090000.tlm	PM1 SWEA Thermal Vac Hot #5	158	-36.4	39.8	14.4	0.50 / 0.50	0.50 / 0.50	150	2/18/2005	0	5	-0.09	0.3668	7.58E-05	13.0982	0.631							780	-0.02	0.3927	7.10E-05	54.24	24.33	1.10E-02	0.754
											1	7	-0.07	0.3665	9.04E-05	12.2502	0.547								-0.01	0.3907	6.02E-05	55.54	24.73	2.02E-02	0.731
											2	7	-0.06	0.3668	8.58E-05	12.8751	0.566								0.01	0.3902	6.15E-05	43.81	21.26	1.93E-02	0.714
											3	5	-0.06	0.3669	8.14E-05	13.3038	0.629								0.02	0.3870	7.43E-05	42.67	20.23	2.24E-02	0.755
Feb 9 2005	0502090000.tlm	PM1 SWEA Thermal Vac Cold #5	136	-84.9	-36.5	12.4	1.12 / 1.12	1.25 / 1.25	20	2/18/2005	0	5	-0.21	0.3673	7.58E-05	13.2515	0.555	-0.11	0.3951	6e-5 (F)	53.66	25.51	0.665	2650	-0.11	0.3952	6e-5 (F)	53.21	23.94	8.68E-03	0.650
											1	9	-0.14	0.3670	9.51E-05	12.2761	0.493	-0.09	0.3966	6e-5 (F)	52.06	25.84	0.605		-0.09	0.3967	6e-5 (F)	53.11	23.92	1.57E-02	0.625
											2	9	-0.20	0.3667	8.49E-05	12.9925	0.459	-0.10	0.3946	6e-5 (F)	43.89	21.11	0.603		-0.09	0.3942	6.78E-05	43.12	20.87	1.60E-02	0.607
											3	9	-0.17	0.3674	7.70E-05	13.4540	0.527	-0.07	0.3904	6e-5 (F)	34.29	16.14	0.717		-0.07	0.3899	6.78E-05	41.85	20.08	1.30E-02	0.652
Feb 10 2005	0502100000.tlm	PM1 SWEA Thermal Vac Hot #6	149	-36	36	14.4	0.50 / 0.50	0.50 / 0.50	150	2/18/2005	0	5	-0.05	0.3674	7.51E-05	13.1265	0.631	-0.03	0.3931	6e-5 (F)	53.54	24.47	0.760	700	-0.03	0.3931	6e-5 (F)	54.45	24.47	1.50E-02	0.760
											1	9	-0.02	0.3680	9.06E-05	12.2690	0.665	-0.01	0.3909	6e-5 (F)	54.65	24.98	0.819		0.00	0.3905	6.60E-05	55.64	24.99	2.35E-02	0.729
											2	5	-0.06	0.3664	8.73E-05	12.8742	0.564	0.02	0.3903	6e-5 (F)	44.79	21.23	0.708		0.02	0.3895	9.05E-05	43.97	21.46	1.80E-02	0.709
											3	5	-0.05	0.3669	8.13E-05	13.3135	0.646	0.00	0.3875	6e-5 (F)	43.02	21.83	0.766		-0.01	0.3883	4.16E-05	42.44	20.48	1.38E-02	0.757
Feb 10 2005	0502100000.tlm	PM1 SWEA Thermal Vac Cold #6	126	-90.7	-30.2	14.6	1.12 / 1.25	1.38 / 1.50	150	2/18/2005	0	5	-0.23	0.3677	7.28E-05	13.1752	0.562							1210	-0.11	0.3951	5.14E-05	50.00	22.70	1.68E-02	0.733
											1	10	-0.14	0.3669	9.06E-05	12.2417	0.775								-0.09	0.3964	6e-5 (F)	50.21	22.99	1.71E-02	0.745
											2	9	-0.20	0.3671	8.72E-05	12.8980	0.496								-0.10	0.3941	7.12E-05	40.84	19.94	1.44E-02	0.615
											3	9	-0.18	0.3670	7.38E-05	13.3627	0.594								-0.08	0.3930	6E-5 (F)	39.37	18.84	1.65E-02	0.669
Feb 10 2005	0502100000.tlm	PM1 SWEA Thermal Vac Hot #7	148	-31.9	37.8	16.4	0.35 / 0.35	0.35 / 0.35	20	2/18/2005	0	5	-0.09	0.3668	7.06E-05	13.2004	0.636	-0.02	0.3929	6e-5 (F)	53.66	24.23	0.765	930	-0.02	0.3926	7.14E-05	54.34	24.42	1.75E-02	0.764
											1	5	-0.03	0.3670	9.51E-05	12.3500	0.577	0.01	0.3903	6e-5 (F)	54.77	25.50	0.732		0.02	0.3896	6.48E-05	54.41	24.18	1.40E-02	0.722
											2	5	-0.06	0.3669	8.51E-05	13.0251	0.571	0.02	0.3900	6e-5 (F)	43.58	21.74	0.699		0.02	0.3898	6.60E-05	43.49	21.39	1.20E-02	0.715
											3	5	-0.07	0.3669	7.35E-05	13.4231	0.629	0.03	0.3870	6e-5 (F)	41.97	20.72	0.732		0.02	0.3871	7.15E-05	42.22	20.30	1.57E-02	0.764
Feb 11 2005	0502110000.tlm	PM1 SWEA Thermal Vac Cold #7	125	-89.3	-38.6	12.2	1.00 / 1.00	1.00 / 1.00	20	2/18/2005	0	5	-0.24	0.3672	7.08E-05	13.2308	0.550	-0.10	0.3950	6e-5 (F)	52.86	24.50	0.672	700	-0.10	0.3952	6e-5 (F)	52.86	24.09	7.04E-03	0.664
											1	7	-0.15	0.3674	9.53E-05	12.2785	0.481	-0.10	0.3969	6e-5 (F)	52.82	25.77	0.624		-0.08	0.3965	6e-5 (F)	53.55	23.88	1.10E-02	0.637
											2	5	-0.21	0.3673	8.25E-05	13.0030	0.479	-0.11	0.3947	6e-5 (F)	42.70	21.19	0.610		-0.09	0.3943	6e-5 (F)	43.01	20.68	5.06E-03	0.609
											3	5	-0.15	0.3675	7.49E-05	13.4619	0.656	-0.07	0.3901	6e-5 (F)	41.97	20.17	0.652		-0.07	0.3902	5.73E-05	41.45	20.22	1.42E-02	0.651

FM1 SWEA/STE-D Operating Hours

- **Most of the FM1 SWEA/STE-D has operated for over 500 hours trouble free**
- **Since the last change (PFR1033, IDPU interface errors)**
  - **Pre, Post Vib CPT: 2.5 Hours**
  - **Thermal Vac: 88.1 Hours**
  - **Boom Suite I&T: 177.4 Hours**

Total: 268.0 Hours

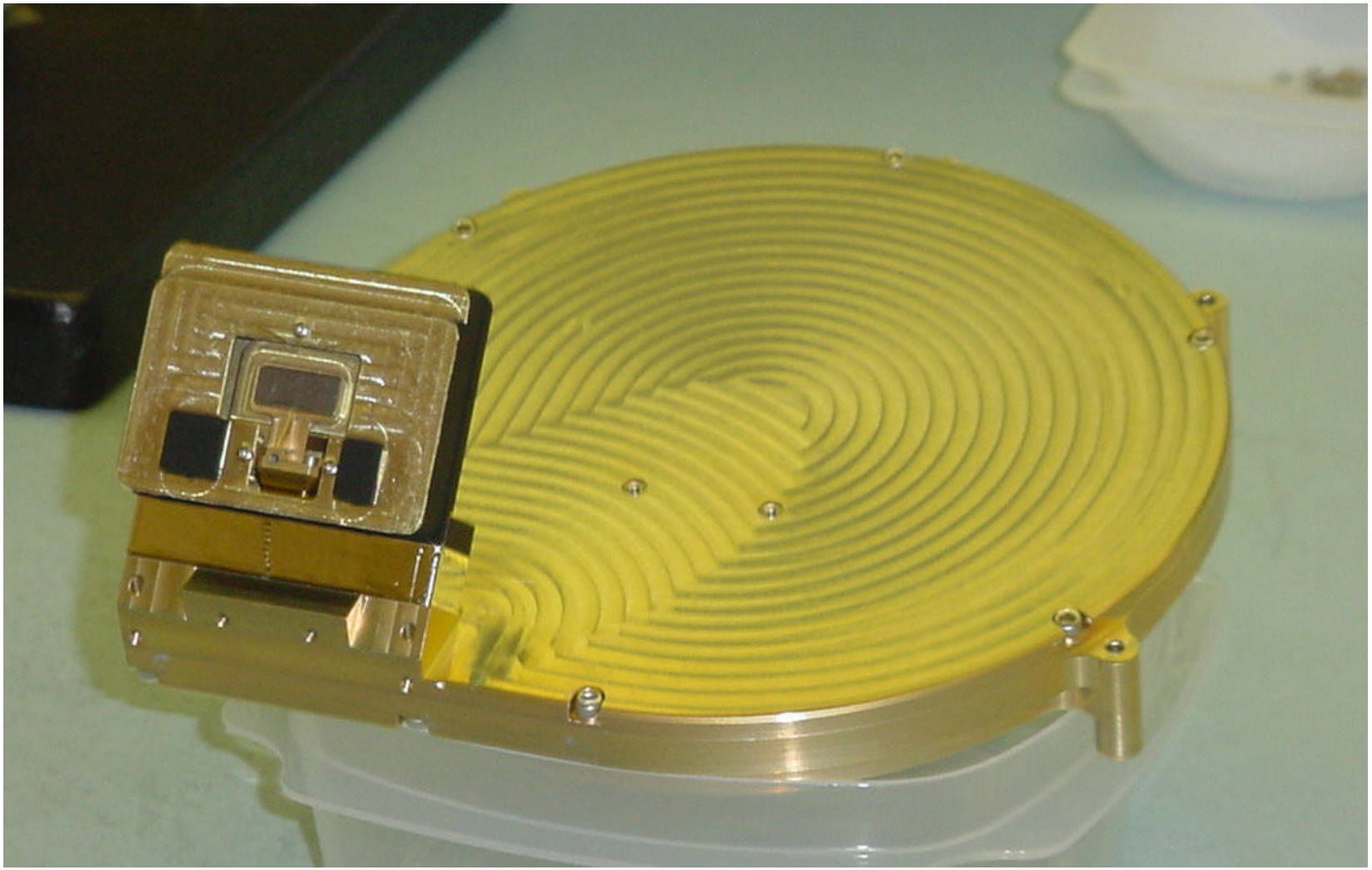
Quality Assurance

- IMPACT Suite QA Issues worked through Ron Jackson at UCB
  - UCB Independent Inspections by Jeremiah Tolbert,
  - Supported by GSFC QA
  - Signs off on work orders, inspections, parts & materials lists, etc.
- Parts Lists
  - All SWEA/STE-D Parts Lists approved
  - Parts qualification, screening (including radiation) completed
- SWEA (CESR) and UCB Materials Lists Approved
- SWEA/STE-D FM1 PFRs Closed except 1029
  - PFRs can be found at: http://sprg.ssl.berkeley.edu/impact/dwc/Problems/
- SWEA/STE-D-related Waivers Closed
  - Except FM1 Suite EMC Test Results waiver
  - Waivers can be found at: http://sprg.ssl.berkeley.edu/impact/dwc/Waivers/
- Acceptance Data Package Prepared and reviewed

SWEA/STE-D Outstanding Issues

- **IMPACT FM1 EMC Waiver not signed off**
  - **Official waiver should be into approval cycle shortly**
- **SWEA Preamp failure still open (PFR1029).**
  - **Potential impact on reliability part lot**

IMPACT FM1 STE-U



FM1 STE-U Test History

- 4/12 First assembly, test
  - PFR1002, broken detector board bond wire in assembly; board replaced with spare
- 5/1 - 5/4 Thermal Balance Test
  - Good correlation with Model
- 5/6 – 6/15 Thermal Vac
  - PFR1006, Mis-wired connector stresses parts at start of test, repaired
  - PFR1008, STE-U door failure cold, repaired, restart tvac
  - PFR1009, preamp oscillation when warm. Fixed between cycles 5 & 6.
- 6/16 Mated with FM1 boom, tests OK
- 6/28 FM1 boom vibration (with STE-U and MAG instruments)
  - PFR1011, STE door failure, fixed
  - STE-U removed after vib for boom thermal vac to avoid contaminating STE
- 9/13 - 9/23 STE-U re-qualified; workmanship vib, 1-cycle thermal vac
- 9/27-10/1 STE-U re-integrated with FM1 boom (final)
- 10/6 – 10/17 Suite I&T
- 10/18 – 11/1 EMC test with the full IMPACT Suite
  - EMC test exceedances have been accepted by the EMC committee; the official waiver is in process.
- 11/19 – 3/8 Support FM1 IDPU Environmental Tests, Boom Suite I&T
- 3/24 STE-U Magnetics Test, passed

STE-U Verification Matrix

Level of Assembly	Item	Elect. test, rm. Temp	Bench Calibration	Elect. Test, hot	Elect. Test, cold	Vibration, Sinusoidal	Vibration, Random	Self Shock	Acoustics	Thermal Vacuum	Voltage margins	Thermal cycle	Thermal balance	Life Test	EMC/EMI	Magnetics	Beam Calibration	Bakeout	Contamination Inspection	Comments
C	Detector, EM	C																		
C	Detector, F	C																	C	
C	Preamp, BB	C	C																	
I	Instrument, ETU	C	C	C	C				A		C			C			C			
I	Instrument, PF (FM1)	C	C			C	C	C		C	C		C		C	C	C	C	C	
I	Instrument, PF (FM2)	C	C			C	C	C		C	C				H	X	C	C	X	

Legend:

Level of Assembly	Unit Type	X =	Test required
		A =	Analysis
C = Component	BB Breadboard	H =	Test at higher level of assembly
I = Instrument	EM Engineering Model	**C =**	**Test Completed**
	PF Protoflight		
	F = Flight		

Full IMPACT Verification Matrix at:
http://sprg.ssl.berkeley.edu/impact/dwc/Verification/IMPACTVerificationMatrix_2005-3-25.pdf

STE-U FM1 Problem/Failures, pre-PER

- **PFR1002, detector bond wire broken in assembly**
  - **Replaced detector board with spare**
  - **Added fixturing to avoid damage in future**

- **This PFR has been signed-off and closed (not “Red-Flag” PFR)**

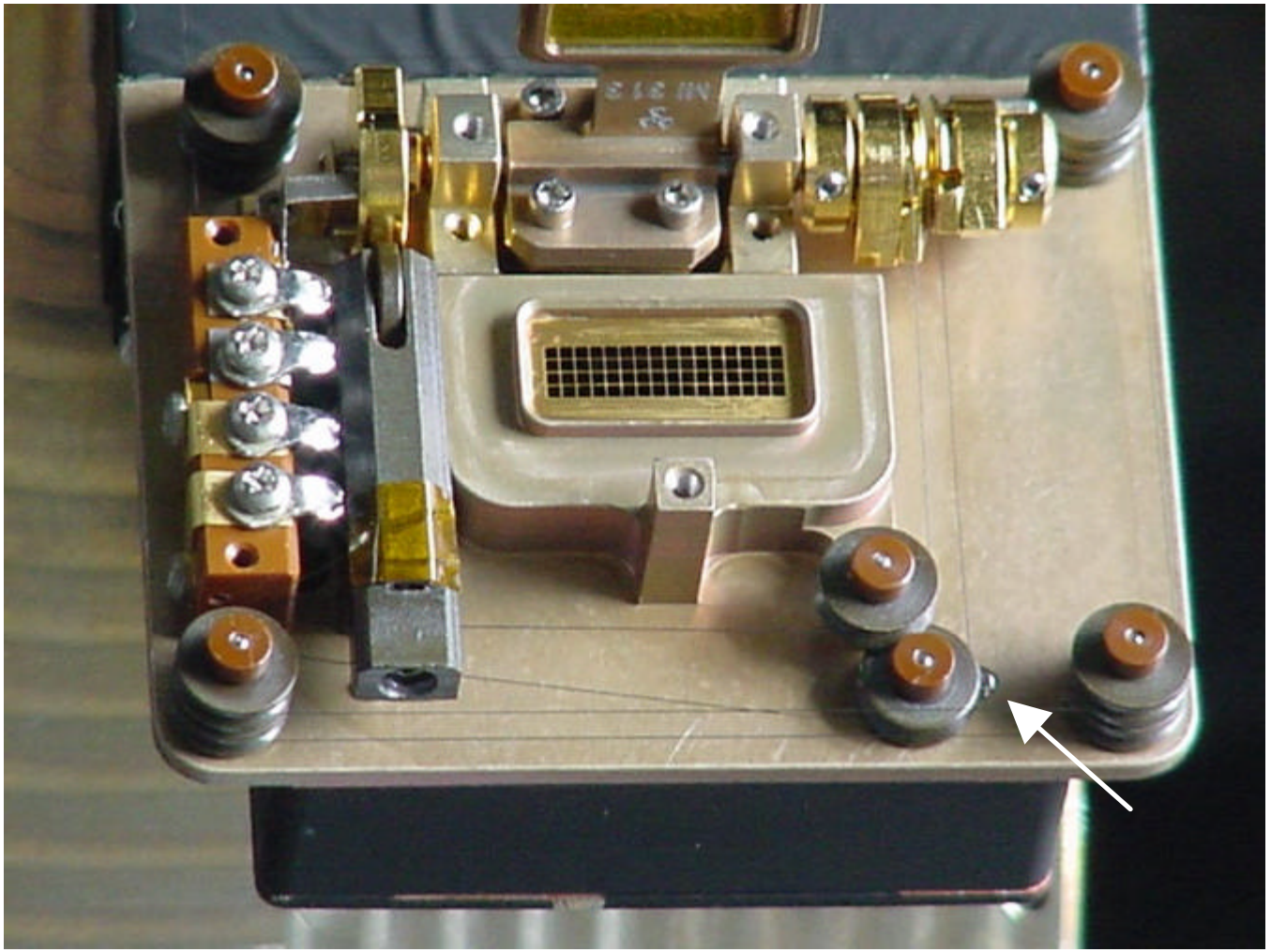
STE-U FM1 Problem/Failures since PER

- **PFR1006:**
  - **STE-U thermal vac feed-through mis-wired**
  - **Discovered during thermal balance setup**
  - **Item worked fine after fixing chamber wiring, but analysis indicates some parts stressed**
  - **Replace stressed parts, re-test, return to thermal balance**
- **PFR1008:**
  - **STE-U door failed to actuate properly when cold (-100C)**
  - **Discovered in Thermal Vac, cycle #1**
  - **Caused by mechanical part out of tolerance (few thousandths)**
  - **Build special tooling to ensure tolerance, rework all STE door parts**
  - **Test all doors at ambient in an LN2 bath, plus 100 motion burn-in**
    - **Also did life test on ETU door; 18,000 cycles at ambient**
    - **500 cycles vacuum, cold**
      - **Expected on-orbit (cold) cycles are ~60 in 2 years**
  - **Door worked fine in subsequent thermal vac test (but see PFR1011)**

STE-U FM1 Problem/Failures since PER continued

- **PFR1009:**
  - **Busts of noise in STE detectors when warm**
    - **Found in thermal vac cycling.**
  - **Problem identified as oscillations in the preamp**
    - **Possibly exacerbated by thermal vac harness, noise**
  - **Broke chamber, adjusted preamp compensation, continued thermal vac**
  - **Final thermal vac cycles confirmed no oscillations**
- **PFR1011:**
  - **STE-U door failure after boom suite vibration**
  - **Caused by a pulley in the door mechanism hung up on a screw**
    - **Screw was missing its washer, and so extended into the pulley**
  - **Washer installed, fixed problem**
    - **Verified on all other STE units**
  - **After fix, workmanship vibration and 1-cycle thermal vac to verify fix**
    - **20 cycles at cold temperature.**
- **These PFRs have been signed-off and closed (not “Red-Flag” PFRs)**

PFR1011



FM1 STE-U Related Waivers

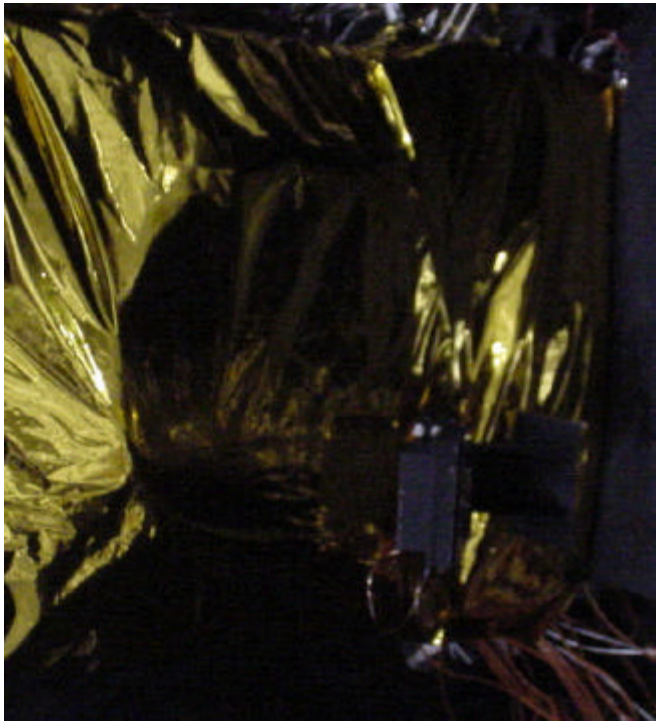
- **Pre-environmental waivers related to STE-U involve waivers to the EMC requirements, including:**
  - **CCR460-40 and CCR460-41 regarding single-ended interfaces to IDPU and secondary power distribution**
    - **EMC committee approved IMPACT design**
  - **CCR463-37, STE door actuator wire exposed voltage**
    - **EMC committee approved IMPACT design**
- **Also:**
  - **CCR463-133, STE-U thermal balance off boom**
  - **CCR463-135, no acoustics test for STE-U**
  - **CCR460-9, 19, 66, 134 regarding IMPACT Suite power consumption**
- **Waivers can be found at:**
  - **http://sprg.ssl.berkeley.edu/impact/dwc/Waivers/**
- **All Waivers approved by CCB**
- **Post-EMC waiver for IMPACT Suite exceedances in process**
  - **Data has been reviewed by EMC committee, no significant issues**

FM1 STE-U Environmental Tests

- **Test Plans/Procedures can be found at:**
  - http://sprg.ssl.berkeley.edu/impact/dwc/TestProcs/
    - **EMC:** http://sprg.ssl.berkeley.edu/impact/dwc/TestProcs/IMPACT-EMC_C.pdf
    - **CPT:** http://sprg.ssl.berkeley.edu/impact/dwc/TestProcs/IMPACT-IDPU-CPT_H.pdf
    - **Vibration:** http://sprg.ssl.berkeley.edu/impact/dwc/TestProcs/IMP-562-DOC-A%20Vibration%20Test%20Procedure.pdf
    - **Tvac/Tbal:** http://sprg.ssl.berkeley.edu/impact/dwc/TestProcs/IMPACT%20STE-U%20TVac%20Test%20Plan.pdf
- **Test Reports can be found at:**
  - http://sprg.ssl.berkeley.edu/impact/dwc/TestReports/
    - **EMC:** http://sprg.ssl.berkeley.edu/impact/dwc/TestReports/02-15-05%20UCBerkeley%20Stereo%20Impact%20Prep%20TR.pdf
    - **Tvac:** http://sprg.ssl.berkeley.edu/impact/dwc/TestReports/IMPACT-STEU-FM1-TVac-ReportB.pdf
    - **Tbal:** http://sprg.ssl.berkeley.edu/impact/dwc/TestReports/BOOM_STE-U_TB_Test_Report.pdf
    - **Magnetics:** http://sprg.ssl.berkeley.edu/impact/dwc/TestReports/IMPACT-FM1-STEU-Magnetics-Report.pdf
    - **Vibration:** http://sprg.ssl.berkeley.edu/impact/dwc/TestReports/IMP-578-DOC%20STEREO%20Boom%20FM1%20Vibration%20Report%20RA.pdf

FM1 STE-U Thermal Balance Test

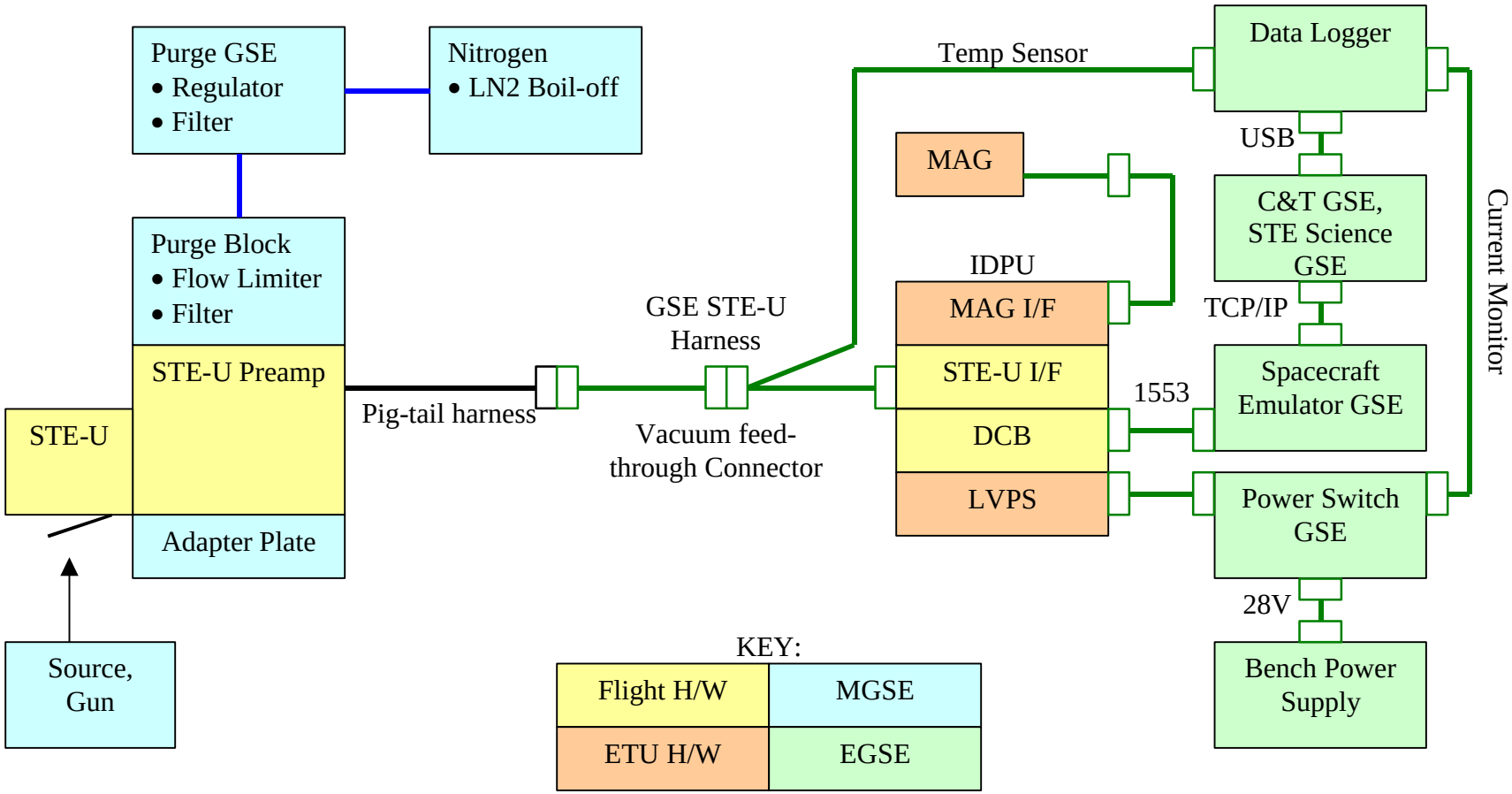
- **Thermal Balance at UCB**
  - **STE-U mounted to baseplate to simulate boom mounting, Shrouds run cold**
  - **ETU Thermal Blankets provided by APL**
- **Test passed**
  - **Good correlation to thermal model**
  - **No problems**



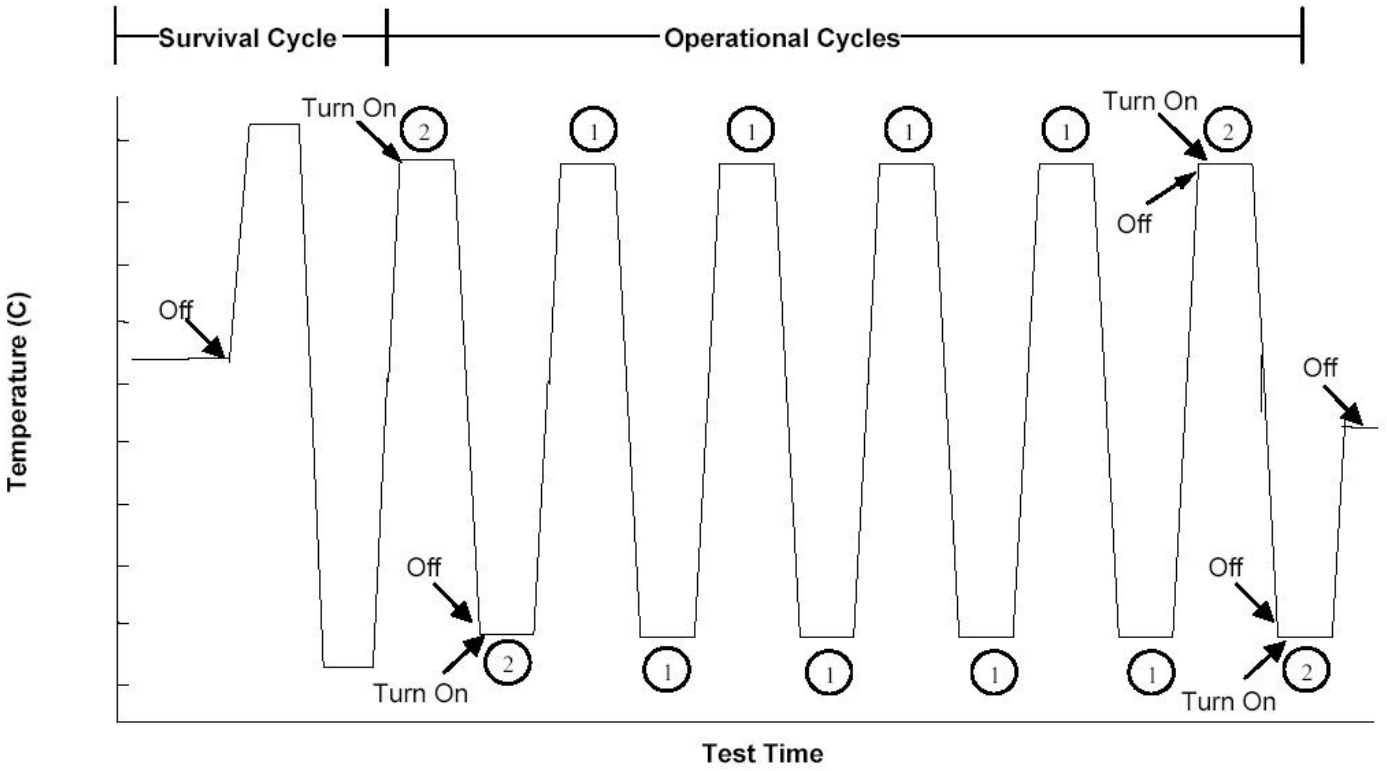
STE-U Thermal Vacuum Test

- **Test Plan:**
  - **Preliminary bakeout, up to 48 hours at +40C**
  - **Thermal vac**
    - **6 op cycles: +40C to –35C for Preamp, -35 to –95C for STE-U**
    - **One non-op cycle: +40 to –30C for Preamp, +40 to –100C for STE-U**
    - **Temperatures from verified thermal model, with at least 10C margins.**
    - **Preamp mounted to baseplate, STE-U connected to cold plate by heat strap to provide for separate control of Preamp and STE-U**
  - **CPT on each operational cycle, cold-start in first and last cycles**
  - **Qualification bakeout**
  - **Temperatures were controlled with Thermocouples attached to the outside of the instrument**
  - **STE-U temperature set using internal temperature sensor**

STE-U CPT / Calibration Setup



STE-U Thermal Cycling



See Table 2.3-1 for component dependant test temperatures.

Stabilization Criteria: Within 3°C Of Plateau And Changing < 1°C/Hr

Six Operational Cycles Required

See Fig 2.3.3.2-2 and -3 for detailed hot and cold transition definitions, resp.

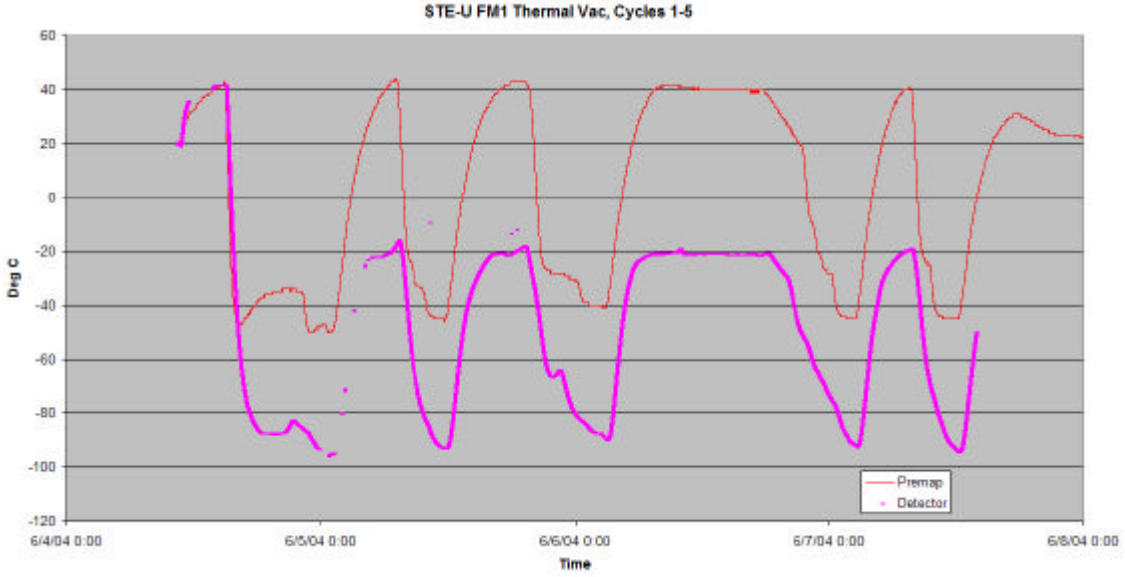
(1) = Stabilize, Print T/C's, Soak 1Hour and Test Concurrently, Print T/C's

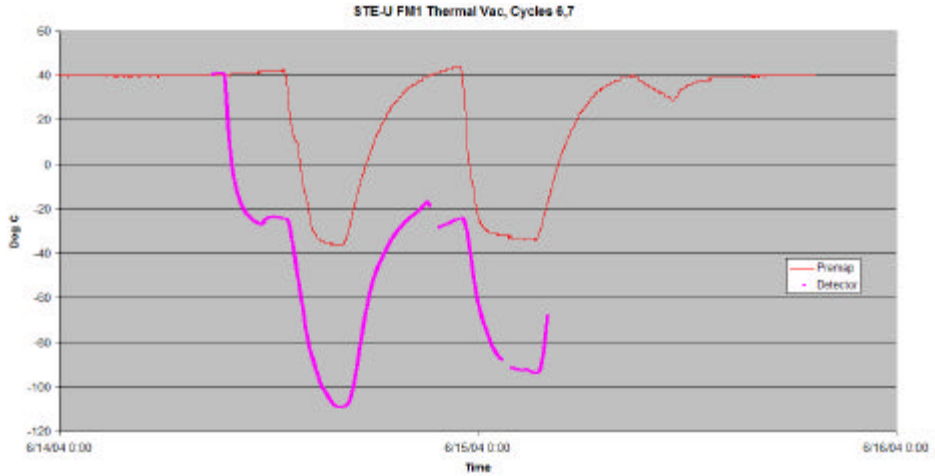
(2) = Stabilize, Turn On, Soak 1Hour and Test Concurrently, Print T/C's at End of Soak

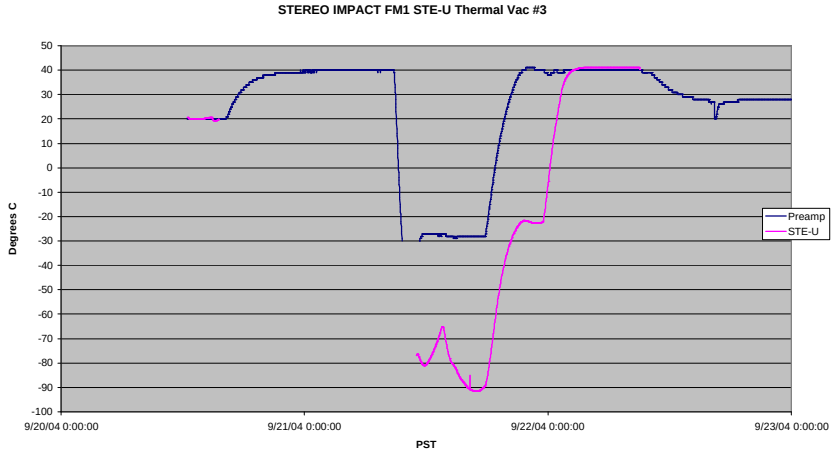
STE-U Thermal Vacuum Test Results

- During pre-test checkout it was found that the chamber feed-through was mis-wired (PFR1006)
  - Potentially stresses parts replaced
- During first cold soak, STE-U door failed (PFR1008)
  - Part out of tolerance; repaired, restart tvac
- Occasional noise observed on STE-U detectors when warm
  - Correlated with chamber operations
  - Caused by preamp oscillation, exacerbated by chamber noise, long thermal vac harness
  - Break chamber and fix preamp compensation between cycles 5 & 6
  - No problem in final cycles
- No significant trends or adverse temperature dependencies were seen

FM1 STE-U Thermal Vac







STE-U Bakeout Results

- After the last cycle of thermal vac the unit was baked out at +40C while monitoring outgassing with a TQCM at -20C.
- Rates seen were 52Hz/hour, close to chamber background, corresponding to an outgassing rate of TBD, compared to a requirement of < 5e-11.

STE-U Vibration Testing

- **Vibrated on FM1 Boom**
  - **Described in Boom section.**
- **STE-U door failed in post-vibration test (PFR1011)**
  - **Tracked to screw interfering with pulley operation due to lack of washer**
- **Retest after PFR1011 fix**
  - **Workmanship vibration per GEVS**
  - **One cycle thermal vac**

IMPACT Suite EMC Tests

- **Described in SWEA section.**

FM1 STE-U Magnetics Test

- **STE-U magnetics were not performed prior to installation of the unit on the boom.**
- **A “swing test” was performed on the integrated FM1 boom suite to measure the field from the STE_U end of the boom.**
  - **Note that the STE-U end of the boom is close to the deployment assembly, which has some know magnetic materials – see boom section**
  - **STE-U end of the boom is >4m from the mag sensor when the boom is deployed, which mitigates magnetics concerns**
  - **Test was performed by swinging STE-U end of the boom periodically past a magnetometer sensor, with closest approach being 50cm.**
  - **Measured field of ~20nT corresponds to a field at the MAG sensor location of <.04nT compared to a spacecraft goal of 1nT (this includes both boom and STE-U contributions)**
  - **MAG PI finds this level acceptable.**

Performance Data

- **STE-U calibrations at UCB**
  - **Geometric factor, FOV, energy resolution, threshold, background**
- **Key measurements were trended throughout testing (IDPU and Sensor)**
  - **No significant trends were found – see following charts**
- **All performance measurements met or exceeded the requirements**

STE-U Trend Data

STE-U FM1 Performance Trend

													Test Pulser					Door Source						Long Integration Door Source (Door LUT)							
Date	File	Test	STE-U Temp	Preamp Temp	IDPU Temp	ISTEUCur (mA)	Door Open (sec)	Door Close (sec)	Bias	Fit Rev	Det.	Thresh.	Offset (keV)	Gain (keV/Bin)	Curv. (1/keV)	Test Gain	FWHM (keV)	Offset (keV)	Gain (keV/Bin)	Curv. (1/keV)	6keV c/s	22keV c/s	FWHM	Acc Time (sec)	Offset (keV)	Gain (keV/Bin)	Curv. (1/keV)	6keV c/s	22keV c/s	88keV c/s	FWHM
4-May-04	0405030000.tlm	Thermal Balance	-62	25	30	20			20	6/10/2004	0		-0.05	0.3842	1.36E-04	13.4625	0.927	0.00	0.3901	7.55E-05	35.86	22.70	0.974								
											1		0.04	0.3838	1.57E-04	12.7275	0.552	0.01	0.3884	9.54E-05	41.18	24.40	0.687								
											2		0.04	0.3829	1.61E-04	12.5961	0.621	-0.02	0.3926	6e-5 (F)	36.49	21.72	0.772								
											3		-0.01	0.3844	1.40E-04	13.1720	0.782	-0.03	0.3972	6e-5 (F)	19.73	14.03	0.891								
2-Jun-04	0406022043.tlm	Pre-Tvac #2 ambient (10MHz noise suppression caps installed on IF)	28.5	Ambient	36	17	0.38 / 0.62	0.25 / 0.38	20	6/10/2004	0	9	-0.03	0.3845	1.29E-04	13.5357	0.848	-0.03	0.3838	1.29E-4 (F)	43.82	28.18	0.928	260	-0.05	0.3855	7.70E-05	41.00	25.47	2.77E-02	0.928
											1	10	0.00	0.3834	1.52E-04	13.0995	0.833	-0.03	0.3790	1.52E-4 (F)	42.49	27.80	0.871		-0.08	0.3821	6.99E-05	38.81	25.78	1.54E-02	0.905
											2	9	-0.03	0.3841	1.52E-04	12.6275	0.822	-0.05	0.3894	1.52E-4 (F)	37.91	24.80	0.917		-0.10	0.3917	4.90E-05	35.51	22.09	1.40E-02	0.908
											3	9	-0.04	0.3845	1.35E-04	13.5003	0.821	-0.02	0.3927	1.35E-4 (F)	36.35	24.78	0.901		-0.05	0.3944	6.00E-05	34.74	23.07	9.80E-03	0.910
5-Jun-04	0406050000.tlm	Tvac #2 Hot#2	-22	38	19	17.6	0.38 / 0.38	0.38 / 0.38	20	6/10/2004	0	8	-0.01	0.3845	1.34E-04	13.4473	0.810	-0.03	0.3892	4.50E-05	49.19	30.14	0.901	570	-0.02	0.3856	5.62E-05	48.30	28.67	1.48E-02	0.907
											1	7	0.03	0.3837	1.58E-04	12.7517	0.677	-0.01	0.3865	1.49E-05	46.50	28.88	0.752		-0.02	0.3858	5.15E-05	44.03	27.65	1.04E-02	0.782
											2	7	0.01	0.3842	1.58E-04	12.4575	0.741	-0.03	0.3914	6E-5 (F)	40.74	27.73	0.839		-0.03	0.3916	5.52E-05	39.40	24.78	1.10E-02	0.857
											3	7	0.00	0.3835	1.43E-04	13.1913	0.774	-0.02	0.3948	4.97E-05	41.49	27.45	0.883		-0.02	0.3945	6e-5 (F)	38.35	24.90	2.44E-02	0.880
5-Jun-04	0406050000.tlm	Tvac #2 Cold #2	-91	-47	27	19.28	0.50 / 0.50	0.38 / 0.50	20	6/10/2004	0	7	-0.01	0.3844	1.34E-04	13.4022	0.695	-0.02	0.3922	6E-5 (F)	46.31	30.00	0.806	2270	-0.03	0.3922	5.11E-05	45.28	27.67	1.90E-02	0.791
											1	6	0.05	0.3835	1.62E-04	12.6837	0.549	-0.02	0.3892	7.70E-05	47.24	30.31	0.663		-0.02	0.3890	7.36E-05	44.11	27.08	1.55E-02	0.656
											2	6	0.03	0.3845	1.64E-04	12.3659	0.612	-0.04	0.3954	6E-5 (F)	39.65	26.13	0.710		-0.04	0.3955	6.44E-05	38.87	25.04	1.30E-02	0.734
											3	7	-0.04	0.3852	1.18E-04	13.0327	0.987	-0.02	0.4003	6E-5 (F)	42.21	26.83	0.802		-0.03	0.4003	6E-5 (F)	38.42	24.75	8.80E-03	0.814
5-Jun-04	0406050000.tlm	Tvac#2 Hot #3	-21	41	35	17.7	0.38 / 0.38	0.38 / 0.38	20	6/10/2004	0	8	0.04	0.3838	1.42E-04	13.4153	0.818	-0.03	0.3883	4.33E-05	49.36	29.65	0.911	220	-0.01	0.3856	5.62E-05	45.76	28.38	2.85E-02	0.910
											1	7	0.06	0.3837	1.64E-04	12.7505	0.677	0.02	0.3852	6e-5 (F)	36.39	25.54	0.787		0.00	0.3848	7.76E-05	43.57	26.85	2.14E-02	0.768
											2	8	0.03	0.3834	1.62E-04	12.4268	0.736	-0.02	0.3912	6e-5 (F)	40.08	28.11	0.876		-0.03	0.3913	6E-5 (F)	38.92	24.88	3.88E-03	0.885
											3	8	0.01	0.3842	1.42E-04	13.1854	0.775	0.00	0.3945	6e-5 (F)	39.93	25.65	0.879		-0.02	0.3949	6E-5 (F)	39.54	24.99	2.60E-02	0.900
6-Jun-04	0406060000.tlm, 0406060220.tlm	Tvac #2 Cold #3	-87	-41.6	25.3	18.7	0.50 / 0.50	0.38 / 0.50	20	6/10/2004	0	7	-0.03	0.3845	1.30E-04	13.4045	0.702	-0.03	0.3916	6e-5 (F)	45.71	28.23	0.808	6220	-0.03	0.3911	4.77E-05	45.43	27.58	1.55E-02	0.829
											1	6	0.02	0.3836	1.55E-04	12.6822	0.558	-0.02	0.3887	6e-5 (F)	47.95	28.79	0.646		-0.01	0.3876	7.02E-05	44.13	27.02	2.09E-02	0.689
											2	6	-0.01	0.3860	1.25E-4 (F)	12.3402	0.622	-0.03	0.3951	6e-5 (F)	41.31	26.49	0.722		-0.03	0.3940	7.03E-05	39.09	24.07	1.53E-02	0.769
											3	6	-0.06	0.3845	1.27E-04	13.0691	0.782	-0.03	0.3995	6e-5 (F)	41.11	26.87	0.794		-0.01	0.3975	6.86E-05	38.42	25.01	1.24E-02	0.822
6-Jun-04	0406060220.tlm	Tvac#2 Hot #4	-21	39.9	29.1	18.4	0.38 / 0.38	0.38 / 0.38	20	6/10/2004	0	7	0.02	0.3838	1.36E-04	13.4758	0.811	0.00	0.3876	5.68E-05	47.46	28.57	0.889	260	-0.02	0.3859	5.15E-05	45.78	28.08	3.50E-03	0.905
											1	7	0.05	0.3830	1.60E-04	12.8044	0.680	-0.01	0.3849	7.60E-05	48.16	27.84	0.748		-0.03	0.3862	3.47E-05	45.10	27.37	6.02E-03	0.772
											2	7	0.03	0.3838	1.61E-04	12.4702	0.733	-0.03	0.3915	6E-5 (F)	41.49	27.54	0.841		-0.04	0.3913	7.97E-05	39.11	25.20	1.26E-02	0.853
											3	7	0.02	0.3840	1.42E-04	13.2478	0.771	-0.02	0.3951	5.12E-05	40.69	25.87	0.884		0.00	0.3956	5.68E-05	38.62	25.37	1.90E-02	0.880
7-Jun-04	0406070138.tlm	Tvac #2 Cold #4	-87.2	-46.5	27	19.2	0.50 / 0.50	0.38 / 0.50	20	6/10/2004	0	7	0.01	0.3840	1.35E-04	13.4076	0.699	-0.03	0.3921	6E-5 (F)	48.30	29.50	0.794	590	-0.02	0.3923	3.90E-05	45.19	27.92	1.31E-02	0.791
											1	5	0.04	0.3835	1.60E-04	12.6856	0.557	-0.02	0.3893	6E-5 (F)	46.93	28.61	0.661		-0.02	0.3893	6.37E-05	43.63	27.05	1.67E-02	0.659
											2	6	0.02	0.3845	1.60E-04	12.3669	0.615	-0.04	0.3954	6E-5 (F)	41.09	26.18	0.741		-0.04	0.3949	9E-5 (F)	39.54	24.08	1.05E-02	0.735
											3	6	0.01	0.3843	1.44E-04	13.0685	0.754	-0.02	0.4002	6E-5 (F)	41.76	27.19	0.810		-0.02	0.4003	6e-5 (F)	35.23	25.00	9.44E-03	0.816
7-Jun-04	0406070138.tlm	Tvac #2 Hot #5 (BOB in)	-21.1	37.7	29	18.6	0.38 / 0.38	0.25 / 0.38	20	6/10/2004	0	9	-0.02	0.3840	1.32E-04	13.4123	0.956	-0.02	0.3881	7.92E-05	48.95	30.12	1.025	970	-0.04	0.3893	4.55E-05	45.55	28.55	2.03E-02	1.021
											1	7	0.05	0.3837	1.60E-04	12.7493	0.766	-0.03	0.3858	6E-5 (F)	47.57	29.66	0.821		-0.01	0.3849	6.42E-05	44.17	27.18	1.17E-02	0.803
											2	8	0.04	0.3830	1.63E-04	12.4658	0.840	-0.01	0.3903	6.14E-05	40.94	27.08	0.927		-0.04	0.3917	6.38E-05	39.05	25.48	1.47E-02	0.927
											3	9	0.01	0.3837	1.46E-04	13.1473	0.957	-0.02	0.3959	6E-5 (F)	41.33	26.48	0.960		-0.03	0.3987	6.70E-05	38.40	25.08	2.10E-02	1.025
7-Jun-04	0406070138.tlm	Tvac #2 Cold #5	-90.8	-47.3	24	19	0.50 / 0.50	0.38 / 0.50	20	6/10/2004	0	6	-0.03	0.3845	1.29E-04	13.3993	0.689	-0.01	0.3911	9.56E-05	46.87	31.14	0.817	3630	-0.02	0.3916	6.00E-05	45.17	27.67	1.88E-02	0.798
											1	6	0.02	0.3837	1.57E-04	12.6788	0.548	-0.03	0.3904	1.58E-05	46.35	27.22	0.661		-0.01	0.3887	7.20E-05	44.18	27.08	2.22E-02	0.665
											2	6	0.00	0.3847	1.58E-04	12.3780	0.611	0.05	0.3959	6e-5 (F)	41.43	26.88	0.748		-0.03	0.3949	7.78E-05	39.25	25.21	1.60E-02	0.745
											3	6	-0.12	0.3858	1.03E-04	13.0659	0.757	-0.02	0.4002	6E-5 (F)	41.35	26.72	0.795		-0.02	0.3985	6E-5 (F)	35.40	24.79	1.20E-02	0.815
11-Jun-04	0406110000.tlm	Ambient test, after compensation caps increased	21	21	27	18.3			20	6/10/2004	0													950	-0.08	0.3877	4.64E-05	41.75	26.08	1.14E-02	0.988
											1														-0.05	0.3833	6.52E-05	40.60	25.95	6.69E-03	0.901
											2														-0.08	0.3904	6.96E-05	38.24	24.10	7.90E-04	0.960
											3														-0.06	0.3933	5.45E-05	35.36	23.69	1.59E-02	0.969
14-Jun-04	0406140839.tlm	Tvac#2 Hot #6	-26	41	33.6	18	0.38 / 0.38	0.38 / 0.38	20	6/10/2004	0	8	0.03	0.3843	1.37E-04	13.5076	0.812	-0.01	0.3890	4.80E-05	48.06	29.65	0.887	1370	-0.01	0.3858	4.80E-05	44.29	27.25	9.51E-03	0.889
											1	7	0.06	0.3834	1.62E-04	12.8147	0.683	0.02	0.3843	1.02E-04	46.61	28.51	0.762		0.00	0.3858	7.51E-05	45.41	26.58	1.54E-02	0.771
											2	7	0.03	0.3842	1.61E-04	12.5141	0.738	-0.02	0.3916	4.79E-05	39.76	29.98	0.848		-0.02	0.3914	6.21E-05	37.76	23.98	2.95E-02	0.849
											3	8	0.01	0.3840	1.40E-04	13.2236	0.775	0.00	0.3948	6e-5 (F)	40.58	26.37	0.870		-0.01	0.3948	5.90E-05	37.81	24.21	1.73E-02	0.880
14-Jun-04	0406140839.tlm	Tvac #2 Cold #6	-99.3	-35.8	32.7	17.5	0.50 / 0.50	0.50 / 0.50	20	6/10/2004	0	7	0.02	0.3848	1.37E-04	13.3941	0.687	0.00	0.3912	9.70E-05	49.16	29.28	0.806	1080	-0.01	0.3920	7.41E-05	45.66	27.58	2.22E-02	0.793
											1	6	0.07	0.3830	1.64E-04	12.6424	0.554	0.00	0.3902	6e-5 (F)	46.48	28.42	0.654		0.00	0.3901	7.23E-05	43.49	26.87	2.01E-02	0.664
											2	6	0.04	0.3848	1.67E-04	12.3823	0.618	-0.03	0.3964	6e-5 (F)	40.55	26.37	0.734		-0.02	0.3965	9E-5 (F)	38.84	24.54	1.04E-02	0.748
											3	6	0.03	0.3840	1.49E-04	13.0719	0.662	-0.02	0.3996	6e-5 (F)	41.78	27.05	0.768		0.00	0.3984	9E-5 (F)	38.74	24.58	9.94E-03	0.777
15-Jun-04	0406140839.tlm	Tvac#2 Hot #7	-27.6	40.2	33.4	18	0.38 / 0.38	0.38 / 0.38	20	6/10/2004	0	8	0.03	0.3845	1.37E-04	13.5087	0.802	0.00	0.3866	5.24E-05	48.41	29.51	0.895	760	0.00	0.3861	7.33E-05	44.23	27.38	2.41E-02	0.894
											1	7	0.07	0.3834	1.62E-04	12.8177	0.678	0.00	0.3857	6e-5 (F)	46.15	28.22	0.773		0.00	0.3862	7.80E-05	43.32	26.12	2.09E-02	0.760
											2	7	0.04	0.3840	1.63E-04	12.5178	0.736	-0.02	0.3914	6e-5 (F)	40.29	25.70	0.851		-0.02	0.3910	6.12E-05	37.55	24.23	1.53E-02	0.834
											3	7	0.04	0.3840	1.48E-04	13.2345	0.781	-0.03	0.3954	6e-5 (F)	40.14	26.52	0.853		0.00	0.3948	6e-5 (F)	37.58	24.28	9.30E-03	0.881
15-Jun-04	0406150000.tlm, 0406150252.tlm	Tvac #2 Cold #7	-91	-34.5	29.6	18.5	0.50 / 0.50	0.38 / 0.50	20	6/10/2004	0	7	0.02	0.3839	1.37E-04	13.4193	0.709	0.00	0.3903	1.11E-04	46.58	29.10	0.807	1160	0.00	0.3913	6.27E-05	45.21	27.58	1.59E-02	0.810
											1	6	0.05	0.3832	1.61E-04	12.6940	0.566	0.02	0.3879	9.27E-05	47.36	28.54	0.673		0.00	0.3859	6.83E-05	44.15	26.86	2.68E-02	0.684
											2	6	0.02	0.3841	1.62E-04	12.4014	0.629	-0.04	0.3955	6e-5 (F)	40.75	26.47	0.753		-0.02	0.3950	6e-5 (F)	35.97	24.43	1.52E-02	0.760
											3	6	-0.08	0.3853	1.23e-4 (F)	13.0929	0.668	0.01	0.3971	1e-4 (F)	40.40	25.95	0.783		-0.02	0.3984	6e-5 (F)	35.84	24.40	1.09E-02	0.810
28-Jun-04	0406281204.tlm	Pre-vibration (on boom)	21.8	22.4	29.5	19	0.38 / 0.88	0.25 / 0.38	20	6/10/2004	0	8	-0.08	0.3844	1.22E-04	13.8478	0.849	-0.03	0.3887	5.30E-05	43.42	26.79	0.887	1470	-0.08	0.3859	3.25E-05	39.73	24.80	1.71E-02	0.884
											1	10	-0.06	0.3841	1.45E-04	13.2355	0.889	-0.07	0.3837	6e-5 (F)	42.16	26.32	0.889		-0.05	0.3831	7.10E-05	39.25	24.40	1.30E-02	0.888
											2	13 (!)	-0.03	0.3846	1.44E-04	12.8298	1.009	-0.03	0.3906	6e-5 (F)	37.30	23.74	0.936		-0.07	0.3908	5.85E-05	33.14	21.40	1.76E-02	0.908
											3	8	-0.06	0.3841	1.30E-04	13.6249	0.795	-0.03	0.3934	6e-5 (F)	35.91	23.02	0.847		-0.05	0.3928	5.06E-05	33.72	21.09	8.68E-03	0.862
29-Jun-04	0406291004.tlm	Post-vibration (on boom)	22.2	22.8	26.2	19.4	0.38 / TO	0 / 0.38	20	6/10/2004	0	9	-0.05	0.3845	1.31E-04	13.9035	0.886	-0.03	0.3865	6e-5 (F)	38.30	23.10	0.875	2090	-0.08	0.3857	5.95E-05	36.45	21.40	6.66E-03	0.888
											1	10	-0.08	0.3836	1.48E-04	13.2509	1.010	-0.05	0.3832	6e-5 (F)	36.75	22.08	0.876		-0.07	0.3836	5.95E-05	34.98	21.36	1.10E-02	0.876
											2	16 (!)	0.07	0.3833	1.48E-04	12.8038	1.225	-0.05	0.3909	6e-5 (F)	31.86	19.50	0.927		-0.08	0.3906	7.61E-05	29.52	18.30	1.12E-02	0.909
											3	8	-0.07	0.3847	1.31E-04	13.6668	0.808	-0.04	0.3930	6e-5 (F)	31.12	17.90	0.862		-0.08	0.3935	6e-5 (F)	28.91	17.50	6.56E-03	0.862
14-Sep-04	0409141837.tlm	Bech test after actuator repair	23.3	Ambient	27.5	19.8	0.38 / 0.38	0.25 / 0.38	20	8/5/2004	0	11	-0.05	0.3847	1.31E-04	13.8966	1.005	-0.05	0.3892	1.04E-04	40.72	24.65	0.979	1790	-0.08	0.3902	6.77E-05	37.43	22.59	1.73E-02	0.948
											1	9	-0.04	0.3837	1.52E-04	13.1918	0.892	-0.09	0.3853	6e-5 (F)	39.61	23.43	0.947		-0.09	0.3856	5.64E-05	36.33	21.47	1.24E-02	0.945
											2	8	-0.04	0.3838	1.52E-04	12.8059	0.797	-0.09	0.3917	6e-5 (F)	35.24	21.91	0.916		-0.09	0.3918	6.07E-05	32.64	19.84	9.18E-03	0.909
											3	10	-0.06	0.3840	1.33E-04	13.6664	0.830	-0.04	0.3952	6e-5 (F)	34.78	21.34	0.870		-0.04	0.3952	6e-5 (F)	31.95	19.67	1.16E-02	0.884
20-Sep-04	0409201225.tlm	Post-workmanship-vib CPT, in Tvac chamber, Ambient	20.3	21.7	32.7	18.7	0.38 / 0.50	0.38 / 0.50	20	8/5/2004	0	13	-0.02	0.3841	1.30E-04	13.6841	1.354	-0.01	0.3887	4.15E-05	38.93	24.85	1.314	600	-0.01	0.3808	5.27E-05	38.70	23.37	1.44E-02	1.291
											1	10	0.02	0.3837	1.55E-04	13.0251	0.981	-0.05	0.3853	6e-5 (F)	40.28	24.09	1.034		-0.04	0.3849	6.71E-05	37.42	22.22	2.05E-02	1.030
											2	8	0.03	0.3834	1.63E-04	12.5800	0.820	-0.03	0.3913	6e-5 (F)	35.95	22.23	0.967		-0.08	0.3904	9.33E-05	32.92	19.08	1.47E-02	0.911
											3	12	0.01	0.3833	1.44E-04	13.4806	1.212	-0.02	0.3949	6e-5 (F)	33.96	22.44	1.241		-0.01	0.3962	5.49E-05	32.37	20.77	1.87E-02	1.274
21-Sep-04	0409211057.tlm	Thermal Vac #3 cold	-91.3	-29.1	36.6	17.7	0.50 / 0.50	0.38 / 0.50	20	8/5/2004	0	9	0.01	0.3837	1.39E-04	13.4626	0.931	0.10	0.3923	6e-5 (F)	40.54	25.06	1.064	540	0.10	0.3916	6.78E-05	35.26	23.04	1.30E-02	1.064
											1	7	0.05	0.3837	1.64E-04	12.7514	0.675	0.08	0.3896	6e-5 (F)	40.68	24.31	0.784		0.08	0.3884	6.46E-05	37.96	22.77	3.04E-02	0.814
											2	6	0.03	0.3837	1.68E-04	12.4017	0.806	-0.02	0.3962	6e-5 (F)	38.23	22.84	0.736		-0.03	0.3962	6e-5 (F)	36.09	20.97	1.04E-02	0.730
											3	9	-0.02	0.3843	1.42E-04	13.2415	0.927	0.01	0.3999	6e-5 (F)	38.60	22.57	1.024		-0.01	0.4003	6e-5 (F)	35.60	21.06	8.75E-03	1.044
21-Sep-04	0409211057.tlm	Thermal Vac #3 cold, bias DAC=100	-91.3	-29.1	36.6	17.7			20	8/5/2004	0	8												660	-0.03	0.3843	6.02E-05	42.48	24.41	1.54E-02	0.915
											1	6													-0.01	0.3905	6e-5 (F)	42.12	23.38	4.55E-03	0.664
											2	6													-0.08	0.3907	6e-5 (F)	36.18	21.30	6.56E-03	0.736
											3	8													-0.04	0.4006	6e-5 (F)	36.48	21.54	2.05E-02	0.886
21-Sep-04	0409211057.tlm	Thermal Vac #3 HOT, bias DAC=100	-22.2	40.9	36.5	17.8	0.38 / 0.38	0.38 / 0.38	20	8/5/2004	0	9	0.02	0.3838	1.48E-04	12.7508	0.963	-0.04	0.3917	6e-5 (F)	45.45	26.80	1.036	540	-0.02	0.3903	1.05E-04	43.25	24.83	1.33E-02	1.039
											1	7	0.07	0.3853	1.70E-04	12.3629	0.677	-0.03	0.3873	6e-5 (F)	46.31	24.06	0.764		-0.01	0.3885	7.66E-05	42.20	23.42	1.40E-02	0.758
											2	7	0.05	0.3866	1.69E-04	12.3258	0.723	-0.07	0.3835	6e-5 (F)	38.66	23.05	0.806		-0.06	0.3913	6e-5 (F)	35.64	21.48	1.33E-02	0.829

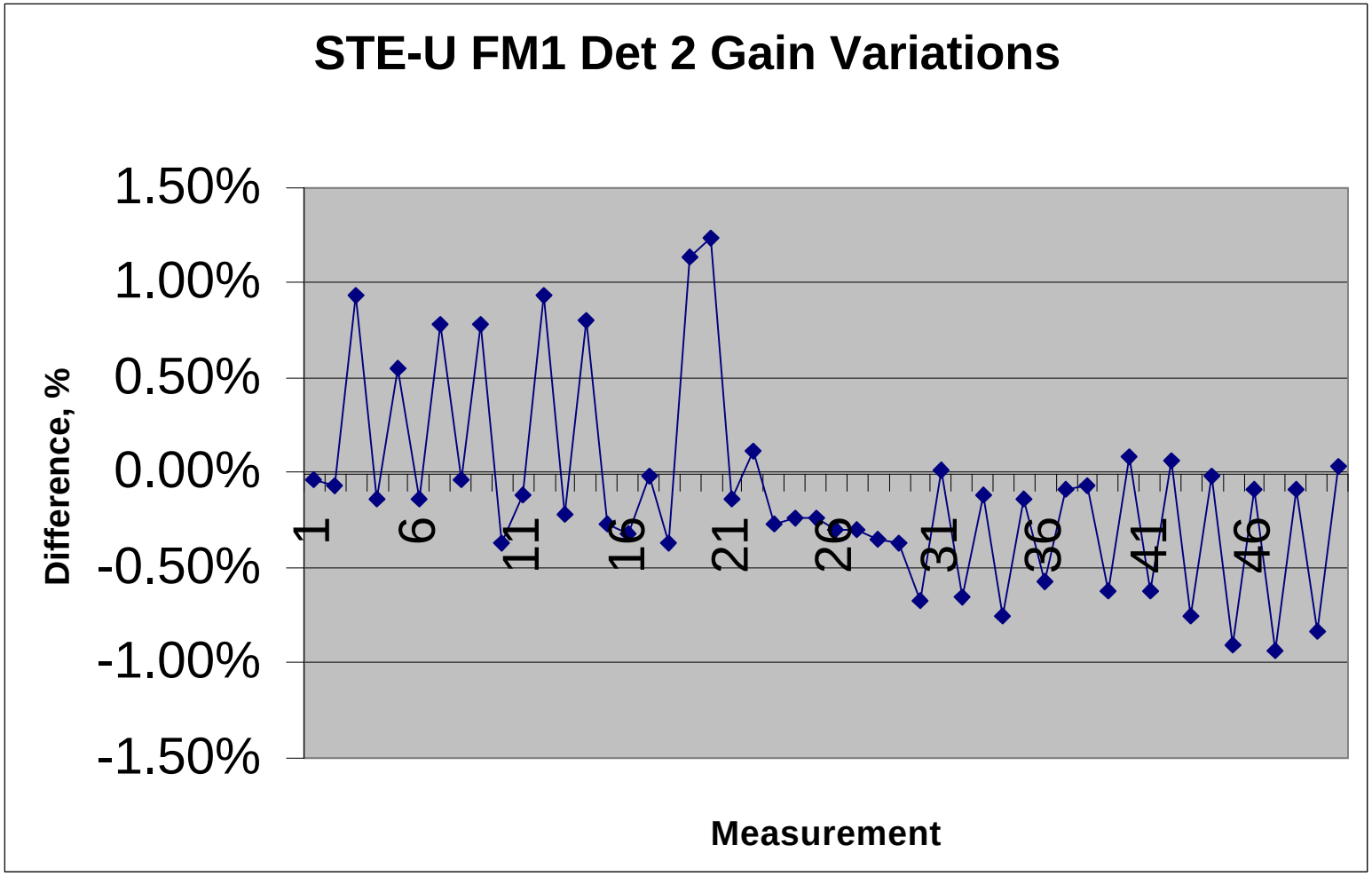
FM1 STE-U Trend Data, Continued

											3	9	0.03	0.3830	1.58E-04	12.6350	0.908	-0.05	0.3970	6e-5 (F)	39.12	24.40	0.960		-0.04	0.3973	6e-5 (F)	37.00	21.57	1.02E-02	1.008
21-Sep-04	0409211057.tlm	Thermal Vac #5 HOT, bias DAC=20 (default)	-22.2	40.9	36.5	17.8			20	8/5/2004	0													840	0.04	0.3908	5.74E-05	40.23	24.35	9.55E-03	1.155
											1														0.03	0.3853	6.59E-05	40.68	23.35	6.80E-03	0.906
											2														-0.03	0.3923	7.09E-05	35.65	21.30	1.48E-02	0.833
											3														-0.01	0.3955	7.15E-05	35.34	21.72	2.34E-02	1.182
1-Oct-04	0410011640.tlm	FM1 Boom I&T, less SWEA	21.9		29.9	18.9	0.38 / 0.38	0.35 / 0.38	20	10/15/2004	0	11	-0.05	0.3842	1.37E-04	13.0044	1.131	-0.14	0.3908	6e-5 (F)	41.88	23.02	1.096	600	-0.17	0.3928	8.50E-06	35.74	22.32	8.93E-03	1.082
											1	12	-0.04	0.3835	1.58E-04	12.5208	1.080	-0.14	0.3862	6e-5 (F)	40.51	24.15	1.030		-0.15	0.3884	5.06E-05	37.55	22.15	1.58E-02	1.028
											2	11	0.01	0.3836	1.63E-04	12.4726	0.885	-0.01	0.3917	6e-5 (F)	34.09	21.11	0.932		-0.09	0.3906	7.58E-05	32.78	19.55	1.50E-02	0.938
											3	9	-0.01	0.3843	1.47E-04	12.8914	0.889	-0.08	0.3954	6e-5 (F)	35.82	21.65	0.936		-0.09	0.3957	6e-5 (F)	33.32	19.65	1.28E-02	0.947
8-Oct-04	0410080933.tlm	FM1 Boom I&T, with SWEA (shield added)	22.6		35	17.4			20	10/15/2004	0							-0.11	0.3907	6e-5 (F)	41.34	23.58	1.003	1720	-0.11	0.3903	5.85E-05	38.92	22.67	1.36E-02	1.032
											1							-0.11	0.3852	6e-5 (F)	41.11	23.15	0.881		-0.01	0.3855	5.51E-05	38.52	21.70	1.85E-02	0.904
											2							-0.09	0.3908	6e-5 (F)	36.10	21.22	0.861		-0.08	0.3909	5.19E-05	32.62	19.85	7.42E-03	0.873
											3							-0.07	0.3952	6e-5 (F)	35.54	20.65	0.948		-0.07	0.3951	6e-5 (F)	33.55	19.35	1.22E-02	0.970
15-Oct-04	0410160000b.tlm	FM1 Suite I&T @ Caltech	22.5		30.7	18.1	0.38 / 0.38	0.35 / 0.38	70	10/15/2004	0	10	0.12	0.3819	1.80E-04	14.0286	1.300	-0.02	0.3886	6e-5 (F)	40.22	23.30	1.335	590	-0.04	0.3806	3.44E-05	37.61	22.93	9.71E-03	1.334
											1	9	-0.03	0.3833	1.47E-04	13.2510	1.178	-0.07	0.3851	6e-5 (F)	40.96	23.60	1.197		-0.05	0.3847	6e-5 (F)	38.84	22.05	8.87E-03	1.194
											2	9	-0.02	0.3836	1.51E-04	12.8967	0.988	-0.05	0.3903	6e-5 (F)	34.24	21.20	1.041		-0.07	0.3909	5.81E-05	32.47	19.98	1.13E-02	1.043
											3	9	-0.02	0.3834	1.37E-04	13.6938	1.117	-0.05	0.3944	6e-5 (F)	34.44	22.05	1.206		-0.04	0.3941	5.68E-05	32.92	19.92	1.94E-03	1.190
3-Nov-04	0411031353.tlm	FM1 boom suite post-EMC at UCB	22.5		30.5	19	0.38 / 0.38	0.35 / 0.38	20	10/15/2004	0	8	-0.07	0.3845	1.23E-04	13.8364	0.849	-0.03	0.3901	6e-5 (F)	40.76	22.23	0.947	970	-0.06	0.3904	5.60E-05	37.61	21.62	7.60E-03	0.927
											1	9	-0.04	0.3845	1.45E-04	13.1723	0.834	-0.05	0.3846	6e-5 (F)	39.50	22.91	0.910		-0.07	0.3850	5.57E-05	37.24	20.90	7.58E-03	0.900
											2	8	-0.02	0.3843	1.50E-04	12.8343	0.788	-0.07	0.3906	6e-5 (F)	35.63	20.71	0.923		-0.08	0.3907	6.19E-05	32.42	19.48	1.58E-02	0.880
											3	8	-0.04	0.3842	1.30E-04	13.6233	0.777	-0.05	0.3945	6e-5 (F)	34.33	20.08	0.904		-0.05	0.3948	6e-5 (F)	32.53	19.24	7.10E-03	0.881
3-Nov-04	0411031353.tlm	FM1 boom suite post-EMC at UCB	22.5		30.5	19			50	10/15/2004	0													22650	-0.11	0.3903	4.88E-05	38.87	21.72	1.35E-02	0.901
											1														-0.10	0.3853	5.96E-05	37.61	21.15	1.28E-02	0.891
											2														-0.09	0.3907	6.25E-05	32.25	19.05	1.17E-02	0.885
											3														-0.08	0.3951	5.93E-05	32.97	19.06	1.14E-02	0.850
17-Nov-04	0411171048.tlm	FM1 IDPU pre vib CPT (with FM1 boom, STE-U; no SWEA)	22		27.8	19.2	0.38 / 0.50	0.35 / 0.50		10/15/2004	0	9	-0.01	0.3840	1.44E-04	13.9820	0.865	-0.04	0.3888	6e-5 (F)	39.82	22.05	0.954	870	-0.06	0.3900	4.05E-05	37.08	21.00	1.11E-02	0.940
											1	9	-0.09	0.3841	1.41E-04	13.2381	0.943	-0.05	0.3848	6e-5 (F)	39.00	21.51	0.894		-0.06	0.3844	8.02E-05	38.24	20.36	1.16E-02	0.919
											2	9	-0.06	0.3840	1.44E-04	12.8826	0.890	-0.07	0.3906	6e-5 (F)	33.16	20.12	0.899		-0.05	0.3905	7.50E-05	32.06	18.48	1.45E-02	0.880
											3	8	-0.05	0.3845	1.31E-04	13.7259	0.850	-0.07	0.3953	6e-5 (F)	33.49	20.09	0.868		-0.05	0.3950	6e-5 (F)	31.48	18.09	1.28E-02	0.891
18-Nov-04	0411181804.tlm	FM1 IDPU post vib CPT (with FM1 boom, STE-U; no SWEA)	22		27.4	19	0.38 / 0.38	0.35 / 0.50		12/6/2004	0	8	-0.02	0.3847	1.32E-04	13.9591	0.820	-0.04	0.3891	6e-5 (F)	41.24	21.98	0.953	660	-0.03	0.3879	1.11E-04	37.17	21.20	3.91E-03	0.928
											1	9	-0.03	0.3841	1.48E-04	13.2394	0.844	-0.05	0.3849	6e-5 (F)	40.18	21.74	0.930		-0.07	0.3855	3.82E-05	38.01	20.17	3.80E-03	0.913
											2	8	-0.02	0.3837	1.48E-04	12.8552	0.797	-0.09	0.3906	6e-5 (F)	33.41	19.87	0.877		-0.07	0.3904	7.66E-05	32.26	18.44	1.09E-02	0.888
											3	8	-0.04	0.3842	1.31E-04	13.6208	0.794	-0.04	0.3946	6e-5 (F)	33.18	20.40	0.902		-0.04	0.3947	6e-5 (F)	31.83	18.38	7.28E-03	0.894
22-Nov-04	0411221340.tlm	FM1 IDPU Tvac Hot #2	25.2		54.9	16	0.38 / 0.38	0.25 / 0.38		12/6/2004	0	9	-0.04	0.3830	1.37E-04	13.5813	0.888	-0.11	0.3886	6e-5 (F)	36.21	20.51	1.071	630	-0.11	0.3902	3.89E-05	33.13	19.17	1.19E-02	1.083
											1	9	-0.06	0.3833	1.56E-04	12.9280	0.892	-0.10	0.3846	6e-5 (F)	35.51	20.33	1.046		-0.17	0.3849	3.73E-05	32.70	18.83	8.87E-03	1.000
											2	10	-0.01	0.3834	1.63E-04	12.5943	0.870	-0.11	0.3882	6e-5 (F)	32.13	18.34	0.953		-0.11	0.3882	5.99E-05	29.40	17.08	4.81E-03	0.949
											3	8	-0.01	0.3837	1.45E-04	13.2839	0.875	-0.05	0.3944	6e-5 (F)	31.27	18.49	0.961		-0.06	0.3944	6e-5 (F)	29.22	17.10	7.93E-03	0.964
22-Nov-04	0411221340.tlm	FM1 IDPU Tvac Cold #2	31.4		-33.3	24.3	0.38 / 0.38	0.25 / 0.38		12/6/2004	0	10	-0.20	0.3858	9.62E-05	13.8488	0.982	-0.16	0.3879	6e-5 (F)	35.74	20.37	1.049	610	-0.14	0.3873	7.35E-05	32.97	19.52	9.41E-03	1.053
											1	11	-0.19	0.3854	1.27E-04	13.1337	0.986	-0.18	0.3845	6e-5 (F)	34.34	20.41	1.034		-0.17	0.3843	5.85E-05	32.48	18.55	1.81E-02	1.014
											2	9	-0.18	0.3854	1.27E-04	12.6973	0.850	-0.16	0.3913	6e-5 (F)	31.00	18.05	0.924		-0.18	0.3919	6e-5 (F)	28.89	17.04	2.28E-03	0.928
											3	9	-0.17	0.3862	1.08E-04	13.6374	0.850	-0.15	0.3935	6e-5 (F)	31.07	17.98	0.960		-0.15	0.3930	6.79E-05	28.56	16.78	1.18E-02	0.951
29-Nov-04	0411290000.tlm	FM1 IDPU Tvac Hot #3	19		64.2	12	0.38 / 0.50	0.35 / 0.38		12/6/2004	0	9	0.00	0.3839	1.43E-04	13.5300	0.914	-0.05	0.3887	6e-5 (F)	38.26	21.78	0.964	630	-0.04	0.3886	5.04E-05	38.30	20.49	6.41E-03	0.997
											1	9	0.01	0.3835	1.64E-04	12.9117	0.911	-0.08	0.3833	6e-5 (F)	39.05	22.31	0.954		-0.08	0.3833	6.80E-05	35.29	19.88	1.24E-02	0.939
											2	8	0.04	0.3835	1.70E-04	12.5880	0.820	-0.06	0.3880	6e-5 (F)	33.44	20.22	0.890		-0.07	0.3893	4.45E-05	31.03	18.15	7.60E-03	0.898
											3	8	0.02	0.3834	1.53E-04	13.3188	0.862	-0.02	0.3941	6e-5 (F)	33.29	18.98	0.915		-0.01	0.3956	7.74E-05	30.94	18.05	1.47E-02	0.930
29-Nov-04	0411290000.tlm	FM1 IDPU Tvac Cold #3	25.9		-27.9	26	0.38 / 0.38	0.25 / 0.38		12/6/2004	0	11	-0.19	0.3850	9.88E-05	13.8398	1.155	-0.13	0.3879	6e-5 (F)	38.16	21.45	0.977	750	-0.12	0.3873	6e-5 (F)	35.70	20.33	3.00E-03	0.968
											1	12	-0.17	0.3846	1.30E-04	13.1012	1.319	-0.15	0.3846	6e-5 (F)	38.03	21.63	0.957		-0.13	0.3842	6e-5 (F)	35.63	19.33	4.40E-03	0.938
											2	13	-0.16	0.3852	1.31E-04	12.6980	1.003	-0.18	0.3922	6e-5 (F)	32.47	19.12	0.897		-0.15	0.3914	6.72E-05	30.56	17.80	1.63E-02	0.902
											3	10	-0.18	0.3858	1.07E-04	13.5958	1.214	-0.13	0.3932	6e-5 (F)	32.52	19.95	0.916		-0.13	0.3934	6e-5 (F)	30.75	17.82	7.17E-03	0.916
30-Nov-04	0411300000.tlm	FM1 IDPU Tvac Hot #4	23		64.7	14.3	0.38 / 0.38	0.25 / 0.38		12/6/2004	0	9	-0.02	0.3835	1.37E-04	13.5270	0.892	-0.05	0.3893	6e-5 (F)	37.89	21.64	0.962	1750	-0.05	0.3890	6.53E-05	38.34	20.58	1.08E-02	0.974
											1	9	-0.01	0.3837	1.60E-04	12.9167	0.895	-0.07	0.3834	6e-5 (F)	38.43	21.78	0.963		-0.08	0.3833	6.94E-05	35.37	19.85	8.69E-03	0.942
											2	8	0.03	0.3834	1.68E-04	12.5836	0.820	-0.09	0.3890	6e-5 (F)	33.34	19.23	0.891		-0.07	0.3859	6.03E-05	30.80	17.90	8.73E-03	0.889
											3	8	0.03	0.3835	1.53E-04	13.3323	0.822	-0.01	0.3938	6e-5 (F)	33.98	18.90	0.928		-0.02	0.3943	5.42E-05	30.98	17.98	8.63E-03	0.911
30-Nov-04	0411300000.tlm	FM1 IDPU Tvac Cold #4	26.6		-20.7	25.1	0.38 / 0.38	0.25 / 0.38		12/6/2004	0	10	-0.17	0.3855	1.02E-04	13.8072	0.997	-0.13	0.3879	6e-5 (F)	36.89	21.23	0.960	1400	-0.12	0.3878	5.62E-05	34.84	19.98	1.48E-02	0.999
											1	11	-0.16	0.3852	1.27E-04	13.0863	1.025	-0.12	0.3841	6e-5 (F)	37.73	20.88	0.950		-0.13	0.3840	7.54E-05	34.50	19.49	9.95E-03	0.966
											2	12	-0.14	0.3855	1.31E-04	12.6980	0.875	-0.13	0.3910	6e-5 (F)	33.01	19.10	0.917		-0.14	0.3913	6.44E-05	30.29	17.35	1.51E-02	0.907
											3	9	-0.15	0.3855	1.12E-04	13.5794	0.850	-0.12	0.3935	6e-5 (F)	32.80	19.47	0.932		-0.12	0.3933	6e-5 (F)	30.40	17.43	1.11E-02	0.919
1-Dec-04	0412010000.tlm	FM1 IDPU Tvac Hot #5	24.3		65	14.3	0.38 / 0.38	0.25 / 0.38		12/6/2004	0	9	-0.03	0.3842	1.40E-04	13.5712	1.012	-0.08	0.3892	6e-5 (F)	38.99	22.24	0.981	610	-0.07	0.3898	5.29E-05	38.14	20.22	6.83E-03	0.993
											1	9	-0.06	0.3834	1.59E-04	12.9229	1.123	-0.09	0.3834	6e-5 (F)	40.53	20.95	0.969		-0.09	0.3835	6.62E-05	34.95	19.72	1.22E-02	0.960
											2	9	0.01	0.3837	1.64E-04	12.5902	0.913	-0.07	0.3888	6e-5 (F)	33.73	18.51	0.910		-0.08	0.3896	3.65E-05	30.50	17.41	6.14E-03	0.907
											3	8	-0.02	0.3840	1.48E-04	13.2490	0.859	-0.02	0.3943	6e-5 (F)	32.05	19.81	0.921		-0.02	0.3942	6e-5 (F)	31.09	17.88	8.80E-03	0.907
1-Dec-04	0412010000.tlm	FM1 IDPU Tvac Cold #5	28.5		-13	24	0.38 / 0.38	0.25 / 0.38		12/6/2004	0	11	-0.14	0.3856	1.08E-04	13.8034	1.024	-0.12	0.3884	6e-5 (F)	37.06	21.24	0.996	1670	-0.11	0.3880	4.71E-05	35.04	19.35	1.02E-02	1.008
											1	11	-0.14	0.3843	1.34E-04	13.0594	1.074	-0.14	0.3848	6e-5 (F)	36.93	21.10	0.968		-0.13	0.3844	6.14E-05	34.68	19.45	1.12E-02	0.970
											2	10	-0.13	0.3858	1.33E-04	12.6923	0.895	-0.13	0.3913	6e-5 (F)	33.52	18.70	0.921		-0.14	0.3915	5.56E-05	30.44	17.63	1.53E-02	0.915
											3	9	-0.16	0.3853	1.12E-04	13.5502	0.893	-0.12	0.3937	6e-5 (F)	31.99	19.58	0.915		-0.11	0.3933	6e-5 (F)	30.04	17.48	4.52E-03	0.924
17-Dec-04	0412171330.tlm	FM1 IDPU Post-workmanship vib CPT	19.1		24.4	20.3	0.38 / 0.50	0.35 / 0.38	150	12/6/2004	0	8	-0.04	0.3844	1.38E-04	12.7705	0.823	-0.12	0.3902	6e-5 (F)	42.57	22.58	0.999	1540	-0.11	0.3906	4.88E-05	35.14	20.84	1.15E-02	0.918
											1	11	-0.01	0.3854	1.60E-04	12.3499	1.054	-0.12	0.3859	6e-5 (F)	40.41	21.88	1.086		-0.11	0.3856	6.41E-05	38.85	20.28	7.33E-03	1.080
											2	10	-0.01	0.3858	1.58E-04	12.3219	0.974	-0.10	0.3911	6e-5 (F)	31.52	18.71	1.051		-0.10	0.3916	5.08E-05	31.29	18.12	8.54E-03	1.032
											3	8	No fit					-0.07	0.3948	6e-5 (F)	35.37	20.17	0.866		-0.09	0.3953	6e-5 (F)	32.42	18.27	9.08E-03	0.858
20-Dec-04	0412201428.tlm	FM1 IDPU Tvac Hot #6	18		58.2	16	0.50 / 0.50	0.35 / 0.38	150	12/6/2004	0	10	0.02	0.3840	1.52E-04	12.6843	0.848	-0.07	0.3902	6e-5 (F)	42.11	21.33	0.943	820	-0.08	0.3909	4.09E-05	38.64	20.62	1.11E-02	0.946
											1	10	0.04	0.3860	1.71E-04	12.3036	1.034	-0.05	0.3846	6e-5 (F)	40.78	22.04	1.057		-0.08	0.3836	7.61E-05	37.47	20.08	1.30E-02	1.066
											2	9	0.06	0.3868	1.75E-04	12.3155	0.970	-0.04	0.3891	6e-5 (F)	34.37	18.90	1.031		-0.05	0.3894	6.42E-06	31.90	18.38	1.16E-02	1.028
											3	8	0.05	0.3843	1.61E-04	12.5775	0.780	-0.04	0.3851	6e-5 (F)	35.17	19.74	0.867		-0.04	0.3953	6e-5 (F)	33.16	18.17	8.87E-03	0.871
20-Dec-04	0412201428.tlm	FM1 IDPU Tvac Cold #6	17		-15.9	24.7	0.38 / 0.50	0.35 / 0.38	150	12/6/2004	0	8	-0.11	0.3857	1.18E-04	12.8987	0.799	-0.14	0.3896	6e-5 (F)	41.10	21.01	0.875	1710	-0.14	0.3894	5.29E-05	38.59	20.61	9.38E-03	0.881
											1	10	-0.08	0.3848	1.43E-04	12.3784	0.948	-0.14	0.3858	6e-5 (F)	41.04	22.13	0.997		-0.12	0.3852	7.65E-05	37.76	20.08	1.18E-02	0.939
											2	10	-0.09	0.3863	1.39E-04	12.3242	0.904	-0.15	0.3928	6e-5 (F)	35.30	19.70	0.964		-0.13	0.3922	6e-5 (F)	31.90	18.02	9.50E-03	0.924
											3	8	-0.11	0.3858	1.24E-04	12.7574	0.751	-0.12	0.3948	6e-5 (F)	34.99	20.30	0.843		-0.13	0.3951	5.13E-05	33.00	18.43	1.15E-02	0.844
21-Dec-04	0412210000.tlm	FM1 IDPU Tvac Hot #7	15.2		69.6	13.4	0.50 / 0.50	0.35 / 0.50	150	12/6/2004	0	9	0.03	0.3834	1.55E-04	12.6414	0.839	-0.05	0.3901	6e-5 (F)	42.85	22.10	0.930	1610	-0.08	0.3907	3.96E-05	38.80	21.02	1.09E-02	0.934
											1	9	0.07	0.3859	1.79E-04	12.2034	0.830	-0.08	0.3840	6e-5 (F)	41.06	21.94	0.912		-0.07	0.3841	6.04E-05	37.85	20.33	1.18E-02	0.901
											2	8	0.09	0.3912	1.82E-04	12.4604	0.783	-0.08	0.3880	6e-5 (F)	35.07	19.29	0.878		-0.04	0.3894	5.24E-05	31.88	18.28	1.42E-02	0.883
											3	8	0.07	0.3835	1.68E-04	12.5423	0.757	-0.02	0.3951	6e-5 (F)	35.93	19.71	0.855		-0.02	0.3951	6e-5 (F)	32.67	18.44	1.20E-02	0.857
21-Dec-04	0412210000.tlm	FM1 IDPU Tvac Cold #7	18.7		-7.5	23.1	0.38 / 0.50	0.35 / 0.38	150	12/6/2004	0	8	-0.12	0.3851	1.20E-04	12.8650	0.793	-0.13	0.3890	6e-5 (F)	41.45	22.17	0.877	1550	-0.14	0.3898	4.22E-05	38.24	20.51	1.20E-02	0.879
											1	9	-0.07	0.3847	1.48E-04	12.3737	0.785	-0.13	0.3856	6e-5 (F)	39.83	21.36	0.883		-0.13	0.3859	5.22E-05	37.52	20.04	1.01E-02	0.885
											2	8	-0.08	0.3863	1.43E-04	12.3280	0.755	-0.13	0.3922	6e-5 (F)	34.00	19.41	0.850		-0.12	0.3921	6e-5 (F)	31.70	17.90	1.15E-02	0.854
											3	8	-0.11	0.3857	1.29E-04	12.7581	0.760	-0.14	0.3950	6e-5 (F)	35.62	20.41	0.865		-0.12	0.3946	6e-5 (F)	32.48	18.16	1.22E-02	0.848
24-Jan-05	0501240958.tlm	FM1 IDPU Tvac #2 Hot #1	15.7		61.1	12.6	0.50 / 0.50	0.35 / 0.38	20	12/6/2004	0	9	0.02	0.3840	1.53E-04	12.6792	0.883	-0.08	0.3898	6e-5 (F)	41.17	21.35	0.959	1230	-0.08	0.3909	5.80E-05	38.28	19.92	1.41E-02	0.958
											1	8	0.06	0.3858	1.78E-04	12.3359	0.828	-0.08	0.3843	6e-5 (F)	40.02	20.38	0.887		-0.07	0.3836	7.10E-05	37.11	19.08	1.60E-02	0.887
											2	8	0.07	0.3930	1.79E-04	12.5464	0.808	-0.04	0.3896	6e-5 (F)	33.75	18.08	0.875		-0.04	0.3889	6.66E-05	31.53	17.02	7.23E-03	0.869
											3	8	0.07	0.3830	1.67E-04	12.5442	0.792	-0.04	0.3950	6e-5 (F)	34.69	18.68	0.861		-0.04	0.3950	6e-5 (F)	32.31	17.33	8.45E-03	0.883
24-Jan-05	0501240958.tlm	FM1 IDPU Tvac #2 Cold #1	19.6		-14.2	24	0.50 / 0.50	0.35 / 0.38	150	12/6/2004	0	9	-0.11	0.3856	1.10E-04	12.8998	0.836	-0.15	0.3890	6e-5 (F)	39.65	21.75	0.905	1390	-0.15	0.3890	5.77E-05	37.53	19.52	7.70E-03	0.909
											1	9	-0.08	0.3848	1.47E-04	12.3789	0.828	-0.15	0.3855	6e-5 (F)	40.45	20.68	0.874		-0.14	0.3858	5.14E-05	38.61	19.07	1.38E-02	0.886
											2	8	-0.08	0.3861	1.43E-04	12.3298	0.776	-0.12	0.3917	6e-5 (F)	33.21	17.70	0.861		-0.13	0.3918	6.24E-05	30.95	16.80	8.72E-03	0.852

FM1 STE-U Trending Data, Continued

										3	8	-0.10	0.3858	1.29E-04	12.7604	0.769	-0.14	0.3947 6e-5 (F)	33.85	18.59	0.845		-0.13	0.3944	6e-5 (F)	32.08	17.17	1.15E-02	0.865
25-Jan-05	05012500 00.tlm	FM1 IDPU Tvac #2 Hot #2	17.1	69.9	13.7	0.38 / 0.62	0.35 / 0.38	150	12/6/2004	0	9	0.02	0.3835	1.58E-04	12.6439	0.882	-0.05	0.3897 6e-5 (F)	39.63	20.41	0.968	1380	-0.07	0.3901	4.98E-05	37.59	19.67	1.13E-02	0.958
										1	9	0.03	0.3804	1.74E-04	12.3267	0.850	-0.07	0.3837 6e-5 (F)	39.61	21.37	0.893		-0.08	0.3839	5.80E-05	38.72	19.08	1.40E-02	0.899
										2	8	0.05	0.3946	1.76E-04	12.5445	0.818	-0.06	0.3888 6e-5 (F)	33.47	18.86	0.859		-0.04	0.3883	7.62E-05	30.98	17.11	9.24E-03	0.867
										3	8	0.05	0.3835	1.68E-04	12.5408	0.799	-0.05	0.3951 6e-5 (F)	34.78	19.02	0.913		-0.03	0.3950	6e-5 (F)	32.39	17.35	1.23E-02	0.900
25-Jan-05	05012500 00.tlm	FM1 IDPU Tvac #2 Cold #2	18.6	-6.6	23	0.38 / 0.50	0.35 / 0.38	20	12/6/2004	0	10	-0.11	0.3853	1.09E-04	13.7576	1.004	-0.04	0.3878 6e-5 (F)	38.61	21.33	1.115	4080	-0.06	0.3878	6.21E-05	38.13	19.41	1.34E-02	1.083
										1	10	-0.07	0.3846	1.37E-04	13.0487	0.956	-0.08	0.3851 6e-5 (F)	37.99	20.53	1.035		-0.06	0.3846	6.79E-05	35.56	19.07	1.38E-02	1.023
										2	9	-0.08	0.3848	1.38E-04	12.6508	0.795	-0.10	0.3913 6e-5 (F)	32.54	18.14	0.899		-0.10	0.3915	6.57E-05	30.74	16.96	1.24E-02	0.882
										3	9	-0.08	0.3851	1.20E-04	13.5046	0.828	-0.09	0.3942 6e-5 (F)	33.44	18.52	0.967		-0.08	0.3939	6.96E-05	31.22	17.28	1.22E-02	0.932
26-Jan-05	05012600 00.tlm	FM1 IDPU Tvac #2 Hot #3	16.2	70.8	13.8	0.38 / 0.62	0.35 / 0.38	20	12/6/2004	0	10	0.03	0.3835	1.44E-04	13.5307	0.998	0.05	0.3887 6e-5 (F)	39.07	21.45	1.075	2030	0.04	0.3884	6.94E-05	38.08	19.61	7.17E-03	1.073
										1	10	0.04	0.3828	1.63E-04	12.8897	0.958	-0.05	0.3836 6e-5 (F)	39.06	21.15	1.025		0.01	0.3824	7.82E-05	35.47	19.09	1.13E-02	1.021
										2	8	0.05	0.3829	1.70E-04	12.5463	0.816	-0.02	0.3887 6e-5 (F)	33.80	18.15	0.896		-0.01	0.3882	7.64E-05	30.87	17.09	8.21E-03	0.869
										3	8	0.04	0.3841	1.53E-04	13.3129	0.835	0.04	0.3908 6e-5 (F)	33.35	19.12	0.933		0.03	0.3956	5.40E-05	31.26	17.40	1.08E-02	0.939
26-Jan-05	05012600 00.tlm	FM1 IDPU Tvac #2 Cold #3	15	-10.4	23.5	0.50 / 0.50	0.35 / 0.38	20	12/6/2004	0	10	-0.11	0.3851	1.11E-04	13.7675	0.988	-0.07	0.3886 6e-5 (F)	38.16	21.25	1.064	870	-0.05	0.3875	7.39E-05	35.92	19.42	1.30E-02	1.057
										1	10	-0.07	0.3846	1.38E-04	13.0536	0.950	-0.13	0.3884 6e-5 (F)	38.33	19.48	0.967		-0.07	0.3844	6e-5 (F)	35.58	18.91	4.40E-03	1.008
										2	8	-0.08	0.3847	1.38E-04	12.6542	0.800	-0.09	0.3906 6e-5 (F)	32.88	18.71	0.863		-0.10	0.3915	6.64E-05	30.58	17.09	1.33E-02	0.860
										3	9	-0.10	0.3857	1.16E-04	13.5374	0.829	-0.07	0.3920 6e-5 (F)	33.68	18.91	0.925		-0.09	0.3942	6e-5 (F)	31.27	17.38	1.35E-02	0.920
29-Jan-05	05012900 00.tlm	FM1 IDPU Tvac #2 Hot #4	13.9	71.4	13.6	0.50 / 0.50	0.35 / 0.50	150	12/6/2004	0	9	0.04	0.3832	1.60E-04	12.6459	0.861	-0.04	0.3896 6e-5 (F)	40.66	21.14	0.941	37350	-0.05	0.3806	5.53E-05	37.99	19.60	1.34E-02	0.942
										1	8	0.07	0.3858	1.82E-04	12.2318	0.817	-0.06	0.3836 6e-5 (F)	40.08	21.35	0.875		-0.06	0.3836	6.39E-05	37.11	19.15	1.15E-02	0.882
										2	8	0.08	0.3808	1.82E-04	12.3064	0.785	-0.03	0.3889 6e-5 (F)	33.43	17.74	0.849		-0.04	0.3886	6.69E-05	31.52	17.20	1.08E-02	0.865
										3	8	0.07	0.3832	1.70E-04	12.5327	0.783	-0.02	0.3951 6e-5 (F)	34.79	18.57	0.885		-0.02	0.3947	6.78E-05	32.35	17.39	1.16E-02	0.882
31-Jan-05	05013100 00.tlm	FM1 IDPU Tvac #2 Cold #4	19.6	-22.5	25.2	0.50 / 0.50	0.35 / 0.38	150	12/6/2004	0	9	-0.14	0.3858	1.15E-04	12.9040	0.831	-0.16	0.3888 6e-5 (F)	39.87	20.29	0.898	1720	-0.16	0.3882	4.73E-05	37.24	19.22	9.44E-03	0.893
										1	10	-0.11	0.3847	1.42E-04	12.2799	0.828	-0.14	0.3855 6e-5 (F)	39.28	20.07	0.877		-0.15	0.3881	4.16E-05	36.40	18.67	8.31E-03	0.886
										2	9	-0.11	0.3862	1.39E-04	12.3245	0.776	-0.16	0.3926 6e-5 (F)	32.05	18.28	0.851		-0.14	0.3920	6.29E-05	30.79	16.83	9.43E-03	0.859
										3	9	-0.12	0.3858	1.22E-04	12.7651	0.757	-0.14	0.3945 6e-5 (F)	34.48	18.95	0.855		-0.14	0.3946	6e-5 (F)	31.67	16.84	1.14E-02	0.855
14-Feb-05	05021500 00.tlm	FM1 IDPU post-vib	22.2	31.5	18.5	0.38 / 0.50	0.35 / 0.38	20	12/6/2004	0	10	-0.13	0.3846	1.07E-04	13.8535	1.075	-0.04	0.3865 6e-5 (F)	38.12	19.86	1.079	1520	-0.04	0.3800	7.35E-05	34.70	18.50	1.24E-02	1.075
										1	11	-0.07	0.3841	1.43E-04	13.2908	1.129	-0.07	0.3849 6e-5 (F)	36.14	19.32	1.041		-0.05	0.3843	7.48E-05	34.66	18.23	1.27E-02	1.034
										2	9	-0.03	0.3839	1.50E-04	12.9068	0.906	-0.06	0.3913 6e-5 (F)	32.48	17.48	0.900		-0.05	0.3809	7.27E-05	30.00	16.20	5.57E-03	0.894
										3	9	-0.05	0.3845	1.32E-04	13.7427	0.912	-0.05	0.3944 6e-5 (F)	32.59	17.97	0.917		-0.03	0.3945	6.11E-05	30.18	16.60	1.04E-02	0.942

Sample Trend Plot



FM1 STE-U Trouble-Free Operating Hours

- **Since the last change (PFR1011, STE-U door failure)**
  - **Pre, Post-Vib CPT 5.3 Hours**
  - **Thermal Vac #3 22.0 Hours**
  - **Boom, Suite I&T 109.5 Hours**
  - **EMC 273.0 Hours**
  - **IDPU Thermal Vac #1 215.0 Hours**
  - **IDPU Thermal Vac #2 135.6 Hours**
  - **IDPU Post-vib CPT 2.4 Hours**
  - **Boom Suite I&T 177.4 Hours**

Total: 940.2 Hours

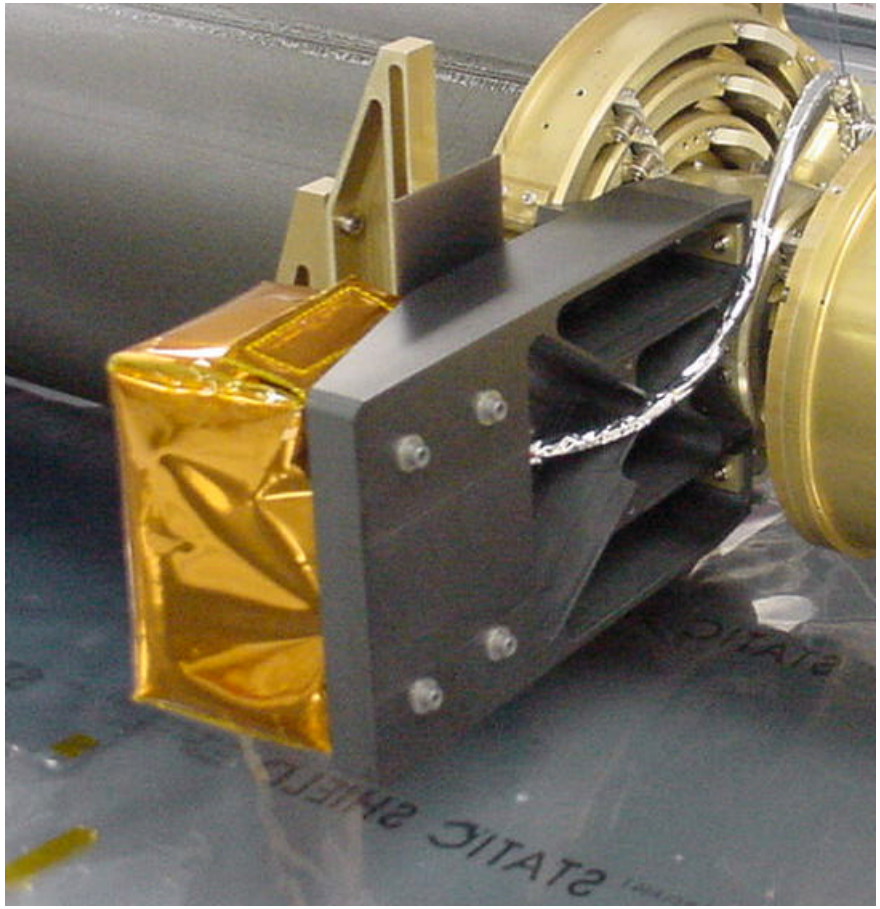
Quality Assurance

- IMPACT Suite QA Issues worked through Ron Jackson at UCB
  - UCB Independent Inspections by Jeremiah Tolbert,
  - Supported by GSFC QA
  - Signs off on work orders, inspections, parts & materials lists, etc.
- Parts Lists
  - All STE-U Parts Lists approved
  - Parts qualification, screening (including radiation) completed
- UCB Materials Lists Approved
- STE-U FM1 PFRs Closed
  - PFRs can be found at: http://sprg.ssl.berkeley.edu/impact/dwc/Problems/
- STE-U-related Waivers Closed
  - Except FM1 Suite EMC Test Results waiver
  - Waivers can be found at: http://sprg.ssl.berkeley.edu/impact/dwc/Waivers/
- Acceptance Data Package Prepared and reviewed

FM1 STE-U Outstanding Issues

- **IMPACT FM1 EMC Waiver not signed off**
  - **Official waiver should be into approval cycle shortly**

IMPACT FM1 MAG Sensor



FM1 MAG Test History

- **4/28/04 FM1 MAG Sensor and electronics delivered to UCB**
  - **Calibrated at GSFC using IDPU simulator GSE**
  - **FM1 MAG Electronics integrated into FM1 IDPU, goes through qualification testing with IDPU (see FM1 IDPU PSR)**
  - **FM1 MAG Sensor integrated with FM1 Boom, goes through qualification testing with Boom (see Boom part of this PSR)**

MAG Test Matrix

Verification Matrix for STEREO/IMPACT/MAG — Revision Date: 2005-3-27 — Revision Number: 3

Hardware Description		Test																
Level of Assembly	Item	Elect. test, rm. Temp	Bench Calibration	Elect. Test, hot	Elect. Test, cold	Vibration, Sinusoidal	Vibration, Random	Shock	Acoustics	Thermal Vacuum	Voltage margins	Thermal cycle	Thermal balance	>100 hours Operation	EMC/EMI	Magnetics	Bakeout	Contamination	Comments
C	Sensor, EM	C	C											C					
C	Sensor, F	C	C	C	C	C	C	C		C		C	C	C	C		C	C	Sensor thermal balance by heritage
C	Electronics, EM	C	C	C	C									C					
C	Electronics,F	C	C	C	C	C	C			C	C	C		C	C		C	C	

Legend:

Level of Assembly		Unit Type		X =	Test required
				A =	Analysis
C = Component		BB	Breadboard	H =	Test at higher level of assembly
I = Instrument		EM	Engineering Model		(Boom for sensor, IDPU for electronics)
		PT	Prototype	**C =**	**Test Completed**
		PF	Protoflight		
		F =	Flight		

Full IMPACT Verification Matrix at:
http://sprg.ssl.berkeley.edu/impact/dwc/Verification/IMPACTVerificationMatrix_2005-3-25.pdf

MAG Problem / Failures / Waivers

- **No MAG specific PFRs or Waivers**
  - **Pending FM1 Suite EMC waiver includes some MAG issues.**

Qualification Tests

- FM1 MAG Electronics tested with FM1 IDPU
  - See FM1 IDPU PSR package
- FM1 MAG Sensor tested with FM1 Boom
  - See Boom section of this PSR
- Trouble-Free Operating Hours (prior to delivery to APL)
  - Same as FM1 IDPU, 350 Hours
  - longer if you add hours accumulated prior to latest IDPU fix, which did not effect MAG sensor or electronics; ~1000 hours.

FM1 MAG Performance

- **FM1 MAG meets Performance Requirements as certified by MAG team prior to delivery**
- **FM1 MAG performance parameters tended through IDPU and Boom Qualification Tests – see next chart**
  - **No significant trends**

FM1 MAG Trending

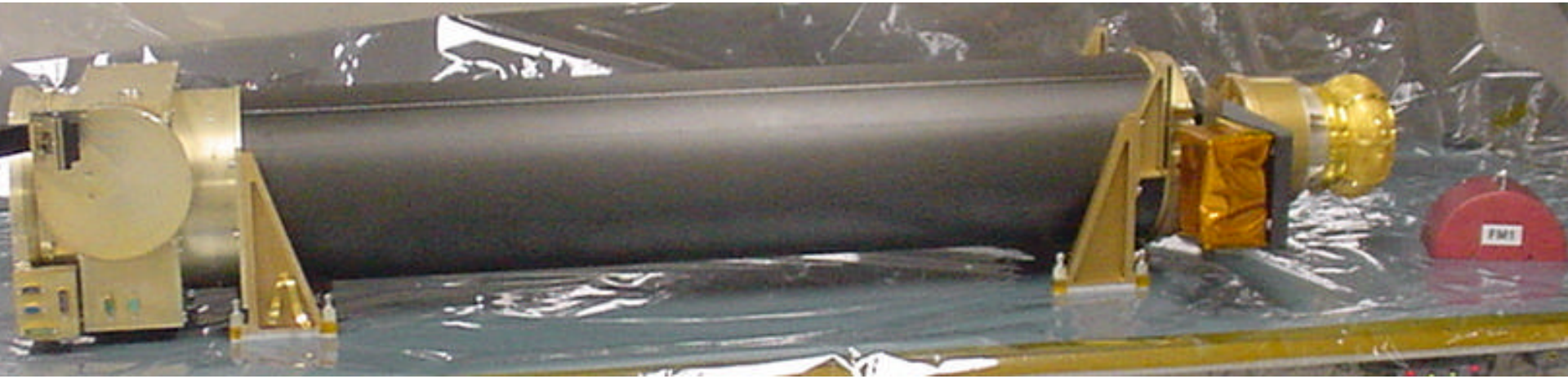
MAG FM1 Performance Trend

Date	File	Test	MAG Temp	IDPU Temp	Heater On HKP	RMSx	RMSy	RMSz	IFC Fit Rev	IFC X Sample Time	IFC X Amplitude	IFC X Rate	IFC Y Sample Time	IFC Y Amplitude	IFC Y Rate	IFC Z Sample Time	IFC Z Amplitude	IFC Z Rate
June 26 2004	0406261204.tlm	Pre-boom-vibration	26.4	29.5	7.2	6.0	3.0	10.0	7/9/2004	-23.9	8910	9.8	-23.5	8792	9.6	-21.2	9283	8.8
June 29 2004	0406291004.tlm	Post-boom-vibration	26.4	27	7.1	5.0	4.0	10.0	7/9/2004	-22.4	8940	9.1	-22.3	8796	9.2	-22.6	9279	9.4
July 6 2004	0407060000.tlm	Boom Tvac Hot #1	38.9	Ambient	6.97	1.5	1.0	1.0	7/9/2004	-22.0	8788	9.2	-21.9	8910	9.4	-21.1	9326	9.3
July 6 2004	0407061406.tlm	Boom Tvac Cold #1	-25.3	Ambient	44.6	1.9	1.2	1.0	7/9/2004	-22.0	8806	9.0	-22.0	8897	9.3	-21.8	9320	9.4
July 7 2004	0407070000.tlm	Boom Tvac Hot #2	38.1	Ambient	7	2.9	1.3	1.2	7/9/2004	-22.4	8787	9.2	-21.9	8911	9.3	-21.2	9325	9.2
July 7 2004	0407070000.tlm	Boom Tvac Cold #2	-27.7	Ambient	44.6	1.3	1.1	0.9	7/9/2004	-22.5	8804	9.1	-22.2	8899	9.3	-21.8	9321	9.3
July 8 2004	0407080000.tlm	Boom Tvac Hot #3	38.2	Ambient	7	2.2	1.1	1.0	7/9/2004	-21.1	8787	8.6	-21.9	8910	9.3	-22.0	9325	9.6
July 8 2004	0407080000.tlm	Boom Tvac Cold #3	-27.8	Ambient	44.3	1.1	0.7	0.9	7/9/2004	-22.5	8807	9.3	-22.0	8897	9.4	-21.8	9321	9.5
July 9 2004	0407090000.tlm	Boom Tvac Hot #4	38	Ambient	7	1.4	1.0	1.1	7/14/2004	-22.1	8789	9.1	-22.3	8911	9.5	-21.5	9326	9.3
July 9 2004	0407091512.tlm	Boom Tvac Cold #4	-20.4	Ambient	44.6	1.5	1.0	1.4	7/14/2004	-22.4	8807	9.1	-22.2	8896	9.2	-21.1	9323	8.9
July 12 2004	0407120000.tlm	Boom Tvac Hot #5	38.9	Ambient	7	1.8	1.0	1.1	7/14/2004	-22.0	8788	9.1	-21.7	8910	9.2	-21.7	9327	9.4
July 12 2004	0407121236.tlm	Boom Tvac Cold #5	-28	Ambient	44.6	1.7	1.0	1.0	7/14/2004	-22.3	8805	9.0	-22.4	8902	9.4	-21.9	9322	9.4
July 13 2004	0407130000.tlm	Boom Tvac Hot #6	38	Ambient	7	2.0	1.2	1.0	7/14/2004	-22.4	8788	9.3	-22.3	8911	9.5	-21.5	9328	9.4
July 13 2004	0407130000.tlm	Boom Tvac Cold #6	-29.6	Ambient	44.6	1.6	1.0	1.2	7/14/2004	-22.7	8804	9.2	-22.1	8896	9.2	-21.8	9319	9.3
July 14 2004	0407140000.tlm	Boom Tvac Hot #7	37.8	Ambient	7	4.0	2.0	1.2	7/14/2004	-22.3	8787	9.2	-22.1	8911	9.4	-20.4	9322	8.8
July 15 2004	0407150000.tlm	Boom Tvac Cold #7	-29	Ambient	44.6	1.3	1.2	1.1	7/14/2004	-22.5	8811	9.2	-22.1	8898	9.3	-21.9	9321	9.5
Oct 1 2004	0410011640.tlm	Boom I&T, less SWEA	22.6	Ambient	10.4	1.7	2.2	1.5	10/15/2004	-22.3	8903	9.1	-22.1	8799	9.1	-23.2	9271	9.9
Oct 16 2004	0410160000.tlm	Suite I&T, pre EMC	23.7	Ambient	10.3	5.6	1.6	37.5	10/15/2004	-22.4	8842	9.1	-22.0	8813	9.0	-21.8	9244	8.7
Nov 3 2004	0411031353.tlm	Post EMC @ UCB	24	Ambient	10.3	6.0	4.0	9.0	10/15/2004	-22.3	8905	9.0	-21.5	8799	8.8	-22.4	9283	9.4
Nov 17 2004	0411171046.tlm	Pre IDPU Vib	22.8	Ambient	10.4	8.4	3.4	12.8	10/15/2004	-22.2	8905	8.3	-22.0	8799	9.0	-22.0	9283	9.3
Nov 18 2004	0411181804.tlm	Post IDPU Vib	22.6	Ambient	10.4	8.0	3.0	7.0	12/6/2004	-22.4	8908	9.0	-21.9	8801	9.0	-22.2	9281	9.4
Nov 22 2004	0411221349.tlm	IDPU Tvac Hot 2	22.5	54.9	12.2	11.0	9.0	9.0	12/6/2004	-12.1	8892	4.9	-21.8	8778	9.3	-21.5	9372	9.5
Nov 22 2004	0411221349.tlm	IDPU Tvac Cold 2	20.8	-33.3	7.7	16.0	10.0	9.0	12/6/2004	-24.6	8922	11.2	-14.2	8778	6.1	-20.7	9361	9.6
Nov 29 2004	0411290000.tlm	IDPU Tvac Hot 3	18.7	64.2	19.5	15.0	9.0	9.0	12/6/2004	-21.9	8892	9.3	-26.6	8789	11.3	-25.2	9370	10.9
Nov 29 2004	0411290000.tlm	IDPU Tvac Cold 3	20.5	-27.9	8.3	11.0	11.0	8.0	12/6/2004	-20.9	8875	10.1	-22.8	8776	10.1	-22.8	9355	10.1
Nov 30 2004	0411300000.tlm	IDPU Tvac Hot 4	18.5	64.7	14	16.0	11.0	8.0	12/6/2004	-21.9	8883	9.5	-20.8	8801	8.5	-21.2	9387	9.0
Nov 30 2004	0411300000.tlm	IDPU Tvac Cold 4	19.8	-20.7	8.1	13.0	10.0	8.0	12/6/2004	-20.4	8894	9.2	-23.5	8783	10.8	-26.2	9365	12.5
Dec 1 2004	0412010000.tlm	IDPU Tvac Hot 5	19	65	13.6	12.0	8.0	10.0	12/6/2004	-22.4	8884	9.7	-22.0	8783	9.1	-23.1	9374	9.9
Dec 1 2004	0412010000.tlm	IDPU Tvac Cold 5	19.7	-13	8.6	16.0	10.0	8.0	12/6/2004	-20.2	8883	9.1	-21.8	8784	10.0	-23.8	9360	11.0
Dec 17 2004	0412171330.tlm	IDPU post-vib	20.2	24	10.9	1.3	1.3	1.3	12/6/2004	-20.4	8884	8.7	-22.1	8769	9.7	-22.1	9353	9.9
Dec 20 2004	0412201426.tlm	IDPU Tvac Hot 6	17.2	58.2	13.6	2.3	2.2	1.9	12/6/2004	-22.0	8891	9.3	-21.6	8772	9.2	-21.6	9357	9.5
Dec 20 2004	0412201426.tlm	IDPU Tvac Cold 6	17.4	-15.9	8.6	1.4	1.0	1.0	12/6/2004	-21.4	8878	9.6	-22.6	8769	10.3	-22.9	9347	10.7
Dec 21 2004	0412210000.tlm	IDPU Tvac Hot 7	17.2	69.6	11.5	1.4	1.5	1.0	12/6/2004	-21.7	8892	9.1	-21.7	8774	9.1	-21.7	9359	9.4
Dec 21 2004	0412210000.tlm	IDPU Tvac Cold 7	19.4	-7.5	9.1	1.3	2.2	1.4	12/6/2004	-22.9	8881	10.4	-21.7	8768	9.8	-21.5	9349	9.9
Jan 24 2005	0501240956.tlm	IDPU Tvac2 Hot 1	17.3	61.1	11.1	1.5	1.4	1.0	12/6/2004	-21.1	8884	8.8	-21.7	8770	9.2	-22.0	9360	9.5
Jan 24 2005	0501240956.tlm	IDPU Tvac2 Cold 1	19.5	-14.2	8.6	1.6	4.0	2.1	12/6/2004	-23.1	8874	10.5	-21.4	8762	9.6	-22.1	9348	10.3
Jan 25 2005	0501250000.tlm	IDPU Tvac2 Hot 2	20.7	69.9	14.2	1.4	1.6	1.0	12/6/2004	-21.8	8883	9.2	-21.7	8769	9.1	-21.7	9360	9.4
Jan 25 2005	0501250000.tlm	IDPU Tvac2 Cold 2	20.2	-6.6	9.5	1.8	3.4	1.3	12/6/2004	-21.9	8875	9.9	-21.3	8765	9.6	-22.0	9349	10.2
Jan 26 2005	0501260000.tlm	IDPU Tvac2 Hot 3	20	70.8	14.3	1.5	3.1	1.2	12/6/2004	-22.1	8885	9.3	-21.9	8766	9.1	-22.1	9359	9.6
Jan 26 2005	0501260000.tlm	IDPU Tvac2 Cold 3	19.5	-10.4	9.3	1.5	3.0	1.2	12/6/2004	-22.8	8876	10.3	-21.9	8747	9.9	-22.2	9348	10.3
Jan 29 2005	0501290000.tlm	IDPU Tvac2 Hot 4	17.6	71.6	15	1.5	1.7	2.0	12/6/2004	-22.0	8885	9.3	-19.6	8767	8.1	-21.7	9360	9.3
Jan 31 2005	0501310000.tlm	IDPU Tvac2 Cold 4	19.5	-22.5	8.4	2.1	1.6	1.4	12/6/2004	-21.6	8869	9.7	-22.4	8760	10.2	-23.1	9348	10.8
Feb 14 2005	0502150000.tlm	IDPU Post-vib	22.9	31.5	10.6	6.8	2.5	6.4	12/6/2004	-22.5	8970	9.3	-22.9	8780	9.5	-22.2	9286	9.3

MAG Open Issues

- **MAG currently has ETU thermal blankets installed**
  - **Flight blankets in fabrication**
  - **Must remove MAG sensor from boom to install blankets**

IMPACT FM1 BOOM



FM1 Boom Test History

- 09 Jan 2004 Assembly Begins.
- 14 Jun 2004 Assembly Completed.
- June 2004 Magnetometer and STE-U Installed.
- 28 Jun 2004 Vibration Test. Completed. Loose Pin found (PFR-1010)
- 30 Jun 2004 STE-U Uninstalled.
- 1-16 Jul 2004 Thermal Vacuum Test. Completed.
- 16 Jul 2004 Bakeout Qualification. Completed.
- Oct 2004 STE-U Installed.
- 18 Oct 2004 – 1 Nov 2004
- EMC test with the full IMPACT Suite. Completed.
- EMC test exceedances have been accepted by the EMC committee; the official waiver is in process.
- 03 Mar 2005 SWEA Harness Failure (PFR-1038).
- 17 Mar 2005 SWEA Final Integration. Boom Complete.

Boom Verification Matrix

Verification Matrix for STEREO/IMPACT/Boom — Revision Date: 1/6/2004

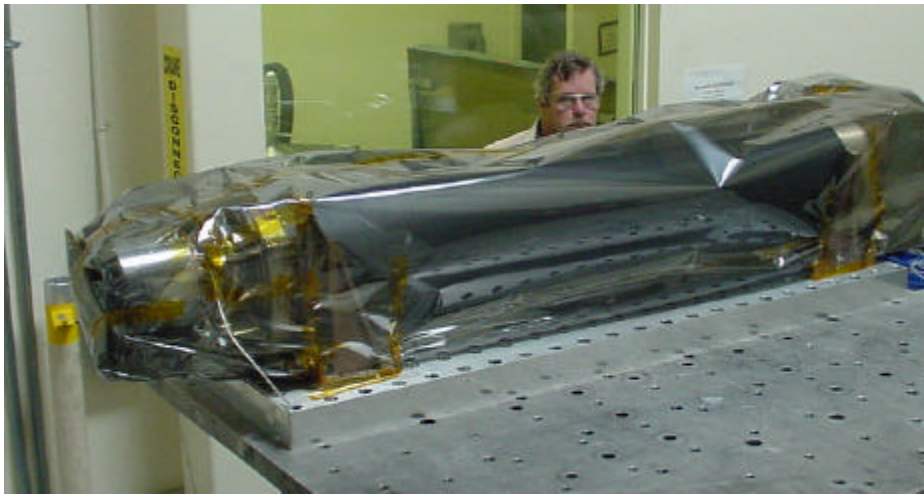
Revision Number: 5

Hardware Description		Test																	
Level of Assembly	Item	Deploy Test, Room Temperature	Deploy Test, Thermal Vac	Stiffness, Proof Load	Vibration, Sinusoidal	Vibration, Random	Self Shock	Acoustics	Alignment	Force Margin Deployment	Thermal Vacuum	Thermal Cycle	Thermal Balance	End-to-End Conductance Test	EMC/EMI	Magnetics	Bakeout	Deployment Contamination	Contamination Inspection	Comments
C	Proto	**P**		**P**																
C	EM	**P**		**P**														**P**		Qual levels
C	PF/FS	**P**	**P**	**P**	**P**	**P**	**P**		**P**	**P**	**P**	**P**	**P**	**P**		**P**				Protoflight levels
C	FM1	**P**		**P**					**P**			**P**		**P**		**P**			**P**	Protoflight levels
C	FM2	**P**		**P**					**P**			**P**		**P**		**P**			X	Protoflight levels
S	FM1		**P**		**P**	**P**	S			**P**	**P**	**P**			**P**		**P**			Protoflight levels
S	FM2		**P**		**P**	**P**	S			**P**	**P**	**P**					**P**			Protoflight levels

Legend:

Level of Assembly	Unit Type		Status	
C = Component	PT =	Prototype	X =	Test required
S1 = with MAG, STE-U	PF/FS =	Protoflight / Flight Spare	A =	Analysis
S = with all instruments	FM1 =	Flight unit #1	**P =**	**Performed**
	FM2 =	Flight unit #2		

Boom FM1 Problem/Failures

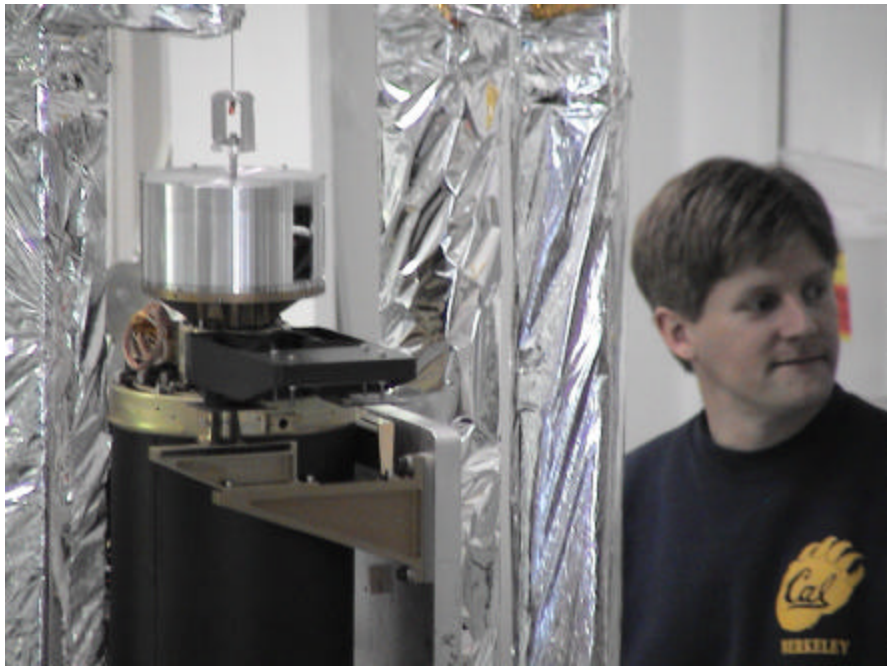


- PFR1010, FM1 Vibration – Loose Pin
  - Locating Pin found in the bagging between vibration runs
  - Replaced Magnetometer Tray Locating Pin
  - Staked FM 1 and 2 pins
  - This PFR has been signed-off and closed
- PFR1028, FM1 SWEA Harness Fault
  - SWEA clocking intermitent following installation
  - Harness checked and fault localized
  - Harness opened and checked, wires fell apart at solder joint
  - New soldering procedure used to rejoin AWG 36 Coax to lead wire
  - This PFR has been signed-off and closed

FM1 Boom Related Waivers

- 460-42, Combined Signal and Power Harness
  - Closed 2002

- 463-116, Cork Brake Pad Contamination Waiver
  - Closed 03 FEB 2004
  - Complete Material List approved



FM1 Boom Test Procedures

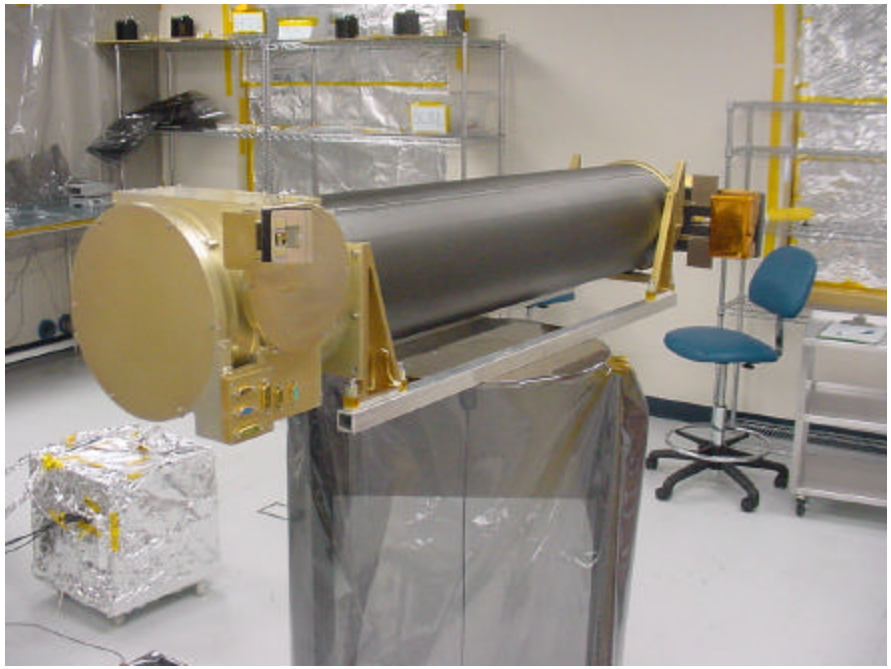
- **Test Plans/Procedures can be found at:**
  - http://sprg.ssl.berkeley.edu/impact/dwc/TestProcs/
    - **EMC:** http://sprg.ssl.berkeley.edu/impact/dwc/TestProcs/IMPACT-EMC_C.pdf
    - **CPT:** http://sprg.ssl.berkeley.edu/impact/dwc/TestProcs/IMPACT-IDPU-CPT_H.pdf
    - **Vibration:** http://sprg.ssl.berkeley.edu/impact/dwc/TestProcs/IMP-562-DOC-A%20Vibration%20Test%20Procedure.pdf
    - **Tvac:** http://sprg.ssl.berkeley.edu/impact/dwc/TestProcs/IMP-563-DOC-A%20Thermal%20Vac%20Cycliing%20Test%20Plan.pdf
    - **TBal:** http://sprg.ssl.berkeley.edu/impact/dwc/TestProcs/BOOMTBTESTPLANFINAL.pdf

FM1 Boom Test Reports

- **Test Reports can be found at:**
  - **http://sprg.ssl.berkeley.edu/impact/dwc/TestReports/**
    - **EMC: http://sprg.ssl.berkeley.edu/impact/dwc/TestReports/02-15-05%20UCBerkeley%20Stereo%20Impact%20Prep%20TR.pdf**
    - **Tvac: http://sprg.ssl.berkeley.edu/impact/dwc/TestReports/IMP-579-DOC-RB%20STEREO%20Boom%20FM1%20Thermal%20Cycling%20Report.pdf**
    - **Tbal: http://sprg.ssl.berkeley.edu/impact/dwc/TestReports/BOOMThermalTestandAnalysisReport.pdf**
    - **Magnetics: http://sprg.ssl.berkeley.edu/impact/dwc/TestReports/IMPACT-BOOM-Magnetics-Report.pdf**
    - **Vibration: http://sprg.ssl.berkeley.edu/impact/dwc/TestReports/IMP-578-DOC%20STEREO%20Boom%20FM1%20Vibration%20Report%20RA.pdf**
    - **Alignement: http://sprg.ssl.berkeley.edu/impact/dwc/TestReports/IMP-592-DOC-R-%20STEREO%20Boom%20FM%20Alignment%20Test%20Report.pdf**
    - **Stiffness: http://sprg.ssl.berkeley.edu/impact/dwc/TestReports/IMP-614-DOC-R-%20STEREO%20Boom%20FM%20Stiffness%20Test%20Report.pdf**
    - **Mass Properties: http://sprg.ssl.berkeley.edu/impact/dwc/TestReports/IMP-617-DOC%20STEREO%20Boom%20FM1%20Mass%20Properties%20R-1.pdf**

FM1 Boom Mass Properties Testing

- **Mass: 14.04 kg**
- **CG: X, Y, Z =**
  -462 mm, -135 mm, -102 mm
- **MOI:**
  - **Ixx = 0.130 kg m^2**
  - **Iyy = 4.668 kg m^2**
  - **Izz = 4.852 kg m^2**



FM1 Boom Magnetic Testing

- **Part level magnetic survey was conducted for the Boom. The two "hot" items are:**
  - **Flyweight Brake Mechanism: ~100 nT @ 5" (1.2 m from Magnetometer when stowed, 4.4 m from Magnetometer when deployed resulting in 0.003 nT field at Magnetometer)**
  - **Preload Spring: ~100 nT @ 5" (1.1 m from Magnetometer when stowed, 4.3 m from Magnetometer when deployed resulting in 0.003 nT field at Magnetometer)**

Boom Functional Test

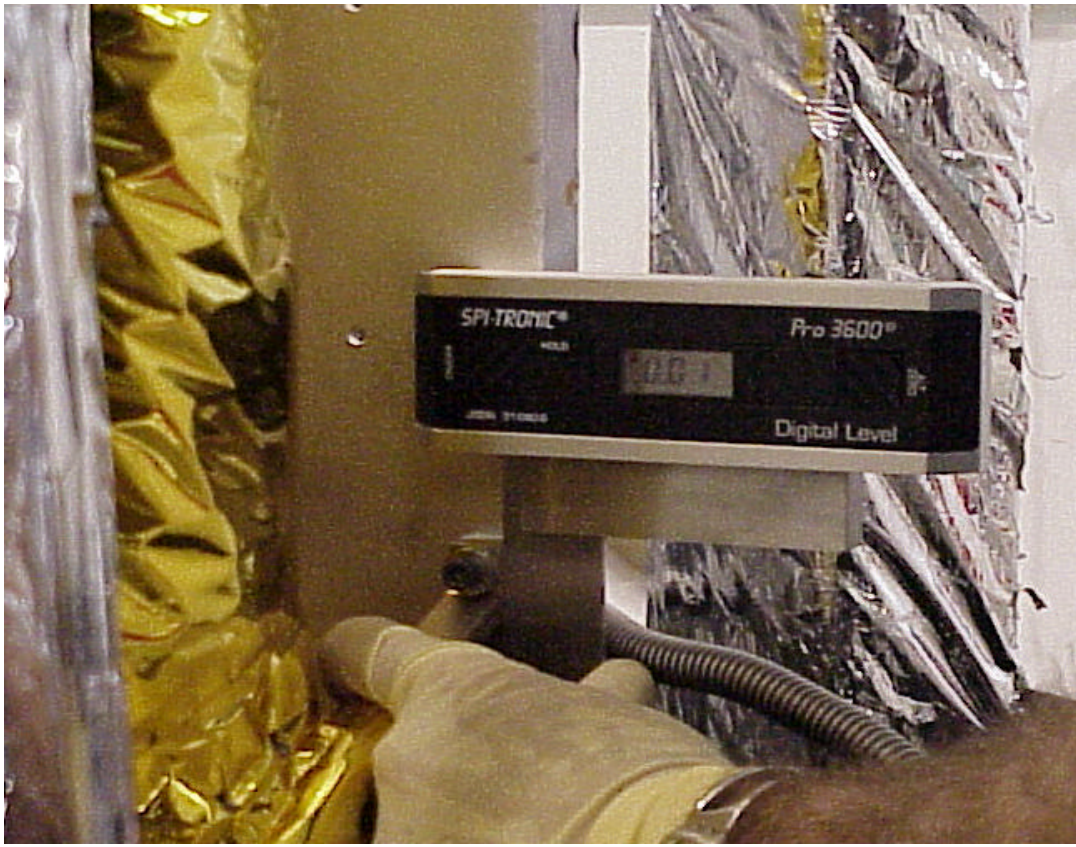
- Boom functional testing
  - Deployments were performed to ensure proper functionality
  - Full deployment is defined as:
    - actuation via powering the SMAR (Shape Memory Alloy Release) pin puller,
    - Stacer initiation via Deployment Assist Device (DAD),
    - full deployment via Stacer,
    - extension of all Tubes
    - and locking of all Lock Pins
  - A total of four (4) full deployments will be made to verify the functionality of the Boom
    - One deployment remains TBC at Spacecraft EMC

FM1 Boom Deployment Test History

umber	Date	Time	Deploy	Actuation	Mass Dummies	Test Purpose	Time	Comments:
T1	26-May-04	12:55 PM	FULL	Actuated	Yes	Tuning - Cable length, harness braid	7.53 s	Force Margin met, Alignment met, Stiffness File: ImpBoomFM1Deploy1_XYPlane, …XZPlane
1	10-Jun-04	2:15 PM	FULL	Actuated	Yes	Functionality Test	6.85 s	Harness installed, Force Margin met Alignment met, Stiffness File: ImpBoomFM1 Deploy2_XYPlane, …XZPlane
2	14-Jul-04	10:05 AM	FULL	Actuated	SWEA MD	Thermal Vacuum Hot, Post-vibration	5.56 s	FM1 Mag installed, Force Margin m Alignment met, Stiffness File: ImpBoomFM1 DeployTVHot_XZPlan …XYPlane (1&2)
3	16-Jul-04	8:00 PM	FULL	Actuated	SWEA MD	Thermal Vacuum Cold	5.64 s	FM1 Mag installed, Force Margin m Alignment met, Stiffness File: ImpBoomFM1 DeployTVCold_XZPlane, …XYPlane (1&2)
4				Actuated	FM1 Instruments	EMC Deployment		Integrated with S/C, Blankets Installe

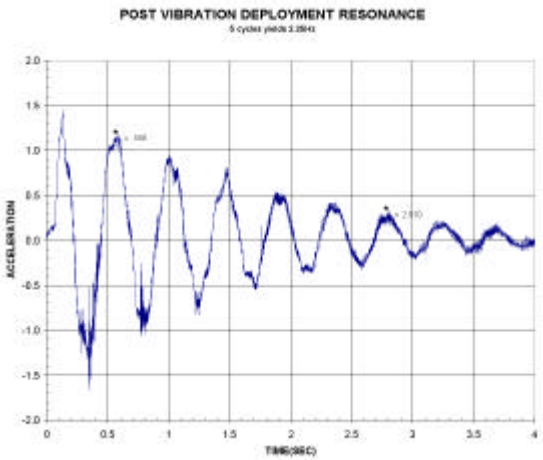
Boom Alignment Test

- Alignment
  - Alignment was verified on Flight Model Booms after each deployment using a digital inclinometer with resolution of 0.01 degree
  - Requirement: 52.5 arcmin
    - FM1 maximum: 11.8 arcmin

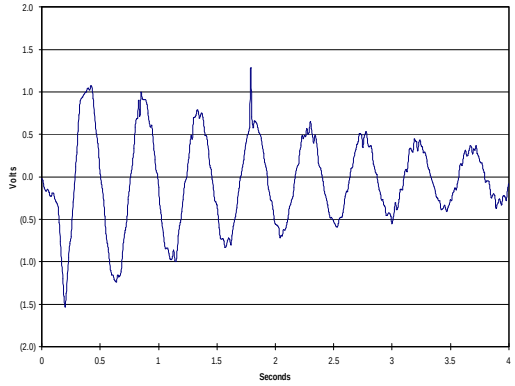


Boom Stiffness Test

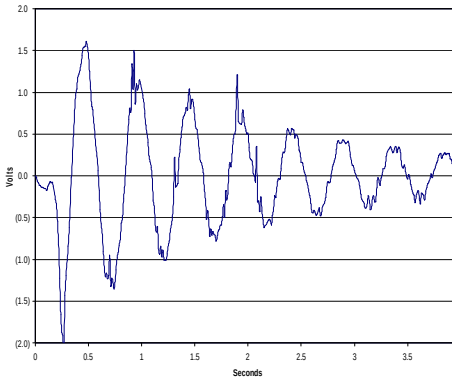
- **Stiffness**
  - **Stiffness was verified for each Flight Model Boom.**
  - **Requirement: > 0.5 Hz and not coincident with another device (i.e., solar cells, SWAVES antennas)**
  - **Fundamental Frequency: ~1.9 Hertz**



STEREO Boom FM1 Hot Deploy XZ



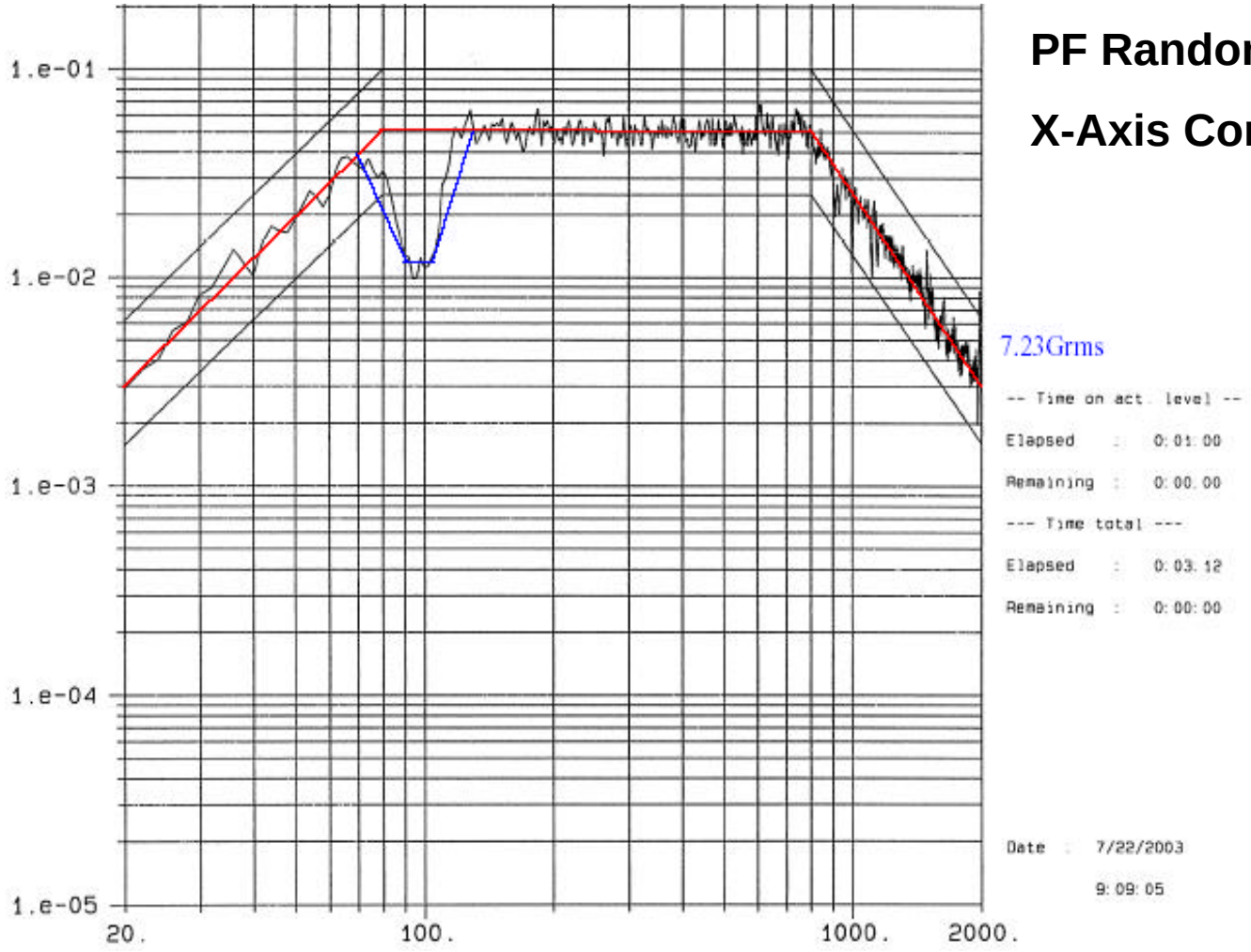
STEREO Boom FM1 Cold Deploy XZ



FM1 Boom Vibration Test

- Vibration
  - Boom was vibrated to levels specified in Environmental Spec (Sine Sweep, Random) at Quanta Laboratories, Santa Clara, CA
  - Vibration spectra are notched per the PF Control Envelopes (next slides, approved by T. Betenbaugh, 08 March 2004)
  - Boom was vibrated powered as in launch: survival heaters on
  - Boom was vibrate with FM1 STE-U and FM1 MAG installed
  - An instrument CPT was performed before and after vibration
  - A harness connectivity test was conducted before and after vibration
  - A full deployment was conducted to verify functionality after vibration. This deployment occured as the hot deployment of thermal vacuum cycling, thus following the "test as you fly" philosophy.
- PFR1010, found a loose pin inside bagging between axes

Boom Random Vibration Test, Notched Spectra, Example

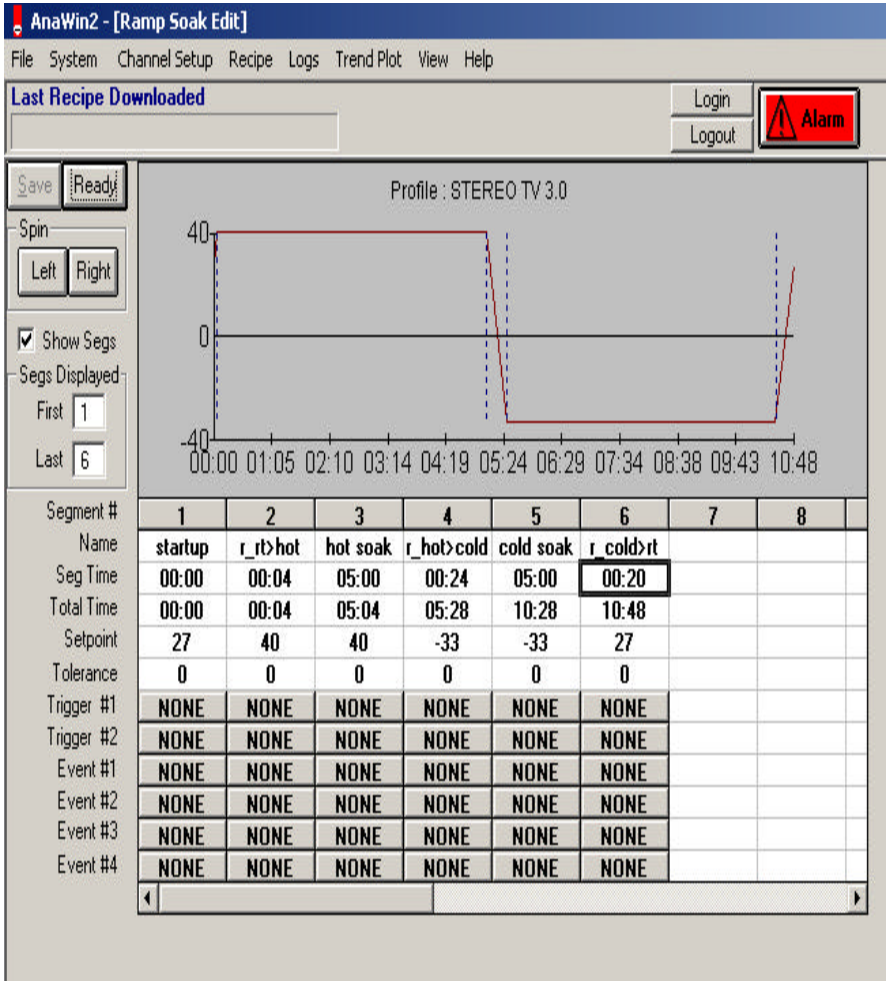


PF Random

X-Axis Control

Boom Thermal Vacuum Test

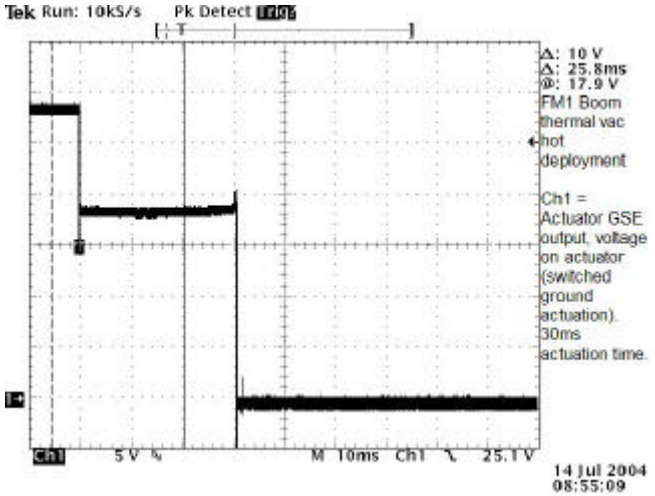
- **Test Plan:**
  - **Preliminary bakeout, up to 48 hours at +40C**
  - **Thermal vac**
    - **7+ survival cycles: +40C to –33C**
    - **One hour soak minimum**
    - **Flight thermistor used as reference**
    - **Temperatures from verified thermal model, with at least 10C margins.**
  - **MAG CPT on each operational cycle**
  - **Deployment on seventh hot soak and seventh cold soak**
  - **Qualification bake-out**

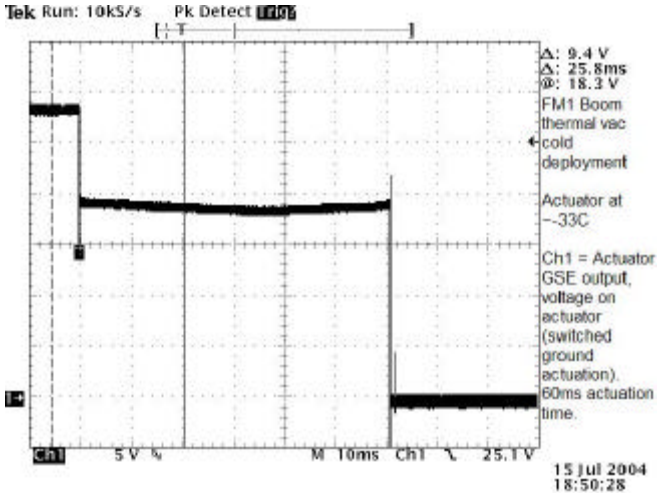


Boom Thermal Vacuum Test, Actuator Current

- SMAR deploy voltage was monitored for thermal dependence

- Voltage:
  - 28V is armed
  - ~17V is firing
  - 0V is fired
- Actuation time:
  - 30ms hot
  - 60ms cold

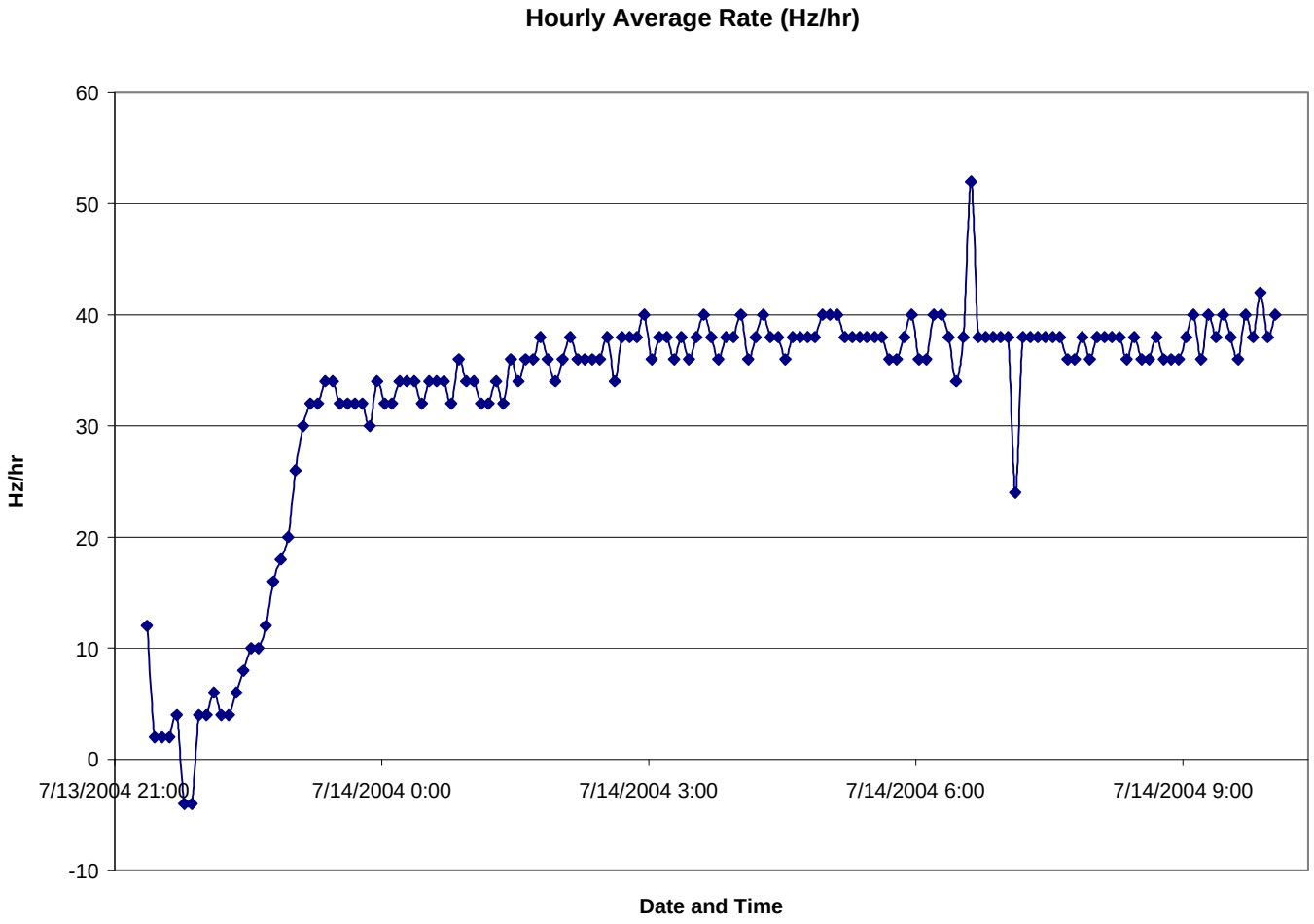




Boom Qualification Bake-out Test

TQCM data taken for 8 consecutive hours with the chamber at 40C and the TQCM at -20C

Final Rate: 40 Hz/hr



Other Boom Environmental Tests

- **Thermal Balance**
  - **Thermal balance was completed for Protoflight and was not repeated for the Flight Models (Waiver submitted)**

- **EMC with the suite**
  - **Described in SWEA section**
- **Acoustic Testing**
  - **No foils or other acoustic sensitivities**
  - **Built into the vibration spec (APL 9003)**

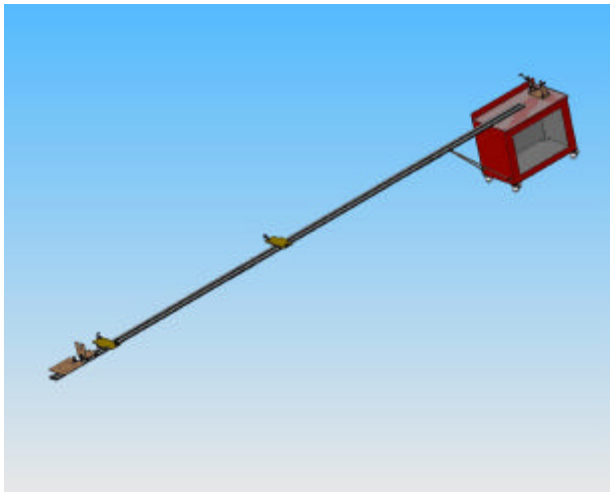
FM1 Boom Test Results

- The FM1 Boom has been deployed 4 times. 3 were full deployments (all subsystems were included)
- The structure has been shown repeatedly to have a first frequency of ~1.9 Hz.
- The structure is stable in thermal cycling.
- The actuation and deployment systems function at survival temperatures.
- The structure, actuation and deployment systems function after sinusoidal and random vibration.
- Vibration levels were determined for all attached instruments.
- The Boom has been found to align the Magnetometer to within 11.8 arcmin (root of sum of squares) in the XY and XZ spacecraft planes. (The requirement is 52.5 arcmin.)
- The deployment system functions with adequate force margin.

Boom Handling

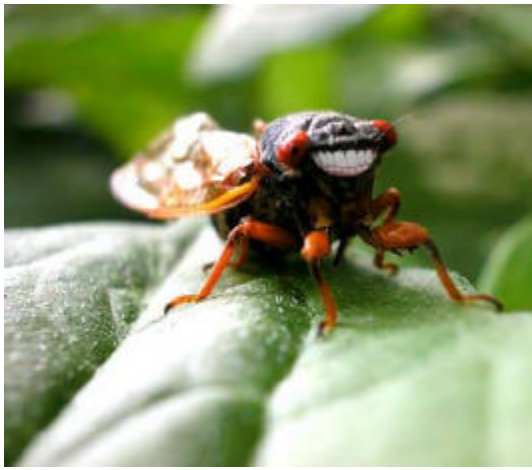
- The Flight Model Booms must be stored in a Class 10,000 cleanroom at all times.
  - The Flight Hardware shall be double-bagged with Llumalloy bagging material or equivalent whenever outside a Class 10,000 clean room following thermal vacuum bakeout.

- The Boom Stowing Procedure, IMP-449-DOC, has been designated a hazardous procedure due to physical contact with the stacer.
  - Basic precautions are required, i.e., experienced personnel must complete this operation and stowing GSE should be utilized.



Quality Assurance

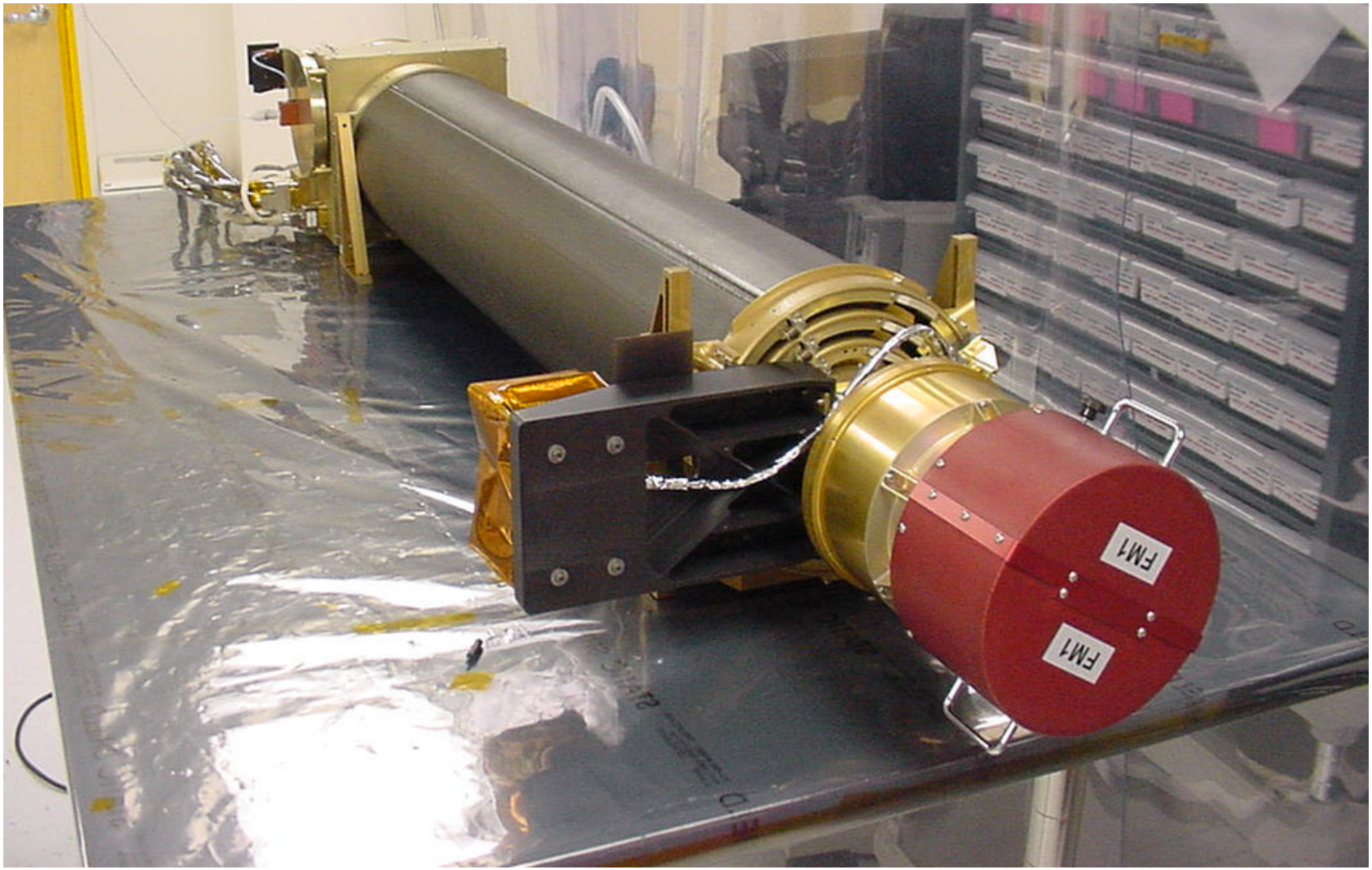
- IMPACT Suite QA Issues worked through Ron Jackson at UCB
  - UCB Independent Inspections by Jeremiah Tolbert,
  - Supported by GSFC QA
  - Signs off on work orders, inspections, parts & materials lists, etc.
- Parts Lists
  - All Boom Parts Lists approved
  - Parts qualification, screening (including radiation) completed
- UCB Materials Lists Approved
- Boom FM1 PFRs Closed
  - PFRs can be found at: http://sprg.ssl.berkeley.edu/impact/dwc/Problems/
- Boom related Waivers Closed
  - Except FM1 Suite EMC Test Results waiver
  - Waivers can be found at: http://sprg.ssl.berkeley.edu/impact/dwc/Waivers/
- Acceptance Data Package Prepared and reviewed



FM1 Boom Outstanding Issues

- IMPACT FM1 EMC Waiver not signed off
  - Official waiver should be into approval cycle shortly
- Thermal Blankets and Taping to be applied after Spacecraft EMC
  - Including STE Silver-Teflon
- PFR1038, SWEA Harness Fault awaiting signatures
- Cow Catcher ESC Closeout

Boom Suite



FM1 Boom Suite Limited Life Items

- **Boom Deployments:**
  - Qual boom deployments: 28
  - FM1 boom deployments to date: 4
  - Anticipated boom deployment in spacecraft I&T: 1
  - Anticipated boom deployments on orbit: 1
- **SWEA Door Actuations**
  - Actuator life (manufacturer): 100
  - FM1 door actuations to date: 14
  - Anticipated actuations in spacecraft I&T: 2
  - Anticipated actuations in orbit: 1
- **STE Door Actuations (count motions)**
  - ETU Life test, (ambient / cold vacuum): 18,000 / 1,100
  - STE-U FM1 door actuations to date: 520 / 119
  - STE-D FM1 door actuations to date: 128 / 46
  - Anticipated actuations in spacecraft I&T (2 per CPT): ~20
  - Anticipated actuations on-orbit: ~58
    - 2-year mission

Boom Suite Safety

- **Premature boom deployment**
  - **Possible personnel hazard, probably damage to unit**
  - **APL actuation safeing plug**
  - **Deployment prevention pin will remain in place most of the time**
- **Radiation sources**
  - **STE units have very weak calibration radiation sources in their doors**
  - **Radiation Safety paperwork has been submitted**
- **SWEA High Voltage**
  - **No personnel hazard – completely contained, but can damage instrument if powered on except in vacuum**
  - **Enable plug will not be installed except for thermal vac and launch**
    - **Delivered with test plug installed in place of flight plug**

FM1 Boom Suite Delivery

- FM1 Boom Suite integrated, tested, ready to ship
- Deliver to APL April 6
  - Shipped on same flight we are taking
    - Double-bagged in lumalloy
    - Bags are sealed, dry N2 back-filled.
    - Shock-mounted inside the boom shipping coffin
    - Shock and humidity monitors will be included
  - Project to provide paperwork and advance warning to TSA, Airlines
  - Unit will be driven directly from the airport to APL
    - Arrangements have been made for late arrival at APL

FM1 Boom-Suite Post-Delivery Plans

- On arrival at APL, unit will return to purge
- Unit will go a radiation safety wipe-test, bench test, and contamination inspection prior to mating with the spacecraft
- An APL procedure will be used for spacecraft mating
- A safe-to-mate will be performed prior to electrical mating
- A post-mating functional will be run using the POC/MOC/Spacecraft/IDPU
- The SEP instruments will be shipped and integrated at a later date
  - SEP Suite is still in environmental tests
- The boom will be deployed for spacecraft-level EMC tests
  - UCB to provide off-load fixture
  - Verifies no interference to deployment from spacecraft
  - Boom will be removed for stowing after EMC