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| Investigation: FIELDS |
| Progress accomplished this period: | March 2013 Reporting Period |
| 1. | Project Management and Product Assurance |
|  | a. | Project Management* Prepared revised SOWs and RFPs for subcontractors U of Iowa and UCLA. Intent is to clarify remaining scope of work and secure budgets for cost to completion planning.
* Supported EDI GDU tiger team activities including a visit by GSFC team members and contractors to UNH
* Supported the following Acceptance Reviews
	+ None
* Supported the following PSRs:
	+ None
* Supported the following PERs:
	+ FM4 CEB
	+ SN5 EDI GDU
	+ SDP SNs 11&12 (3 Apr)
* Supported the following TRRs:
	+ FM4 CEB vibration
	+ SN5 EDI GDU vibration
* Supported the following FRBs
	+ CRAM multibit errors (FM4 CDPU-B)
	+ RE launch latches
* Received delivery of the following flight hardware items to UNH
	+ SN5 EDI Gun and GDE
	+ SN5 EDI Optics
	+ FM4 AEB
* Delivery of the following flight hardware items from UNH to FIELDS partners
	+ Selected IWF HVOCs for use in Guns 4 & 6 (to IWF)
	+ Probes removed from SDP SNs 5&6 (to KTH for rework)
* Delivery of the following flight hardware items from UNH or LASP to the IS and Observatories
	+ None
* CDRL and contract deliverable submissions this month:
	+ None
* Supported the GDU Status and Planning Review;
* Prepared and distributed the CEB and EDI PER templates;
* Supported the opto coupler testing;
* Updated the Gun/GDE schedule.
* Prioritized and coordinated the efforts of the UNH team, subcontractors, foreign partners, outside vendors and in-house workshops to optimize schedule performance. This month’s activities in this regard include:
	+ UNH team
		- Priorty given to the UNH EDI GDU HVOC design and build effort. This feeds the Gun effort at IWF, the critical path for GDU and FIELDS. The SDP effort, given the shared commitments of key individuals, is most affected by the assumption of this task at UNH.
	+ UNH machine shop
		- Fabricated housings and plugs for UNH-built EDI HVOCs
		- Fabricated flight parts for SDP
	+ - UNH electronics shop
		- Assembly of sample HVOCs for EDI GDU
		- Assembly of test boards for sample HVOCs for EDI GDU
		- Continued assembly of EDI Sensor boards
		- Support for SDP and GDU intrgration
	+ UNH TV
		- Priority ranking: prototype HVOCs, FM4 CEB, SN5 GDU, SDPs 11&12
	+ Vendors
		- Coordination of vibration test activities with our vendor, BAE (for CEB, GDU and SDP).
		- Surface treatment of FM SDP and EDI parts
	+ FIELDS team partners, IS and S/C teams
		- This continues to be a major part of the agenda at weekly FIELDS team meetings.
		- FIELDS PM also participates in weekly IS meetings where IS I&T activities and planning are coordinated. FIELDS SE and LASP are important participants at these meetings.
 |
|  | b. | Product Assurance |
|  |  | Turco / Salwen* SDP thin wire crimping for FM 11, 12
* SDP Fab inspections
* SDP motor audio testing/inspections/cleaning/assembly
* CEB assembly support
* EDI IR LED mechanical measurements, electrical tests
* EDI HV OPTO Isolator assembly life testing and TVAC testing support
* CEB FM4 PWAs parylene coated
* FIL4 and FIL7 inspection and staking
* Assisted in SDP motor inspections
* Prototype UNH optocoupler assembly and test support
* Support FM5 EDI PER

Software Product Assurance (Heirtzler)* CDPU and EDI SW is stable
 |
| 2. | Systems Engineering and FIELDS I&T |
|  |  | Rau / Dors* Performed FM4 and FM5 AEB Acceptance Testing
* Performed FM4 ADP FIT
* Performed FM4 Magnetometer FIT testing
* Returned FM3 AEB to LASP for noise investigation
* Operated SDP 09/10 at FIELDS level to increase operating hours
* Operated SDP 05/06 at FIELDS level to increase operating hours
* Determined expected responses for SDP Sweeps given different terminations
* Performed Magnetics testing on FM4 CEB, AEB, and SCP Preamp
* Continued FIELDS verification entry into DOORS
* Investigated FM2-FM4 CEB AC magnetic violations
 |
| 3. | Post-Delivery Support |
|  |  | * Supported and reviewed WOA and procedure development at IS/OBS levels
* ADP support: See ADP I&T section below.
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| 4. | Science activities |
|  |  | SWT and SWG * Supported science activities as needed
* Attended the magnetometer team, SWT and SDWG meetings at LASP

Science data processing activities* Submitted raft volumes for MMS Science Data Products Guide for EDI, AFG/DFG, and SCM
	+ A good start on SDP volume
	+ ADP volume lagging a bit
* Mag team and FIELDS processing team met at LASP in conjunction with SWT. Many questions answered. More questions asked.
* Making progress towards specifying coordinate systems, file formats, details of processing schedule
* Working towards availability of processing interfaces at SDC in August 2013
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| 5. | Magnetometers |
|  | a. | DFG  |  |
|  |  |  | * No hardware and testing activities
* Participation in MAG and Fields Team Meeting
 |
|  | b. | AFG |  |
|  |  |  | Completed deliveries prior to March:* FM1 complete set [DFG Sensor S/N 04, AFG Sensor S/N 05, AFG Electronics S/N 01],
* FM1 flight harness set (boom S/N 01 and S/N 02, CEBW6 S/N 01, CEBW4 S/N 01)
* FM2 complete set [DFG Sensor S/N 08, AFG Sensor S/N 06, AFG Electronics S/N 02],
* FM2 flight harness set (boom S/N 03 and S/N 04, CEBW6 S/N 02, CEBW4 S/N 02)
* FM3 complete set [DFG Sensor S/N 07, AFG Sensor S/N 09, AFG Electronics S/N 03],
* FM3 flight harness set (boom S/N 05 and S/N 06, CEBW6 S/N 03, CEBW4 S/N 03)
* FM4 complete set [DFG Sensor S/N 10, AFG Sensor S/N 11, AFG Electronics S/N 04]

March activities:* Continued fabrication of DFG Spare Sensor
* Mandatory Inspections waived for the DFG Spare Sensor
* UCLA Mag science team (Russell, Strangeway, Leinweber) attended Science Working Team meeting in Boulder
 |
|  |  |  |  |
|  | c. | SCM | * SCM FM1 => SENSOR S/N FM1 + PREAMP S/N FM1
	+ - Delivered to UNH, 03 OCT 2011
* SCM FM2 => SENSOR S/N FM2 + PREAMP S/N FM2
	+ - Delivered to UNH, 25 JUL 2012
* SCM FM3 => SENSOR S/N FMS + PREAMP S/N FM4
	+ - Delivered to UNH, 25 JUL 2012
		- FM3 harness delivered to UNH without the outgassing certification
* SCM FM4 => SENSOR S/N FM3 + PREAMP S/N FM5
	+ - Delivered to UNH, 27 FEB 2013
* SCM FMS => SENSOR S/N FM4 + PREAMP S/N FM3
	+ - Sensor manufacturing complete. 3D measurements to be performed on April 09.
		- Sensor PER held on April 04.
		- Preamp vibrated safely at acceptance levels. Thermal vacuum complete.
		- Following post thermal vacuum investigations, the Preamp S/N FM3 can be used as the spare model. Waiver to be written by Olivier Le Contel and Roy Torbert based on the abovementioned investigations.
		- NCR => MMS-SCM-NC-PRE-140
		- Waiver => MMS-SCM-RW-PRE-606
* NCR and alignment measurements report to be completed (MMS-SCM-NC-TRI-623-LPP and MMS-SCM-PR-TRI-622).
 |
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| 6. | EDI |
|  |  | Problems* GDE converter foldback occurred during GDU SN5 baseline FFT in vacuum

Toplevel* Supported Tiger team visit at UNH
* Ship set 2 - GDU SN 5
	+ Assembly, Baseline FFT in vacuum, PER, Vibration

Controller* Ship set 4, SN 4
	+ MIP after Parylening
	+ Performed functional test after parylening
	+ Delivered board for integration into CEB FM4

Gun - UNH efforts* Shipped selected optocouplers to IWF for installation in Gun SN4
* Performed BLT on reworked HV-FIL board SN 4
* Vacuum Testing of Beam Generation System SN 1
* HV-FIL board SN 7 population

Gun - IWF efforts* Ship set 2 - SN 5
	+ Delivered Gun/GDE to UNH for GDU assembly
* Ship set 4 - SN 4
	+ Installed replacement optocouplers on deflection boards

Optics* Delivered SN 5 to UNH
* Continued work on ship sets 3,4

 UNH HVOCs and tiger team activity* Presented details of the design assembly and test of UNH HVOCs for EDI GDU to tiger team members visiting UNH.
* Discussed the Gun HV and Filament board design, test and simulation with tiger team members visiting UNH. IWF will address questions raised about the RUAG transformers.
* Completed fabrication and testing of sample UNH HVOCs for EDI GDU. Initial results look good. Will present data and plans present to a review at UNH in early April.
	+ The UNH devices use the same component parts as the IWF devices and maintain the footprint of the IWF devices. Housing, assembly and testing approach differ from those of the IWF devices.
* Procured additional HV diodes and discussed screening with ATC
 |
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| 7. | SDP/BEB/LVPS  |

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| --- | --- | --- |
|  | a. | SDP/BEB/LVPS (KTH/IRFU/Oulu)KTH/IRFU SDP BEB’s:* Shipment of units FM13-16 awaits Brian King’s next visit to Sweden. This has been delayed given Brian’s involvement in the HVOC effort for EDI.

KTH/IRFU SDP Preamp/Boom Cable Assembly:* No New Developments.

KTH/Oulu/IRFU Sphere / Yo-Yo Mechanism:* Reworked and retested B3 and B4 probes after being removed from S/N 7,8.
* Thermal vacuum testing of probes B3, B4, E2-4 await Brian King’s next visit to KTH.

KTH/IRFU/Oulu Management:* Continue to work all issues related to testing, documentation, hardware, shipping and QA/PA and shipping needs.

KTH Product Assurance (OHB Sweden):* No activity this month
 |
|  | b. | SDP/BEB/LVPS (UNH)LVPS:* No activity this month
* FM LVPS status:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Assembly** | **Test** | **Shipped** | **Incoming** |
| **Unit** | **Board Status** | **MIP** | **EE at KTH** | **EE at IRFU (Thermal)** | **Parylene** | **To** | **Inspection** |
| FM1 | Complete | Complete | Complete | Complete | Complete | UNH | Complete |
| FM2 | Complete | Complete | Complete | Complete | Complete | UNH | Complete |
| FM3 | Complete | Complete | Complete | Complete | Complete | UNH | Complete |
| FM4 | Complete | Complete | Complete | Complete | Complete | UNH | Complete |
| FM5 | Complete | Complete | Complete | Complete | Complete | UNH | awaiting UNH Test |

 A-BEB’s:* No activity this month
* FM A-BEBs status:

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Assembly** | **Test** | **Shipped** |
| **Unit** | **Board Status** | **MIP** | **EE at KTH** | **EE at IRFU (Thermal)** | **Parylene** | **To UNH,****Incoming Inspection** | **To LASP** |
| FM1 | Complete | Complete | Complete | Complete | Complete | Complete | Complete |
| FM2 | Complete | Complete | Complete | Complete | Complete | Complete | Complete |
| FM3 | Complete | Complete | Complete | Complete | Complete | Complete | Complete |
| FM4 | Complete | Complete | Complete | Complete | Complete | Complete | Complete |
| FM5spare | Complete | Complete | Complete | Complete | Complete | Complete | Available at UNH |

S-BEB’s:* No New Developments.

SDP MGSE:* Stable. No new developments.

UNH SDP EGSE:* Stable. No new developments.

SDP Preamp:* No activity this month

SDP Mechanical:* Completed motor study. Discussed with project during PER.
* Completed integration of FM11 & FM12
* Preparing for FM11 & FM12 vibration test in April
* Fabrication of various piece parts was completed in shop. Ongoing.
* RWC major items back from coating vendor: PFE
* Kitting for FM13 & FM14 in process

SDP Thermal:* No New Developments.

SDP EMC:* No New Developments.

FM SDP * Final assembly of SNs 11 and 12. FFT and PER conducted successfully (3 Apr)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Electrical** | **Mechanical** |  | **Test** |
| **Unit** | **Board Status** | **Assembled** | **Inspection** | **Test (FFT)**  | **Vibe** | **Test (FFT)** | **TV** | **Post Test** |
| Test Unit FM1 | Needs rework | Modified & in test | NA, test unit | NA, test unit | NA, test unit | NA, test unit | NA, test unit | NA, test unit |
| FM2 | Needs rework | In Storage | NA | NA | NA | NA | NA | NA |
| FM3 | Completed | Completed | Completed | Completed | Completed | Completed | Completed | Completed |
| FM4 | Completed | Completed | Completed | Completed | Completed | Completed | Completed | Completed |
| FM5 | Completed | Completed | Completed | Completed | Completed | Completed | Completed | Completed |
| FM6 | Completed | Completed | Completed | Completed | Completed | Completed | Completed | Completed |
| FM7, 8 | Completed | Completed | Completed | Completed | Completed | Completed | Completed | Completed |
| FM9-10 | Completed | Completed | Completed | Completed | Completed | Completed | Completed | Completed |
| FM11-12 | Complete | Complete | Complete |  |  |  |  |  |
| FM13-14 | Complete |  |  |  |  |  |  |  |
| FM15-16 | In-process |  |  |  |  |  |  |  |
| FM17-18 | In-process |  |  |  |  |  |  |  |

SDP QA:* Continued work on individual deployer issues, update assembly activity sheet to reflect any changes, with review and complying of work sheets.
* Monitored the assembly and test activities for the flight units

AEB (UNH)* Supported FRB regarding DAC bias channel noise observed at cold temperature (SN FM3)
 |
|  | c.  | SDP (LASP) (Preamp)* No activities this month
 |

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| 8. | ADP |
|  | a. | ADP I&T activities* Changed ADP Boom connector brackets on 3 ADP Booms at GSFC
* Supported integration of the +Z ADP Boom on observatory #1.
* Returned the 2nd ADP IS-level Simulator box with new switches to the IS I&T at Goddard. The box was tested successfully with the CIDP.

SN08 ADP RE Launch Latch opening anomaly activities* Completed latch FRB investigation. Root case of the anomaly was tolerance buildup within the latch assembly which led to an overly-advanced rocker arm angle.
* FRB findings, updated latch acceptance criteria, and corrective actions were presented to the project. The proposed corrective actions were accepted. In addition to the latch that opened during vibration, LASP recommended that 5 additional tip latches be modified and retested so that they would meet the updated acceptance criteria.
* All 6 latches have been modified (SN11 – SN16), acceptance tested, cleaned, inspected, photographed, and functionally tested. The latches are ready for vibration testing.
* Vibration testing for SN08 RE and the modified latches is scheduled for 4/23.

ADP Booms and Simulators* The 2nd ADP IS-level simulator box was returned to LASP for debug. No problems were found, but the HOP end-of-travel switches were changed to toggle style switches in order to improve the simulator design.

AEB* Generated an informal test plan for the AEB FM3 DAC noise investigation.
* Setup EGSE and an ambient pressure thermal chamber in preparation for investigation.
* Hand-carried AEB FM3 from GSFC to LASP for DAC noise investigation.
 |
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| 9. | DSP, Thermal, Systems Engineering, Product Assurance and Management (LASP) |
|  |  | DSP* Reviewed and approved DSP performance data for FIELDS FIT test.

Thermal* No activities this month

Systems Engineering & Project Management* ADP 35 Hz vibration frequency RFA closed and concurred
* DSP SCM channel permutation fix algorithm documentation RFA closed and concurred.

Quality Assurance, Parts, and Materials Engineering* Provided a revised LASP PAIP to UNH with corrected reference documents
* Provided the final NCR documentation for the AEB FM4 cold survival TV test anomaly. This NCR is now closed.
* Provided the draft NCR paperwork for the mis-wired ADP IS-level Simulator GSE to UNH for review.
 |
| 10. | CEB  |
|  | a. | Hardware |
|  |  |  | CDPU & BPM (Bodet)* No activity. This work is complete.

CEB (Rau, Dors, Bodet, Nolin)* Finished acceptance testing of FM4 CEB boards CDPU and EDI controller
* Performed post coating test of AFG and DFG boards for FM4 CEB
* Final assembly FM4 CEB
* Performed Baseline FM4 CEB FFT
* Supported investigation of FM4 CDPU CRAM issue
* Prepared for and held the FM4 CEB PER
* Performed FM4 CEB vibration (Acceptance Levels)
* Performed post vibration and pre-TV FM4 CEB FFT
* Began FM4 CEB TV
* Performed FM4 CEB EMI test
 |
|  |  |  |  |
|  | b. | CDPU Software, Support for Operations, I&T and Post-Delivery activities (Needell) |
|  |  |  | * Continued support of post Delivery activities for Observatory 1,2 and IS Deck 4
* Supported Prep of CEB4 for TVac
* Participated in Commissioning TIM (remotely @ LASP)
 |
|  |  |  |  |
| 11. | GSE (Mello, Chutter, Bodet) |
|  |  | GSE Hardware* No activity

FIELDS Simulator* No activity

GSEOS & GSE Software* Create & Test FM4 GSEOS Configurations
* Support Testing
* Support I&T Efforts
* Telemetry Screen Improvements
* Keep Software Repository Updated
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|  |
| 12. Problems encountered (some resolved) and updates this period |

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|  |  | AEB* [UPDATE] Out of Family Noise on Bias Voltage DAC (AEB FM3, ADP5 Side, TV cold) (PFR-10160.53-94-IP)
	+ After analyzing data from FM4 AEB TV testing, it was found that during FM3 AEB TV testing, out of family noise levels were found at the -30C plateau on the Bias Voltage DAC line.
	+ Cause, unknown at this time.
		- Likely root cause: Intermittent connection, unknown if in the FM BEB or in the GSE inside the TV chamber
		- Another possibility is noise pickup (interference) from the TV test facility when operating cold
	+ Agreed actions
		- UNH (Rau) to coordinate removal of FM3 AEB from IS#4 with SwRI (Alan Henry). Unit to be returned to LASP for testing
		- UNH to perform functional and safe-to-mate tests on the FM5 (flight spare) AEB. (King & Rau). Make this unit available if needed for IS or observatory level testing while the FM3 AEB investigation is underway.
		- LASP to retest the FM3 AEB without disassembly and report results to the FRB.
		- FRB to consider reported retest results and advise next steps.
	+ [UPDATE 5 Apr 2013] LASP test in thermal chamber reproduced the effect below -25C. The LASP testing confirmed the problem is on the BEB boards downstream of the DAC.
		- Suspected cause: Parylene contamination inside one of the stacking connectors connecting the AM and CP boards.
		- Corrective action: return to UNH for inspection, rework and retest

ADP RE* [UPDATE] ADP RE launch latch opened during vibration test (SN08) (PFR-10160.53-92-OP)
	+ SN08 ADP Receiving Element tip Launch Latch opened inadvertently during x-axis random vibration testing.
	+ The currently leading failure hypothesis is tolerance buildup and/or out of family parts in the over-center release mechanism. Inspections on all launch latches are in process. Results and recommendations to be presented to FRB.
	+ Likely root cause: Tolerance buildup in the SN16 launch latch mechanism led to insufficient detent.
	+ Open work: LASP to define a new set of latch acceptance criteria, test the SN08 RE latch (SN16) to protoflight levels then show that all other units meet those criteria.
	+ [UPDATE, 5 Apr 2013]
		- Completed latch FRB investigation. Root case of the anomaly was tolerance buildup within the latch assembly which led to an overly-advanced rocker arm angle.
		- FRB findings, updated latch acceptance criteria, and corrective actions were presented to the project. The proposed corrective actions were accepted. In addition to the latch that opened during vibration, LASP recommended that 5 additional tip latches be modified and retested so that they would meet the updated acceptance criteria.
		- All 6 latches have been modified (SN11 – SN16), acceptance tested, cleaned, inspected, photographed, and functionally tested. The latches are ready for vibration testing.
		- Vibration testing for SN08 RE and the modified latches is scheduled for 4/23.

SDP* [UPDATE] Wire deployment stopped during initial FFT - gearbox jam (SN 10) (PFR-10160.53-86-IP)
	+ Observation: During the initial Full Functional Test wire deployment, the motor stopped.
	+ Cause:
		- The motor was seized by a relatively large debris lodged in the tooth root of the ring gear (housing) aligned with the first stage satellite gears.
		- Materials analysis indicates that the debris’ chemical composition is within the composition range of the weld that joints the motor pinion gear to the shaft. The surface texture of the debris is also similar to the weld..
	+ Corrective action: Replaced the jammed motor/gearbox with a new assembly. Continued I&T of SDP SN10.
	+ Retest of SN 10 successful
	+ Impact to other units:
		- None foreseen, but TBD pending inspection of available spare motor/gear box assemblies and report of findings.
		- SDP team will add inspection of all subsequent motor/gear box assemblies prior to integration with harness and SDP
	+ UPDATE, FRB 21 Feb 2013
		- UNH presented results inspections and acoustic noise tests of spare motors
		- Plan forward, agreed by FRB:
			* Reassemble the Flight Spare Motor/Gearboxes and repeat acoustic testing in “Shaft Up” orientation
			* Recommend continuation of acoustic study and disassembly inspection of balance of Flight Motor/Gearbox assemblies for SDP FM11 through FM18
			* Reconvene after study completion to discuss results and plan forward for delivered units
	+ UPDATE, 3 Apr 2013
		- This issue was discussed again during the PER for SDP SNs 11&12 (chair:Dirks). The study of all available flight spare and flight motors, completed since the 21 Feb 2013 FRB, was summarized. No further issues were encountered in these inspections and tests. Attached are three files summarizing the results:
		- 1) Copy of sdp\_motor\_gearbox\_FSpare\_inspection\_r12.xls
		- Summarizes the inspections for all motor/gear box assemblies and identifies the audio files
		- 2) Flight Motor Plots Post Inspection Deploy\_2013-03-18.pdf
		- Plots of acoustic measurements on the designated flight motor.gear box assemblies
		- 3) Spare Motor Plots Post Inspection Deploy\_2013-03-18.pdf
		- Plots of acoustic measurements on the designated flight spare motor.gear box assemblies
		- The discussion also addressed the plan for acoustic testing of the earlier SDP units. This plan is summarized as follows.
		- SNs 3&4 (OPEN):
		- These are the long term storage demonstration units. They also require rework of the fine wire crimps. They will be removed from the Observatory following observatory environmental testing for FFT and rework of the fine wire crimps. The acoustic measurements will be made during the deployment test that is part of the FFT.
		- SNs 5&6 (MEASUREMENT DONE, but need acoustic plots attached here for closure):
		- These units were removed from the IS deck and returned to UNH for rework of the fine wire crimps. The acoustic noise measurement was made during the short deployment operation that was performed to gain access to the probes and preamps.
		- SNs 7&8 (OPEN):
		- These units should be the two selected for removal from Observatory-2 for FFT following observatory environmental tests. This is consistent with the plan prescribed by the project. The acoustic measurement during deployment is now part of the FFT procedure.
		- SNs 9&10 (CLOSED):
		- These units deploy very quietly. SDP engineers are confident in these motors and see no need for additional deployments to gather acoustic data.
		- SNs 11-18 (CLOSED): All motors for these units have been inspected and had acoustic measurements. These are attached. Deployment tests during FFT now include acoustic measurements on the SDP assembly.
* [UPDATED, OPEN PENDING REWORK OF DELIVERED UNITS] Fine wire disconnected - crimp slip ( SDP FM8), Open rework (SNs 3, 4, 5, 6) (PFR-10160.53-75-IP)
	+ Inspection revealed the fine wire from the probe/yo-yo assembly had come completely out of the crimp ferrule inside the preamplifier during the TV test.
	+ TV test of SDP SNs 7&8 was completed.
	+ Root cause investigation revealed inadequate control of the crimping process. FRB defined rework and retest activities.
	+ Crimp process redefined and approved
	+ Impact to other units:
		- SNs 3-6 will be reworked
		- New process applied successfully to 7-12
		- New process applies for all subsequent units
	+ NCR to remain open until rework is complete on units already delivered: SNs 3-6. A plan for this rework was presented and agreed at the PSR for SNs 7-10.
	+ UPDATE: The probes were removed from SNs 5&6. Prescribed rework will be performed when replacement probes are received from KTH (April).

EDI* [NEW]: GDE Converter Fold-back (GDU FM5) (PFR-10160.53-96-IP)
	+ During the baseline full functional test in vacuum a GDE converter shutdown occurred after configuring the Gun for operation at 1keV
	+ Testing continues. Note that recurrence is reduced with additional time in vacuum. Analysis pending.
* Revised: HV amplifier failure during Gun/GDE calibration at IWF (S/N1 EDI Gun) (PFR-10160.53-89-IP)
	+ This record replaces that previously recorded in (PFR-10160.53-51-CL. The earlier record had erroneous data and will be marked void.
	+ Problem with deflection channel 2 on Gun SN1 reported during Gun/GDE SN1 calibration at IWF.
	+ Conducted DPA of damaged parts.
	+ Replaced transistor Q33
	+ Replaced op amp U14
	+ Cause: Likely a discharge event that propagated within the GUN.
* [UPDATE] Negative Current spikes seen on Plate 7 Optocoupler during calibration (GUN SN4) (PFR-10160.53-85-AP)
	+ HK data analysis done at IWF indicates problems with several optocouplers. OC7 shows the isolated downward spikes. Manfred (IWF) is confident that replacing the positive side optocoupler will solve the issue. For OC6 the case is not as clear as we do not understand the behavior, so we may have to replace both optocouplers and maybe also the drive circuit for the LEDs.
	+ An FRB, conducted 4 Jan 2013, defined additional diagnostic steps. Another FRB will be conducted to review the diagnostic results prior to any disassembly
	+ Screening of optocouplers: all optocouplers in Gun FM4 were screened. It is pretty obvious that our screening process is not helping us to identify bad parts. Lack of being able to use elevated temperatures may be the most likely factor.
	+ Further activity with SN4 Gun awaits tiger team recommendation.
	+ UPDATE, 1 Apr 2013: UNH has identified screened IWF HVOCs to use for the rework of this Gun and has provided them to IWF.
* Sensor FPGA reset (EDI GDU FM3) (PFR-10160.53-83-IP)
	+ While obtaining additional operating hours in vacuum (UNH vacuum chamber room 145), there were two red limit violations. It was noticed that the MCP supply was off. In looking at the HK data it turns out that all setpoints (MCP ref, preamp ref, MCP limit) were zero, so this was likely caused by a sensor FPGA reset.
	+ Cause: Likely due to a HV discharge within the sensor. Still under investigation.
* GDE Converter Fold Back and Comm Locks observed during TV test (GDU SN FM3) (PFR-10160.53-81-IP)
	+ Three converter shut downs and 1 comm lock observed. Normal operation restored upon reset.
	+ TV test is continuing; data analysis is underway for root cause investigation.
	+ UPDATE: additional observations continue to be made in extended testing in vacuum in the EDI test chamber, Morse hall room 145. This testing is aimed at a better understanding of the problem. Results to be presented to tiger team and FRB.
	+ UPDATE, 5 March 2013. Recurrence stopped during continued operation in vacuum
* GDE Converter Shutdown during TV power-on (GDU SN FM3) (PFR-10160.53-80-IP)
	+ Root cause determined to be current limit setting on GSE power supply. Retest successful upon reset of current limit setting.
	+ The functional test procedures will be modified to use a higher current limit setting of the GSE power supply for instrument power-on. After power-on the current limit will be set back to a lower value. Note that the instrument does not violate the inrush current requirements and the proposed modifications affect merely instrument level testing. There will be no impact on testing on the IS deck or observatory.
	+ UPDATE, 27 Feb 2013: Functional test procedures were updated to specify 0.8A initial current limit for power on. Associated CSTOL test scripts were updated to set current limit back to 0.4A for operation/testing after power-on. Functional test procedures and associated CSTOL test scripts were updated appropriately. Proceeding toward closure.
* Failure to set the Wehnelt voltage (EDI Gun SN4) (PFR-10160.53-78-IP)
	+ During inital tests in vacuum preparing for the calibration of Gun S/N 4 a failure to set the wehnelt voltage occurred (at IWF).
	+ The failure mode could be explained by a damaged transistor on the HV-FIL board.
	+ The HV-FIL board was replaced in SN4 Gun. The suspect board was returned to UNH for test and, most likely, DPA of the suspected part.
* [CLOSED] Increase of beam and filament current (EDI Gun SN3) (PFR-10160.53-73-CL)
	+ Observation made at IWF during calibration with GDE. Evidence of failing filament.
	+ BGS replaced; SN3 Gun/GDE calibration completed successfully
	+ Awaiting further inspection of the defective BGS. Defective BGS was sent back to UNH for refurbishment. Add 24 hr. burn-in for future BGS assemblies.
	+ CLOSURE: BGS was reworked using a new filament. Retest of BGS, including additional burn-in, was successful.

CEB* [NEW] AFG Z-axis measurement unstable during FM4 CEB TV test (PFR-10160.53-98-OP)
	+ During CEB TV the AFG z-axis measurement has exhibited anomalous behavior. During a time of quiet operation (no stimulus) the z-axis measurement has jumped and drifted by +\-50 to 100nT. During a time of stimulus the z-axis did not respond accordingly.
	+ In consultation with UCLA, the suspected cause is a slight change in contact resistance in some element of the GSE harnesss. The TV test is continuing.
* [NEW] Multibit Errors on CRAM (CEB FM4 CDPUB PWA U5) (PFR-10160.53-95-AP)
	+ This observation is similar to that encountered on CEB FM1 CDPUA PWA (reference NCR-10160-53-70).
	+ Cause unknown but may be related to use of the hand-held degauss device used at board level.
	+ Corrective action: As approved by the FRB, we have completed the reload of the FM4 CDPU-B FSW. This included:
		- Single "poke" to verify that address 0x10902c8 could be restored to a 0. Successfull.
		- "Wipe" of the entire CRAM - Conduct "address test" and 4 pattern write tests, leave CRAM all 0's - Successful
		- Reload all FSW - Successful
		- Checksum entire CRAM - Successful.
	+ Use as is disposition agreed at FM4 CEB PER
	+ Residual risk record (ID: 114 in PIMS MMS Project) updated.
* [NEW] Communication errors between the FM4 CEB and the FIS BEB emulator (PFR-10160.53-97-IP)
	+ Cause: Signal noise related to mismatch of LVDS drivers and receivers and mismatch of wiring impedance.
	+ Correction: Add 18 pF capacitors across 100 Ohm termination resistors on clock lines in device (on the GSE board). Retest successful
* [CLOSED] DSP Packet Anomaly (DSP PWA SN05) during FIELDS CPT for CEB FM3 (PFR-10160.53-90-CL)
	+ During the FIELDS CPT for CEB FM3, there was a corrupted packet found during the DSPB side bias sweeps. 4 sweeps were executed, the anomaly occurred in the last segment of the 3rd sweep.
	+ Note that there are no requirements invalidated by this anomaly. This is a single occurrence event, recognizable and the data is completely recoverable.
	+ Cause: Unknown. It is not completely known why this anomaly occurred. It has never been seen in any of the other CEB FMs at any level of testing. Continue investigation for root cause.
	+ CLOSURE: Unable to determine root cause. Use-as-is disposition agreed at FM4 CEB PER. A corresponding residual risk record [PIMS ID: 115] was initiated in the PIMS.
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| 13. Issues and concerns |
|  |  | From FIELDS PM* The pace of Gun/GDE test and calibration activity is likely to slow given that a key engineer for this effort IWF has left the institute. This is the critical path for GDU and FIELDS. The UNH and SwRI teams have identified individuals available to provide additional support at IWF. Details must be worked out and agreed by IWF. Associated ITAR restrictions apply. A new TAA drafted by SwRI is intended to relieve some key restrictions. IWF is considering the provisions of this draft.
* The addition of the EDI HVOC work at UNH places new demands on team members involved in both EDI and SDP. That said, the individuals involved have stepped up to the challenge admirably.
* The HVOC effort’s need for the TV chamber presents new demands on that facility. The FIELDS PM team is working with all involved and with SwRI to resolve resource conflicts and set priorities as needed. For the TV testing in April, the priority sequence is HVOCs, CEB, GDU, SDP.
* A sequence of unanticipated problems with ADP, including AEB, has stretched the available resources at LASP. All problems are addressable, but conflicts of priority between activities at LASP and the need for LASP personnel to support ADP I&T activities at GSFC must be resolved. The FIELDS PM will give the priority to the I&T activities at GSFC recognizing that LASP costs will rise as the in house activities at LASP are delayed.

From LASP* The ADP RE latch opening anomaly and AEB FM3 DAC noise investigation will result in unplanned ADP expenses in February, March and April. The LASP PM will watch these expenditures closely. Current under-spending since the start of FY2013 was slated for ADP post-delivery support labor and travel which was likely underestimated. These unplanned expenditures may impact LASP’s ability to provide post-delivery support within its current contract value.
* ADP RE spare - Waiting for project approval of RE spare. Ron Black indicated the liens and threats to reserves may mean that funding is unavailable for the RE Spare. No developments in March
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NCR Summary: Provided separately (Excel file)

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| Activities planned for next reporting period |
|  |  | Management |
|  |  |  | * Pursue a new TAA for EDI including IWF, SwRI, UNH and selected contractors as parties. The intent is to establish a less restrictive agreement allowing more direct US assistance to the Gun effort.
* Continue to support the GDU tiger team including conduct of HVOC review at UNH
* Review UCLA and U of Iowa cost to completion proposals expected in April.
* Continue to push open RFAs and NCRs to closure
* Continue to prioritize and coordinate the work of the UNH team and its FIELDS partners. Similarly, prioritize and schedule work in the UNH electronics and machine shops and with outside vendors. Note the following.
	+ FIELDS Team, IS and S/C Partners:
		- Continue to use the weekly FIELDS meeting for coordination of near-term activities. Post-delivery support activities are increasingly the subjects of these meetings. Dave Rau and Scott Tucker are key players in coordinating this support.
		- Coordinate IWF and U of Iowa support of GDU integration
	+ UNH team
		- Completion of the HVOC design and the fabrication of flight devices will get priority if conflicts of resources, particularly with SDP, are encountered.
		- UNH will work with IWF to support its Gun testing efforts.
	+ UNH Machine Shop:
		- EDI HVOC fabrication
		- Fabricate remaining SDP Parts
	+ UNH Electronics Shop:
		- EDI HVOC fabrication
		- EDI Sensor stack boards
		- SDP S/C Bracket Wiring
	+ BAE:
		- Vibration services for SDP
* Closely monitor status and schedule performance of team members. Identify schedule risks and provide assistance for mitigation if warranted. Work to minimize schedule slippage.
* Coordinate problem investigations and associated resolution.
* Support FRBs;
* Support/staff the T/V testing as needed
* Update the Gun and GDE schedule.
* Make delivery of the following items from UNH to FIELDS partners
	+ SDP preamplifier/cable assemblies SNs 17&18 (final units)
	+ Deliver 1 refurbished BGS to IWF
	+ Delivery 2 HV&Fil boards to IWF.
	+ Flight spare DFG sensor (to IWF)
* Receive delivery of the following items at UNH
	+ FM3 AEB for rework (from LASP)
	+ SDP probes for retrofit on SDP SNs 5&6 (from Oulu/KTH)
	+ Probes for SDP SNs 13&14 (from Oulu/KTH)
	+ Flight spare DFG Sensor (from UCLA)
* Prepare and conduct the following PERs and associated TRRs
	+ SNs 11 &12 SDP
	+ FM spare SCM Sensor
* Prepare for and conduct following PSRs.
	+ FM4 FIELDS (excl. SDP and GDU)
* Make or coordinate delivery of the following to GSFC IS or S/C teams
	+ FM4 set CEB, AEB, AFG, DFG, SCM
	+ SN3 GDU
* CDRL and contract deliverable submissions:
	+ None planned
* Support/staff T/V testing as needed
* Update the Gun and GDE schedule
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|  |  | Product Assurance, Configuration Management, Parts, Materials, Facilities |
|  |  |  | Turco/Salwen* Continued EIDP work
* Support of flight UNH optocoupler assembly and testing
* EDI Sensor PWA in process inspections
* FIELDS SS#4 PSR support

Software Product Assurance (Heirtzler)* Continue support for EDI and/or CDPU software testing as needed
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|  |  | Systems Engineering & FIELDS I&T |
|  |  |  | Rau / Dors* Perform FM4 FIELDS CPT
* Prepare for and conduct partial FM4 FIELDS PSR
* Plan for and deliver FIELDS Ship set 4 to IS deck 3
* Perform EDI GDU SN03 EMI, magnetic and FIT testing
* Perform EDI GDU SN05 EMI, magnetic and FIT testing
* Compile and release open environmental and FIT test reports
* Continue submitting FIELDS verification material for closure
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|  |  | Post-Delivery Support |
|  |  |  | IS and Observatory Support FIELDS* Deliver EDI GDU SN03 to IS I&T and install on OBS-1
* Deliver partial FM4 FIELDS to IS I&T and install on deck 3
* Support OBS-1 mag boom 2nd and 3rd segment deployments
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|  |  | Science |
|  |  |  | SWT and SWG* Support science telecons as needed

Science data processing activities* Refine drafts for MMS Science Data Products Guide
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|  |  | AFG |
|  |  |  | * Finish DFG Spare Sensor fabrication
* Planned delivery date 4/24/13
* Complete revision of Statement of Work
* Submit revised FY13 to EOM budget
* Ramp up data reduction/software development activities
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|  |  | DFG |
|  |  |  | * Processing of FM4 MAG FIT data
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|  |  | SCM |
|  |  |  | * FM4 PSR on April 22-23.
* FMS Sensor vibration on April 12.
* FMS Sensor thermal vacuum in May. The precise date will be defined later in April.
* FMS overall calibration in June.
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|  |  | EDI |
|  |  |  | Top level* Ship set 1 - GDU SN 3
	+ - FIT Test, Magnetics Test, Pre-ship inspections, Delivery to GSFC
* Ship set 2 - GDU SN 5
	+ - Detector Characterization, EMC, T/V, FIT Test, Magnetics, Pre-ship inspections, Delivery to GSFC
* Ship set 4 - GDU SN 4
	+ - GDU Assembly

Sensor* Ship set 4 - SN 6
	+ - MCP module assembly and final sensor assembly
* Ship Set 3 - SN 7 & 8, Flight Spare
	+ - Board Population (MCP supply board, HV connection board)
* Gun - UNH efforts
* Vacuum Testing of Beam Generation System SN 3 and 11
* HV-FIL board SN 8,9 population

Gun - IWF efforts* Ship set 4 - SN 4
	+ - Assemble Gun
		- Calibrate Gun
		- Deliver Gun and GDE to UNH for Assembly

Optics* Continue work on ship sets 3,4

 UNH HVOCs* Conduct a review of the UNH HVOC design, prototype test results, flight device fabrication, assembly and test plans.
* Continue procurement and manufacture of component parts and materials for FM devices
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|  |  | SDP/LVPS/BEBs/Preamp/Probe (KTH/ Oulu/IRFU) |
|  |  |  | SDP:* Continue fabrication of Deployer test calibration set-up at IRFU. This is to provide high resolution calibration data.

S-BEB’s & Preamp & Probe:* Complete testing of SS#5 S-BEBs, preamp and probes.
* Complete post test SS#4 S-BEBs, shipped to UNH.
* Prepare the test reports for the all shipped units.
* Fix and test the next probes to be refurbished at Oulu.
* Deliver SDP BEBs, associated preamp/cable assemblies and probes for SDPs 13-16 to UNH

A-BEBs and LVPS:* Done

KTH Management and Product Assurance:* Inspection of new SDP HW
* Submission of Final inspection report for SDP FM13-16
* Acceptance data package preparation for all delivered hardware
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|  |  | SDP/LVPS/BEBs/Preamp/Probe (UNH) |
|  |  |  | UNH SDP:* FFT, PER, TRR, vibration and TV test for SNs FM11 & FM12
	+ FFT, PER and vibration TRR were complete by 03 Apr.
* Continued flight model fabrication and integration activities.

LVPS and BEBs* Ship SNs 17 & 18, S-BEBs, preamp and probes to KTH.
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|  |  | ADP/SDP/DSP (LASP) |
|  |  |  | QA/Parts/Materials* Support the project as necessary.

DSP* Complete DSP FM4 timing verification reports

ADP* Complete ADP RE to Boom fit checks for SS3 and SS4 ADPs
* Vibration testing of SN08 RE
* Vibration testing of reworked ADP Launch Latches
* Post-vibration functional testing of SN08 RE
* Preparation for ADP RE installation at Goddard
* Support ADP I&T activities at Goddard

AEB* Investigate AEB FM3 DAC noise issue

SDP* Support SDP integration activities at UNH as needed.

Thermal* No activities planned

Systems and Program Management* Support requirement verification and EIDP prep
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|  |  | CEB Hardware |
|  |  |  | CDPU & BPM (Bodet):* FM boards are complete; spare is kitted. No further activity is planned.

FM4 and FS CEB* Complete FM4 CEB TV
* Flight spare kits are complete. No further activity is planned.
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|  |  | CDPU Software, Support for Operations, I&T and Post-Delivery activities (Needell) |
|  |  |  | * Support CEB4 TVac
* Support FIELDS FM4 delivery to GSFC
* Continued support of post Delivery activities for Observatory 1,2 and IS Deck 4
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|  |  | GSE (Mello, Chutter, Bodet) |
|  |  |  | GSE hardware* No planned activity

GSEOS & GSE Software* Fields TLM spreadsheet updates
* Telemetry Screen Improvements
* Support FM4 CEB TV Testing
* Support I&T Efforts
* SOC Testing
* Keep Software Repository Updated

 FIELDS Simulator (FS)* No activity planed
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