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| Investigation: FIELDS | | | | |
| Progress accomplished this period: | | | | August 2014 Reporting Period |
| 1. | Project Management and Product Assurance | | | |
|  | a. | Project Management   * Still awaiting feedback from SwRI subcontracts group regarding the review of the July 2013 FIELDS cost change proposal. * Submitted the GFY15 spend plan and addressed questions raised following submission. * Supported the following PERs and associated TRRs   + EDI GDU FMs 4 & 8 * Supported the following FRBs   + SDP FM7 deployment stoppages   + EDI GDU FM8 Gun chopper circuit anomaly   + Obs-3 –Z ADP inner guard short - conductive fibers * Supported the following Acceptance Reviews or PSRs   + PSR: SDP FM2, formerly the flight spare (05 Sep) * Received delivery of the following flight hardware items at UNH   + EDI Gun and GDE (SN8) * Delivery of the following flight hardware items from UNH to FIELDS partners   + None. * Delivery of the following flight hardware items from UNH GSFC   + SDP SNs 2 & 8   + GDU SNs 2 & 6 * Prioritized and coordinated the efforts of the UNH team, subcontractors, foreign partners and in-house workshops to optimize schedule performance. * Supported processing of NCRs and risks * Supported EDI GDU TV testing | | |
|  | b. | Product Assurance | | |
|  |  | Turco / Salwen   * SDP FM2 & FM7 TV support and anomaly investigations * EDI GUN and GDU FM9 integration support * SDP FM2, FM7 TVAC testing support, Clean and pack for shipping * SDP FM7 Motor Harness/stalling evaluation support | | |
| 2. | Systems Engineering and FIELDS I&T | | | |
|  |  | Rau, Dors, Needell   * Continued support of SDP SN07 anomaly investigation and resolution * Continued submitting verification material for EDI GDU and SDP SN02 | | |
| 3. | Post-Delivery Support (UNH) | | | |
|  |  | IS and Observatory Support (FIELDS)   * Transported SDP SN02 and SN08 to GSFC * Installed and tested SDP SN02 and SN08 on OBS-2 * Supported OBS-1 and OBS-2 penalty Acoustics Aliveness testing * Supported OBS-1 and OBS-3 ADP deployments and flight close outs * Supported OBS-1 and OBS-3 Mag boom deployments and functional tests * Finished OBS-4 -Z ADP close out * Performed magnetometer boom inspections on OBS-1and OBS-3 * Executed SDP door deployment procedures on OBS-1 and OBS-4 * Supported MRT-10 * Supported MRT-7 on OBS1 DFG boom * Supported MRT-17 run for ASPOC * Installed SDP termination resistors for OBS-1 CPT * Continued development of OBS SDP Sensor Safety Removal procedure * Continued OBS3 EMI RE01 data analysis and equipment calibration * Continued supporting commissioning planning discussions with SOC * Continued I&T planning for FIELDS at the OBS level * Supported OBS WOA and procedure development and PFR/PR resolution * Continued reviewing all test data from previous OBS tests | | |
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| 4. | Science and Science Data Processing | | | |
|  |  | SWT and SWG   * Participation in all science planning discussions.   Science data processing activities (Compiled by Chutter)   * ALL   + Continued working through coordinate system requirements   + Continued working on software to run at SDC   + Continued discussions on how to use MMS-style CDFs (from Cluster data) to test processes, etc. * UNH   + Continued work on EDI E Field interfaces   + Continued review of science and engineering telemetry from observatory level testing   + Worked on scripting to control batch science processing   + Used FIELDS real time displays to detect deployments on observatories at I&T * LPP   + Calibration tables have been updated for the 4 SCM flight models and the spare model.   + The software to select the most relevant calibration table with regard to data has been written.   + Bug fix:     - Wrong calibration factor for TM to Volts conversion     - Use of CDF\_REAL4 instead of CDF\_DOUBLE   + Automatic increment of CDF data file version number is partially done. * UCLA   + Work continues on magnetic field data processing   + Developing inflight calibration procedures   + Work continues on inflight calibration and procedures * GSFC   + L2pre processing now nearly fully-functional: despins data, uses coordinate transformations from THEMIS   + Began work on FDOA quaternion-based coordinate transformation routine   + Met with SPDF to try to find standard methods for dealing with some issues with CDF files   + Investigated change in calibrations at low/high range transitions and ADC transitions   + Analyzed results from MRT tests. Found source of delays observed between different data rates in AFG/DFG data   + Analysis to determine effect on calibrations due to time delays between channels * IRFU   + Adding implementation of data flags to functional version of DCV and DCE processes * LASP   + Working on ADP software | | |
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| 5. | Magnetometers | | | |
|  | a. | DFG |  | |
|  |  |  | * Evaluation of observatory test data * Continued activities in the frame of EDI/MAG data processing and in-flight calibration | |
|  | b. | AFG |  | |
|  |  |  | Pre-launch Preparations   * Louise Lee converting analysis software to Python. * Continued bi-weekly mag team telecons to develop calibration data flow, and magnetic conference procedures * Evaluated data processes tested through MRT9c orbit in the life exercise. Noted that the time delays for different AFG and DFG data rates had not been removed in the Level 1A files. Initiated discussion on when in the data processing sequence to implement the time corrections. Mark Chutter tested the Level 1A code, and reported that the data at different rates were synchronized.   Post-launch Preparations   * Continuing to assess effort requirements to develop and maintain calibration system.   Engineering: Post-delivery Activity   * Watching over activities in assessing LM6142. | |
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|  | c. | SCM | * The SCM EM Sensor was received from UNH and is now is safe storage at LPP. * = | |
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| 6. | EDI | | | |
|  |  | Ship Set 4 - GDU SN4 (was SN9)   * Received GDE/Gun SN4 * Removed GDE SN9 from GDU, and swapped in GDE SN4 * Baseline FFT, PER * Started TVAC test (together with SN8)   Ship Set 4 - GDU SN 8   * Received GDE/Gun SN8 * GDU Assembly (with Sensor SN4, Lower/Upper Optics SN4, Collar SN8) * Baseline FFT, PER, Vibe * Started TVAC test (together with SN4) * Shipped GDE SN9 and partial Gun SN4 back to IWF   Gun - IWF efforts   * Ship Set 4 - SN4   + Shipped GDE SN4 and partial Gun SN4 to UNH * Ship Set 4 - SN8   + Completed calibration; delivered GDE and Gun to UNH   Flight Software   * Continued implementation and testing of electric field mode   HV amplifier trend root cause investigations (UNH)   * Investigations of root cause for LED current drift observed in Guns continue at UNH. We completed tests of the two DEFL boards removed from the SN 4 Gun. These tests have not relived concerns about increasing current trends. We will next remove and subject two of the HVOCs from one board to life testing and prepare a briefing of our findings. * GSFC completed analysis of 4 LEDs removed from problem HVOCs. The reports reveal various defects in LED construction, but we are not able to conclude that these are related to the observed trends. | | |
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| 7. | SDP/BEB/LVPS | | | |

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|  | a. | SDP/BEB/LVPS (KTH/IRFU/Oulu)   * All hardware efforts are complete. * Assessed the impact of the mismatched probes in FMs 2 & 8 that are now paired on Obs-2. The effects of the mismatch can be measured and corrected on-orbit. |
|  | b. | SDP (UNH)  SDP SNs 2 & 8   * Both units (FM2 and FM8) were delivered to GSFC 6 Aug for integration with Obs-2 on 7 Aug. The full flight complement of SDPs is now integrated on the Observatories.   Deployment stoppages investigation   * Reviewed the details of the investigation with John Stone. Sumamry:   + Investigation for root cause continued at UNH with the understanding, again verified in laboratory tests on non-flight hardware, that these stoppages are the result of the motor stalling after a momentary skipping of steps. This understanding is consistent with the assertions that these stoppages are fully recognizable and recoverable and that there is no resultant stress on the electronics or the motor in the stalled state.   + We have also recognized that slower deployment speeds can be used to avoid the stoppages.   + After further review, the stoppages are unlikely a result of problems with the FPGA code or a short time distortion of the clock or command signals. * Next steps defined and agreed. See Plan for September. |
|  | c. | SDP (LASP)   * No activity. |

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| 8. | ADP | | |
|  | a. | LASP ADP Post-Delivery Support Activities   * Obs #1   + Performed post-environmental functional and deployment/release tests on the Obs #1 +Z and –Z ADP Receiving Elements.   + Performed final close out, inspection, and mechanism reset for both the Obs #1 +Z and –Z ADP’s.   + Performed a borescope inspection of the Obs #1 –Z ADP inner guard per PR MMS-WOA-461-MECH-1017-001. * Obs #2   + Performed post-environmental functional and deployment/release tests on the Obs #2 +Z and –Z ADP Receiving Elements.   + Performed final close out, inspection, and mechanism reset for both the Obs #2 +Z and –Z ADP’s.   + Performed a borescope inspection of the Obs #2 +Z and –Z ADP inner guards per PR MMS-WOA-461-MECH-1017-001. * Obs #3   + Performed post-environmental functional and deployment/release tests on the Obs #3 +Z and –Z ADP Receiving Elements.   + Performed final close out, inspection, and mechanism reset for both the Obs #3 +Z and –Z ADP’s.   + Performed a borescope inspection of the Obs #3 +Z and –Z ADP inner guards per PR MMS-WOA-461-MECH-1017-001. * Obs #4   + Performed final closeout and inspection of Obs #4 –Z ADP.   + Performed a borescope inspection of the Obs #4 –Z ADP inner guard per PR MMS-WOA-461-MECH-1017-001. * ADP WOA closure review * Supported MMS IS I&T planning teleconferences | |
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| 9. | DSP, Thermal, Systems Engineering, Product Assurance and Management (LASP) | | |
|  |  | DSP, Thermal - No activities this month.  Systems Engineering and Program Management   * Revised the LASP FIELDS FY2015 spend plan per feedback from UNH. Submitted updated spend plan to UNH.   Quality Assurance, Parts, and Materials Engineering – No LASP activities | |
| 10. | CEB | | |
|  | a. | Hardware | |
|  |  |  | * No activity. CEB hardware activities are complete. |
|  | b. | CDPU Software and FIELDS test support (Needell) | |
|  |  |  | * Supported ADP RE testing as needed * Supported Magnetometer functional testing post 3rd motion as needed * Prepared and delivered scripts for SDP Door deployments - Executed successfully on OBS1 and 4. * Supported OBS1 and OBS2 Acoustic tests (Pre/post aliveness tests) * Supported SDP (FM02,FM08) integration on OBS4 |
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| 11. | Commissioning and Mission Operations (Needell) | | |
|  |  | * Supported MRT10 - OITL (48 test using all OBS ) * Continued participation in Commissioning planning telecons with MOC. * Continued working with SOC on Commissioning Activity planning and script review. * Continued working with SOC on MRT17 planning and script development | |
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| 12. Problems encountered and updates this period | | | |

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|  |  | ADP   * A problem was encountered during the Obs #3 –Z ADP Functional Test. A short was detected between the ADP inner guard and ground. The root cause was determined to be a loose conductive fiber from the ADP boom lacing ties that was bridging the inner guard surface to a connector backshell. The fiber was removed. Five other ADP’s were inspected and several more fibers were removed. None of these fibers were causing shorts.   SDP   * [CLOSED] Boom wire deployment stopped during cold TV test of FM2 and FM7 (parity error) (PFR-10160.53-144-AP)   + There was a wire boom deployment stoppage of SDPs FM2 and FM7 during the 3rd cold deployment segment of the TV test. This was traced to a communication (parity) error that occurred while reading torque monitor data. The SW is designed to stop deployment when this occurs. The subsequent completion of deployment for that segment was normal.   + Acceptable behavior. Fully recognizable and recoverable. UAI was agreed to during FRB with UNH, GSFC and SwRI on 08/05/2014. JG 20140806   + Residual Risk tracked on IS level.   + CLOSED * [UPDATE] Increased torque monitor readings near end of cold TV deployment test (FM7) (PFR-10160.53-145-IP)   + Torque monitor data prior to this stoppage shows a gradual torque increase spanning several meters and a deployment stop when the torque reached the limit setting of 1.5 in-lb.   + Suspended TV deployment testing of FM7 so that it could be studied when the test of FM2 (flight spare) was complete.   + With FM2 removed from the TV chamber and the QM BEB in its GSE position, and without touch ing FM7, deployed additional lengths of the FM7 boom wire while observing wire motion. Wire motion seemed normal, but torque values remained in high range (~1.3 in-kb). There ws a torque trip when 1 torque monitor sample read 1.5 in-kb.   + Increased the torque monitor limit to 1.75 in-kb. The subsequent 1.1m boom wire deployment to the full 57m length completed successfully alt hour the torque monitor readings remained in the high range (~1.3 in-kb). Wire motion appeared normal.   + With the 57m deployment complete, Granoff used a probe to feel the wire coils visible through the slot. These coils appeared normal and could be moved freely. An additional 78cm deployment segment was performed. Again, wire motion appeared normal but the torque monitor readings remained in the same high range.   + Four 1-m retractions went smoothly and the torque monitor readings were what we had seen in previous retractions.   + A subsequent 4-m deployment to the 57m length was successful with the nominal (lower) torque readings (~0.7 in-lb).   + Subsequent full retraction and re-stow completed normally with nominal torque.   + UPDATE: Keep FM7 at UNH as flight spare. NO FURTHER ACTION IS PLANNED. * [CLOSED] Boom wire deployment stopped during cold deployment in TV test (SDP FM2) (EMI-related) (PFR-10160.53-143-IP)   + The SDP SN2 boom wire deployment stopped after 5m during the 1st 14-m cold deployment segment (17 July 2014).   + A second, similar, SDP SN2 boom wire deployment stoppage occurred (30 Jul 2014) during a second round of TV testing following a change of some of the GSE cables to match the 100 Ohm impedance of clock signals. This impedance mismatch was thought to be related to the cause. IN this case the boom wire stopped deploying on the 1st cold deployment segment after 2m of the 14m segment.   + Subsequent cold deployment segments to the full 57m deployed length were all successful.   + Analysis     - Preliminary: Tests with GSE and EM hardware identified disturbances on the LVDS clock lines related to the impedance mismatch of the GSE cables. 100 Ohm cables yield much cleaner clock signals.     - During second round of cold deployments after changing to 100 ohm cable, FM2 stopped deploying on the 1st cold deployment segment after 2 of 14m.     - The motor currents, monitored with an oscilloscope during deployments, are observed occasionally to fluctuate. These were more stable using the 100 Ohm cables but were still seen to fluctuate occasionally.   + Cause: Interference (EMI) from external sources is suspected but not proven.   + Proposed action: None. These events are fully recognizable and recoverable. Tracked as risk [159] at the MMS level in the PIMS.   + CLOSED * [UPDATE] Boom wire retraction stopped during stowing process (SDP FM7) (PFR-10160.53-138-IP)   + The SDP SN7 boom wire retraction stopped during re-stow following successful FFT. The remainder of the stowing operation completed normally.   + Symptoms are similar to deployment stoppages observed in TV but included a slight rise in motor current. This feature is consistent with earlier measurements during EMI susceptibility testing.   + FRB (6 June 2014) recommended disconnection of the pinion gear and assessment of motor sound in three deployer orientations.   + Motor sound testing prescribed by the FRB revealed no mechanical concerns regarding the motor/gear box assembly.   + FRB (20 Jun 2014) recommended conduct of a cold TV boom wire deployment of the SN7 as well as environmental testing of the flight spare (SN2).   + During TV test, the door and first motion deployments were normal (7/10-15).   + (7/15-16) During the setup of the GSE for subsequent boom wire deployments there were three stoppages on SN7.   + An incremental approach was then used. First the CEB was replaced from the silver "MAG" CEB to the black "SDP" CEB. The deployments to the 3m length needed for this setup were completed successfully.   + 7/17-18: FM7 deployed the full 57 m length of boom wire over the two cold plateaus without any stoppages.   + 7/21: During the subsequent retraction (at ambient temperature and pressure), a number of stoppages were seen.   + During a meeting held on 7/18/14, it was determined that the clocks could become asynchronous and cause the motor to become out of synch. This issue would point to the LVDS drivers. It was further noted that the CEB and cabling used during the TV tests were not the same as used in Rm 160 where only 1 stoppage had occurred.   + It was also noted that 100 ohm cable was not used. 100 ohm cable is used on the S/C flight harness. Not using 100 ohm cable could effect clock time on the LVDS lines to the BEB from the CEB. A comparison was done between the cables presently used in the TV testing and the 100 ohm cable. The slides summarizing this comparison are attached.   + 100 ohm cable that is used during FIELDS FIT testing was then used. While the clock signal lines looked better, stoppages still occurred during retraction.   + FRB was held on 7/21: Focus during this FRB centered back to the motor harness assembly. It was agreed to put a spare motor in place to allow retraction to continue for FM2. This retraction occurred without any stoppages.   + FM7 motor was put back inline to facilitate retraction of FM7 with 100 ohm cable in place, monitoring current signals. Before pluggin the motor back into FM7, a safe to mate was performed. It was found that there was an intermittent short between pin 2, AD590 shield and chassis. Breakout box was kept in place to monitor short during retraction. cable was also flexed and pushed to induce the short. Short could not be replicated and retraction of FM7 was completed.   + FRB held on 7/22 to update progress. Since the intermittent could not be duplicated it was determined that the best course was to replace the motor cable assembly. This was done 7/23.   + During inspection of the FM7 motor cable assembly, it was found that the shield wire soldered to the outer braid of the AD590 cable had punctured through the insulating kynar tubing and was contacting the out aluminum tape shield connected to chassis. Pictures of this puncture are attached.   + Actions     - Replace the motor/harness assembly on FM7     - Replace the TV GSE CEB to BEB harness with a new GSE harness made with 100 Ohm cables for the command, data and clock lines.     - Resume the TV test to include additional hot, then cold boom wire deployments.   + The TV test (FM7 and FM2) was repeated. Two EMI-related stoppages attributed to FM2 were observed despite the change to 100 Ohm cables.   + UPDATE: SDP FM7 is now the designate flight spare. No further test acivity is planned.   EDI   * [NEW] EDI GDU SN8 Converter Shutdown during TV (PFR-10160.53-153-OP)   + During TV test of GDUs FMs 4&8 at UNH while conducting the last FFT in vacuum at ambient temperature, there was a converter shutdown of FM8 during the Wehnelt / coding frequency scan at 1keV and another converter shutdown 23 minutes later while reconfiguring the unit to complete the test.   + We suspended further operation of GDU 8 in TV and completed the FFT of GDU4.   + We broke vacuum and moved GDU FM8 to the room 145 chamber and are conducting the detector characterization measurements. We will report results when that testing completes. * [NEW] Single-sample Red Limit Violation of MCP Supply Current (GDU SN8) (PFR-10160.53-152-IP)   + While performing the Limited Functional Test at the third hot plateau during the TVAC test of GDU SN8, a single-sample red limit violation of the MP Supply current occurred at 2014-09-02 18:40:27 UTC. At the time of the occurrence the GDU was configured for 1keV energy and the beam current had been ramped up.   + All other HK parameters were nominal at the time of the red limit violation. This kind of single-sample limit violation has been seen to occur as a result of either noise in the LVDS lines or due to HV discharges. * [NEW] Red limit violations Upper Deflector & Injector during FFT in vacuum (GDU FM8) (PFR-10160.53-149-OP)   + During GDU FM8 FFT in vacuum the LED currents of Upper Deflector and Upper Injector went OOL (+39/-40 mA) for 7 HK samples while exercising extreme optics voltage combinations (Upper deflector 3.5kV, Upper injector: 0V). After that the optics performed normally throughout the test.   + 25 Aug 2014: The condition has been seen repeatedly. At the last occurrence on Aug 23, 2014, during the repeat of the FFT the condition did not reset itself within 4 minutes. When continuing with the next test step of the FFT that reconfigured the optics voltages a communication lock occurred.   + The TV testing continued and completed on 7 Aug without recurrence of this condition. * [NEW] Slowly increasing primary current in FFT ambient mode configuration (GDU FM8) (PFR-10160.53-150-OP)   + During the FFT in vacuum of GDU FM8 in ambient mode test configuration (which is used in the FFT to demonstrate that we are below our Slow Survey power allocation) we were just barely below our power allocation, and the primary current was climbing slowly but steadily.   + Simulations have identified a failure mode of the chopper circuit that matches these observations.   + An operational work-around was defined and discussed at the 25 Aug 2014 FRB and has been used successfully in subsequent testing, including GDU8 TV.   + Operating constraints:     - Ground Testing: revise test procedures to omit testing with DC beam and ensure the chopper is in the OFF state when disabling 5V power during the transition to Slow Survey     - In-Flight: ensure the beam chopper is always alternating * [NEW, CAN BE CLOSED] Power derating of R20 on Gun HV-Fil board is exceeded in GDU FM8 (PFR-10160.53-148-AP)   + During fully assembled testing with the associated GDE, due to higher than expected resonances, the power going through R20 on the HV Filament PWA is 120mW. The derated power value per EEE-INST-002 is 90mW. The rated power of R20, which is M55342K06B20DR at 70C is 150mW.   + The beam chopper anomaly reported in PFR 10160-53.146 causes a noticeably increased power consumption when operated statically in the ON state, but also a slightly increased power consumption when operated at the beam coding frequencies. This extra power can perhaps explain the additional current drawn on the GUN 25V supply that was believed to be due to off-resonance HV supply operation, causing stress of R20.   + We now understand where this increased power consumption comes from – the chopper. There is no stress on the R20. This PFR can now be closed. * [NEW] Beam chopper anomaly (FM8 Gun) (PFR-10160.53-146-IP)   + From Steller, 8 Aug 2014: During beam profile testing at IWF at higher temperature levels, above 30°C or 35°C, the beam tends to switch to OFF when operated in “no code” mode. Since the CINV is not toggled it looks like the chopper in the gun is switching to off status. As long as we run the code we do not see a problem. During the max beam current measurement we will see how often this failure case occurs.   + Continuing with GDU testing. During the Baseline FFT in Vacuum it was noticed that the Slow Survey power consumption was out of family and very close to the power allocation. Moreover, the power consumption was not steady, but increased slowly beyond the allocation. Additional diagnostic testing on Aug 22, 2014, revealed that the current increase was related to the state of the 5V\_A supply. In the OFF state of this supply the primary current of the instrument was non-nominal and it increased slowly. This points to a problem with the beam chopper circuit. Further diagnostic testing would require disassembly of the GDU.   + UNH recommendation that environmental testing of GDU8 proceed was agreed by the FRB. The risk associated with a use-as-is disposition was presented and discussed. THIS PROBLEM IS BEING TRACKED IN PFR-150. * [UPDATE] Low Beam Current at 500 eV (EDI GDU FM9) (PFR-10160.53-136-OP)   + During the first functional test in vacuum (room 105 chamber) of GDU SN9 we did not get enough beam current out at 500 eV. At 1keV things were just fine.   + UPDATE     - FFT retest in room 145 chamber, per FRB recommendation, showed situation at 500 eV was unchanged, and that we now had the same problem at 1keV.     - Corrective action: FRB recommended replacement of the BGS with the available spare (BGS SN13) and conduct of measurements to assess the impact on calibration.     - Test of the Gun/GDE SN9 with the new BGS showed adequate beams but a discrepancy of ~3 degrees in the pointing. Subsequent checks of the alignment in the test setup and beam tracing calculations provided evidence that MGSE alignment and the effect of magnetic field could account for the discrepancy. The decision was made to proceed with GDU reintegration and retest.     - The GDU 9 FFT in vacuum (room 105 TV chamber) showed nominal results except that the azimuthal scan across the hole in the Maheu hat revealed a change of about 2 degrees in azimuth from the test performed with the previous BGS. Approximately 1.5 degree of this change remains after accounting the effects of the magnetic field differences in the 2 chambers.     - The GDU9 PER recommended proceed at risk. Accept this amount of deviation from IWF calibration and develop an algorithm for in-flight corrections. A separate NCR (PFR-10160.53-139) was initiated and a residual risk (PIMS ID 125) defined.     - [UPDATE] Cause/Status: Awaits completion of retest and inspection of the removed BGS. Retest found higher than expected beam current. Inspection is pending. NCR to remain open pending this investigation * [UPDATE] Beam pointing deviation relative to the Gun/GDE calibration (GDU FM9) (PFR-10160.53-139-OP)   + The FM9 Gun Calibration at IWF is not 100% valid after the exchange of the beam generation system. See PFR-10160.53-136. A pointing deviation of about 2 degrees between the calibration and the actual pointing with the new BGS has been determined in testing at UNH.   + Actions (UNH):     - Prepare the inflight calibration plan for presentation at PSR.     - Retest in the room 145 chamber     - Retest (9 Jul) produced similar results     - [UPDATE]: No further hardware action is possible. Close this NCR with a UAI disposition and track the residual risk and associated mitigations. FIELDS Risk ID 126 has been initiated to assess the residual risk and define mitigations. * [UPDATE] Upper Injector +140V offset (EDI Gun FM4) (PFR-10160.53-137-OP)   + During the functional test of the reintegrated FM4 Gun, IWF measured a+140V offset in Upper Injector. The+140V offset is linear over the full range from 0...2000V. This appears to be a fixed offset, not a gain error. This voltage is provided by a channel in the Gun Optics board (the half board). The test was performed on 12 May and repeated on 13 May with the same result.   + The SN 4 EDI Gun was disassembled at IWF to investigate the voltage offset on the Optics board UI channel found during Gun stack testing. The offset was not observed in subsequent board level testing.   + [UPDATE, 8 Sep 2014]:     - Gun SN4 has been set aside so that IWF resources could focus on Gun SN8.     - IWF is once again investigating Gun SN4. IWF performed reflow of solder joints on one HV resistor on the Optics board and is reassembling the 3-board stack. We are awaiting the results of the subsequent test. * [UPDATE] Lower than expected impedance measurement during safe to mate (EDI GUN FM8) (PFR-10160.53-133-IP)   + During the safe to mate incoming receiving inspection test at UNH, a lower than usual impedance measurement was seen across the +5V line (P5V2) to ground: (800 Ohm versus ~4M Ohm for earlier units). IWF reported also that their incoming test at UNH showed a higher than previously measured and out of family supply current at the P5V2 line. The Gun performance is otherwise nominal   + Tests at UNH by UNH and IWF to investigate the cause of the anomaly, including tests in vacuum, have identified possible sources of the problem. Partial disassembly is required to further isolate the problem. The Gun/GDE were returned to IWF for further investigation, rework and recalibration.   + IWF has isolated the problem to the Beam Board. IWF will replace the beam board with a new one assembled at UNH.   + [UPDATE, 8 Sep 2014]: Gun 8 has been reassembled and tested using the new beam board. The FM8 Gun/GDE calibration and the subsequent integration with GDU8 are complete. Closure awaits completion of the GDU 8 environmental testing and detector characterization. |
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| 14. Issues and concerns | | |
|  |  | From FIELDS PM   * The EDI GDU deliveries are the critical path for FIELDS.   + With Project approval, a truncated testing plan for GDU FM8 is being exercised. The plan included 8 rather than 12 TV cycles. The delivery and integration of the GDU pair (FM4 and FM8) on Obs-4 is on track for 15 Sep. This will complete the flight compliment of 8 GDUs. That said, these units are being delivered at risk given use-as-is dispositions of NCRs. See NCRs in problems sections.   + We will build the FM9 GDU as the flight spare. In Dec we will evaluate the relative status of GDU FMs 8&9 and consider with the Project whether replacement of FM8 with FM 9 on Obs-4 is warranted.   + UNH will offer support for Gun and GDE I&T activities at IWF. * The risk record regarding GDU performance and schedule (PIMS ID 176, MMS Project) is being used as a tool to help coordinate mitigation efforts.   + GDU-specific mitigations are now identified in the risk record. * Improved understanding of the occasional deployment stoppages of SDP wire booms provides relief of the associated perceived risk. Our findings include that there is no resultant stress on the electronics or the motor when in the stalled state and that slower deployment rates can be implemented to avoid the stoppages.   From FIELDS SE   * OBS-3 ADP +Z Boom Canister B-side thermistor is not operational and may be left that way for flight   Science Data Processing Issues (Compiled by Chutter)   * GSFC   + In order to finalize the L2pre software, need direction as to whether we should still split the AFG/DFG L2pre/L2 data into two separate products: one for science, and one for use as an input to further processing   + The issue of where timing corrections get applied has come to everyone’s attention. AFG/DFG processing code may need to be extended to handle delays between samples |

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| Activities planned for next reporting period | | | |
|  |  | Management | |
|  |  |  | * Prepare contract modifications for U of Iowa, UCLA and LASP based on modification expected from SwRI for FIELDS July 2013 proposal. * Continue to review and update the EDI GDU delivery and risk mitigation. * Continue to push open NCRs to closure. Support FRBs as needed. * Continue to prioritize and coordinate the work of the UNH team and its FIELDS partners. * Receive delivery of the following items at UNH   + None * Delivery of the following flight hardware items from UNH to FIELDS partners   + None * Make or coordinate delivery of the following to GSFC IS or S/C teams   + EDI GDU FMs 4 & 8 * Prepare and conduct the following PERs and associated TRRs   + None * Prepare and conduct the following PSRs or Acceptance Reviews.   + PSR: EDI GDU FMs 2-8 * Prepare for the MMS PSR. Slides due 06 Oct. * CDRL and contract deliverable submissions:   + None planned |
|  |  | Product Assurance, Configuration Management, Parts, Materials, Facilities | |
|  |  |  | Turco/Salwen   * SDP FM2 PSR support * SDP FM2 EIDP uploading * EDI GDU test and integration support as needed. |
|  |  | Systems Engineering & FIELDS I&T | |
|  |  |  | Rau, Dors, Needell   * Perform refurbished GDU SN04 EMI, Magnetics, and Acceptance Test * Perform GDU SN08 EMI, Magnetics, FIT and Acceptance Test * Support SDP SN02 PSR and prepare for EDI GDU and mission PSR's * Continue submitting FIELDS verification material for closure |
|  |  | Post-Delivery Support (UNH) | |
|  |  |  | IS and Observatory Support (FIELDS)   * Support OBS-2 ADP deployments and flight close outs * Support OBS-2 Mag boom deployments and functional tests * Perform magnetometer boom inspections on OBS-2 * Execute SDP door deployment procedures on OBS-2 and OBS-3 * Finish development of SDP Sensor Safety Removal procedure for OBS level * Install SDP termination resistors for OBS-2 and OBS-4 CPT's * Support OBS-1, OBS-2 and OBS-4 CPT * Deliver, integrate and test GDU SN04/08 on OBS-4 at GSFC * Continue I&T planning for FIELDS at the OBS level |
|  |  | Science | |
|  |  |  | SWT and SWG   * Support science telecons as needed   Science data processing plans   * ALL   + Work on INITIAL versions of software by end of November   + Use SPDF tools to verify CDF and skeleton files follow MMS CDF Guide   + Work on error and warning management   + Support SODAWG * UNH   + Work on real time data display for EDI and DFG/AFG   + Continue working on EDI E Field interfaces   + Work on RunEst software (for E Field and mag spin axis calibration)   + Continue work on scripting to control processing   + Continue L0 to L1 software updates as necessary * LPP   + [in progress] Analyze the results of the MRT9 data test and correct the software where needed.   + [in progress]Test further the SCM calibration software with the new SCM L1A   + [in progress] Include CDF version number computation (vX.Y.Z)   + L1B data will be delivered in both SCM123 and OMB reference frames as decided on the data processing group meeting, Iowa, March 2014   + Include coordinate transformation from mechanical frame OMB to GSE in L1BtoL2   + [new] Produce and check CDF skeleton files fully ISTP/MMS standard compliant. * UCLA   + Continue developing in-flight calibration procedures   + Continue converting analysis software to python   + Work on MMS Products Guide * GSFC   + Continue work with LANL and DSWG to define for attitude/ephemeris data product and transformation software.   + Work on fully functional L2pre software: finish DMPA-GSE transformation.   + Modify L1B and L2pre software to handle data overlap, fine timing corrections.   + Create MMS-style attitude/ephemeris from Cluster attitude/ephemeris.   + Work on coordinate transformation software required for L2 data production.   + Work out and implement a reasonable versioning scheme for the L1B, QL, and L2pre data products.   + Work on calibration document: timing corrections; plans to modify calibration file: add uncertainties and temperature correction * IRFU   + Generate test files using Cluster data   + Discuss interaction between ADP, SDP and EDI processing * LASP   + Continue improving DCE software |
|  |  | AFG | |
|  |  |  | * Continue work on data products guide. * Continue developing inflight calibration procedures. * Continue software analysis activities. * Continue discussion of time-lags for different data rates |
|  |  |  |  |
|  |  | DFG | |
|  |  |  | * Continue support of observatory testing. |
|  |  |  |  |
|  |  | SCM | |
|  |  |  | * FMS ADP: final review still to be completed. |
|  |  | EDI | |
|  |  |  | Ship Set 4 - GDU SN4   * Finish TVAC test * EMC, Magnetics * Fields Acceptance Test, Cleaning/Bagging * Ship to GSFC   Ship Set 4 - GDU SN8   * Finish TVAC test * Detector Characterization * FIT, EMC, Magnetics * Install GeBk tape * Fields Acceptance Test, Cleaning/Bagging * Ship to GSFC   Gun - IWF efforts   * Gun SN4   + Continue investigation of offset problem on OPT\_DEFL board   + Assemble board mini-stack (3 boards) and re-test   + Complete Gun assembly, functional testing   Flight Software   * Generation of tables * Testing of FSW Build 06 (including tables) * Generate Load scripts   Investigation of HV amplifier trends   * Perform life testing on two HVOCs removed from one of the FM4 Gun DEFL boards. * Report findings to Project |
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|  |  | SDP/LVPS/BEBs/Preamp/Probe (KTH/ Oulu/IRFU) | |
|  |  |  | * Support commissioning planning activites |
|  |  | SDP/LVPS/BEBs/Preamp/Probe (UNH) | |
|  |  |  | UNH SDP:   * Prepare for and conduct the PSR for FM2, now paired with FM8 on Obs-2. * Deployment stoppages root case investigation: Next steps:   + Continue to study the chain between the FPGA and the motor controller.   + Presently setting up for testing on the IVM-BEB in the thermal chamber to review the effects that temperature has on the signal into and out of the isolation transformer / Flip-Flop (reset/set) circuit.   + This will be followed by a similar test on flight like hardware.   + The intention is to see if colder temperature delays signals such that margins are reduced at the Flip-Flop input/output. Such an effect would indicate additional susceptibility to missed steps.   LVPS   * No activity planned |

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|  |  | ADP/SDP/DSP (LASP) | |
|  |  |  | ADP   * Support observatory I&T at Goddard as needed.   Thermal   * Perform thermal analysis of ADP preamp in deep eclipse   Systems and Program Management   * Support project as needed. |
|  |  | CEB Software and FIELDS test support (Needell) | |
|  |  |  | * Support pre Ship CPTs on all 4 OBS. * Support Magnetometer functional testing post 3rd motion as needed * Support EDI integration to OBS4 as needed |
|  |  |  |  |
|  |  | Commissioning and Mission Operations (Needell) | |
|  |  |  | * Continue participation in Commissioning planning telecons with MOC. * Continue working with SOC on Commissioning Activity planning and script review. * Continue working with SOC on MRT17 planning and script development |
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