5Nov2013_ISISPDR

Tuesday, November 05, 2013
7:10 AM

Attendees:
Reviewers: Glenn Mason, Ken Wagner, Hari Nair, Lawrence Brown, Kristin Wortman, Chris Hersman, Alan Holtzman, Stuart Hill, Dave Persons, Susanna Petro

Other attendees: Weidner, McComas, Dickinson, Angold, Birdwell, Seifert, McNutt, Cummings, Christian, Fretz, Hill, Kinnison, Lori Suther, Becker, Cook, Kecman, Petty, [PM], Tycho, Gurnee, Do, Michell, Stone, Mewaldt, Edlund, Dirks, Tumlinson, Alexander, Schwadron, others

FORMAL NOTES

McComas 05: ISIS Science

Petros questions 16%

McComas answers it has to do with 6 bins/decade

Hersman asks about uses of data sets: are there any other instruments that you want to coordinate your measurements with?

McComas answers: we are not driving requirements to them

Hersman: Sometimes there are assumed requirements from other teams

McComas: we are really not driving their measurements

Mason: Science drivers slide: no drivers about minimum intensity

No requirement that says you can measure ions

McComas: it is in other documents

When you get close to the sun, there is a concern about maximum intensity

Dickinson 06: ISIS SE

[presenting]

- Fix the power summaries so that all instrument power isn't summed
- Ensure NTEs are shown on resource slides

McNutt 07: EPI-Lo Sensor

Mason: Where is the Parker Spiral on the FOV plots? Why are there such sparse pixels in that direction?

McComas: you need to sample large pitch angles

Mason: Real viewing is almost perpendicular to the PS direction

McNutt: it's a good point; we have been weighing mass trades

Get a good enough sample in as much as the sky as possible to match L1 Sci reqs

@ Mason: Point out the PS on the FOV plot

McNutt: agrees; we will mature the graphics

Petros: there are gaps in the FOV; do you measure the percentage of how much you are losing w/gaps and is it acceptable to L1 sci reqs.

McNutt: we did much analysis; doesn't have numbers off top of head

Petros: it would be nice to have these numbers tracked as a resource

Mitchell: mag field moves around a lot; it will be in/out of FOVs in short time

Strong convective component; low energies for prime science

Convective velocity is important; will move the sweet spot into the clustered FOV

We'd love overlapping FOVs, but it is not possible

We look into the hemisphere that is not obscured by S/C

Petros: interested in calibration; believes there are numbers on sky coverage
Mitchell: we have geometry factors; hasn't calculated percentage gaps
Try to make a continuous band along great circle
McComas: there was only a band in the SDTD, so EPI-Lo seems FOV rich
More discussion
Mason: slide 10: are the electron emitting foils at a bias or grounded?
Mitchell: they are grounded
Mason: Black grid is at a plus voltage; penetrators will be producing secondary electrons
McNutt: we are looking at trajectory mappings; looked at dispersion
You have to be in a specific area of the MCP to get a count
Persons: If the MCP shifted 5000th of an inch, how would that expect your science
McNutt: we haven't checked this
Persons: You will go through cal, then vibe; how do you track the tolerances
Mitchell: we've specified tolerances on all of these things
5000ths wouldn't make a bit of differences
Brown: circle locations masks in HW or SW?
McNutt: HW
Mason: Rest of the plate sensitive? Does spot in between produce a cascade
McNutt: no
Mason: MCPs are not coated?
Mitchell: the masking is accomplished at 2 levels: exit plane w/holes/grids; shims are also solid; MCP won't multiply at any locations except where unmasked
Mason: why do any particles fall outside the circles?
Mitchell: it's a simulation; it is notional for grid planning
Hersman: does SSD need to stay cold?
McNutt: no; we are ok w/thermal limits in thermal design
Mason: UV supression is a function of wavelength; what wavelength are you talking about?
Christina: Ly-alpha
Mason: that's easy to get rid of; what about shorter wavelengths?
Mitchell: we have Palladium as well to block UV
Aluminum-Palladium-Polyimide foil with carbon for conductivity

Gurnee 08: EPI-Lo Tech Dev - 10:15-10:38
Petros: How do you define TRL6?
Gurnee: realistic prototype in a Space-like environment
Petros: you need to make measurements in the environment; need to test all energies, all possible fluxes
Gurnee: presentation goes over testing
Gurnee: also has heritage instruments; spot check on the ground
Petty: focus on critical measurements and critical environments
Petros: where is the plan/justification on critical environments
Petty: the tech dev plan has rational as to why certain things are not critical
Emphasize the similarities
Mason: what is the area of the detector?
Gurnee: approx. 1cm2
Wagner: slide 9: do you meet the requirement?
Gurnee: requirement is <400ps - small is good; narrow is good
Hersman: slide 12: on metal there are squares; on the sim, there were circles
Gurnee: it was done for simplicity of layout; FM will be circles; performance doesn't make a difference
Hersman: if it doesn't make any difference and squares are easier, why use circles

Gurnee: it is optimized
Wagner: slide 15: what's the difference between the 1st, 2nd, 3rd version of ASICs
Gurnee: extremely detailed answer; analog ASICs are sensitive and can always be improved; 1st version would have been fine; subsequent are slight improvements
Wagner: it is changes in the silicon
Gurnee: yes
Wagner: are you locked in on a design
Gurnee: yes
Wagner: when do you know your done?
Gurnee: we're done
Persons: talk about daughter board: is it in FM config?
Gurnee: GSE board
Petros: where's the technology readiness plan?
Weidner: we will send it
[discussion with Kinnison on who reviewed/approved the plan]

Cooper 09: EPI-Lo Mechanical - 10:40-11:18
Hill: does ICD capture interface to the bracket
Cooper: orientation/location of instrument w.r.t. S/C
Dickinson: there is a separate ISIS MICD that captures this
Hill: what size are torlon screws? Have we used them before?
Cooper: #4; not that he can think of
Hill: are there any lessons learned knowledge base on the screw? Torque, use, derating, etc.
Cooper: can't say; part of development is to make/test them
Folks that make the screws recommend 70-80% derating
Hill: what size are collimator screws
Cooper: very small; #1s
Collimators still a design in progress
Persons: What is the red thing made of?
Cooper: Aluminum
Hersman: EPI-Lo sits inside bracket; is there any MLI between that and the bracket
Cooper: mounting interface is thermally isolated; more info in thermal presentation
Hersman: if we need it, is it a mechanical issue; this is one of the reasons for the ISIS MICD
Mason: tell us the thickness of the wedge grid; mounting, holes, size, etc.
Gurnee: there's an exploded view that might be better
Persons: mention the materials of each piece while you're talking about them
Persons: if you are not happy placement of MCP, how could you adjust
Cooper: you could change the spring, or thickness of spacers
Persons: how are you sizing the preload?
Cooper: quasi-static load factor on the mass of assembly
More than load factor for the instrument: 60 Gs?
Mason: what is the thickness of the MCP
Someone: each one is 1.5 mm
Mason: thickness of wedge grid
Cooper: nickel, 5 mils thick
Hersman: are you worried about the 2 middle apertures causing stress on the wedge cover; holes for collimators
Hill/Cooper: probably not a concern
Persons: CTE mismatch between wedge cover and wedge grid; what are requirements

from science standpoint?
Cooper: not aware of a number
Sidebar requested with Cooper later
@ Persons: worried about geometric changes in the wedge that affect science
Worried that wedge grid will go under tension, buckle-up
McComas: Don can participate; have a side bar
Sidebar with Mitchell, Hill, Persons
Hill: purge interface - do you have purge requirements?
Cooper: yes; we haven't fleshed it out in the design
Hill: Have a plan for hard-cover?
Cooper: yes
Hill: where is the ground point?
Cooper: not defined yet
Persons: he has been through the package; what is the programs plan for putting all 3 models together and re-running the analysis? Solder joining stresses, board responses, bracket coupling; analysis as a unit
Weidner: this will be lead by Alexander

Gurnee 10: EPI-Lo Electronics - 11:19 - 11:55
Wagner: Why is EPI-Lo 25 kRads and EDTRD 80 kRads?
Gurnee: FASTRad analysis determines radiation at specific points on the S/C
Susanna: HV power supply: is it designed in a way that you can operate at lower voltage than maximum? What's the low voltage?
Gurnee: yes; max: 3300V; you can operate continuously over the full 0-3000 range; we have 4 supplies, individually controlled
Wortman: are those internal test pulsers? Do you have externals?
Gurnee: yes
Hersman: is POR redundant?
They have 2 parts on the board
Wagner: are you comfortable with just 18 spare FPGA I/Os?
Gurnee: it sounds tiny, but we have wired up everything, and even have chips that are wired and unused
4 spare TOF channels are wired up with 40 extra I/Os
Wagner: socket or soldered down?
Gurnee: slide 14: Aldec prototyping
Can put the socket down, but can't stack the boards
Wagner: 1.5V core voltage 5%; 75mV tolerance; where is it generated?
Gurnee: came up at peer review; generated at LVPS; action item response determines voltage drop on this rail
Wagner: there is no sense wire?
Gurnee: no; voltage drop is 20-30mV
Susanna: 40% resource margins (FPGA utilization) is good
Gurnee: processor is extremely compact; 10% of resources
Mason: what is difference between start 1/start 2?
Gurnee: S1/S2 read out preamps from different sides; used to identify pad
Redundancy is in S1 to stop, S2 to stop measurements
Mason: if S2 goes away, how do you know which side it came on
Gurnee: this would be a major failure; it's not redundant hardware
If you lost a single TOF chip, you would still be able to make the measurement
Hersman: does pad dimension (square vs. circle) matter?
Mitchell: no
Mason: what's the total delay?
Gurnee: 1/2 ns per delay

Wagner: is HV TVAC testing planned at the FM board level? Worried about HV testing
Gurnee: we don't have particularly high voltages; EM instrument is tested in vac
Wagner: are detectors put into vac testing?
Gurnee: they are tested separately
Hersman: do you vibe the suite as a whole?
Weidner: each instrument gets a mass model and a bracket
Wagner: is everything a real part right now
Gurnee: they are all real parts; least real are the ASICs
Wagner: where are the opto-couplers?
Gurnee: power supplies are covered in a different presentation
Wagner: is there a way to tweak up the 1.5V regulator
Gurnee: yes - you can get it dead-on
Wagner: when is the PSDA/WCCA scheduled to be completed?
Wagner: PSDA and WCCA may cause problems
Weidner: will be done before CDR
Wagner: what about the grounding diagram?
Weidner/Dickinson: it's in the SPP-ISIS ICD

Hayes 11: EPI-Lo SW - 11:56 - 12:20
Wagner: low data rate, large memory; does data rate meet requirements?
Gurnee: data management plan; it is not a bottleneck
Brown: any plan to implement a priority scheme for raw products?
Hayes: data products are truly raw
Wagner: priorities, interrupts, time keeping; how do you know how accurate your time keeping needs to be? Time keeping link budget?
Hayes: individual event time is not that important
Gurnee: we have a requirement; it is 1 s
Binned data at 1s resolution
Hersman: what about tagging of event in time
Hayes: time tags are only good to 1 s
Mitchell: we've talked about doing epoch analyses, but whether we need it or not, we're not sure.
Mason: reusing code is good
Wortman: test port; SW that supports the command; will this code be left in for FM
Hayes: yes, it is left in
Wortman: do you have a separate command to enable the test port
Hayes: no; each test point has a 16-1 mux, so FPGA can pick which values to monitor
By default, nothing is appearing on these
Wortman: for XCVR on VA Probes, there were 2 commands to enable test port
Hayes: turning this on would be harmless

LUNCH

Wiedenbeck 12: EPI-Hi Sensor - 12:58 -
Mason: what's the FOV for the more energetic particles?
Wiedenbeck: FOV is defined by front 2 detectors; guard is only on top detector; we don't veto on the guard areas below that
Mason: small pixel: how does it work?
Wiedenbeck: discuss this later

[Break]

Cook/Kecman 14: EPI-Hi Electronics - 1:50 - 2:56

Wagner: does EPI-Hi have a FASTRad analysis that indicates their radiation is less than EDTRD

Dickinson: Yes

Wagner: does it make sense for EPI-Hi to use an RTAX2000

Cook: advantages were not sufficient to outweight the cost

Wagner: EPI-Lo would not fit into a 250?

Dickinson: correct

Wagner: slide 7: changes to the ASIC itself, not the logic around the ASIC

Cook: correct

Wagner: is the name the same on SPP/STEREO: PHASIC?

Cook: yes

Wagner: changing design to improve performance: how do you track changes with original

Cook: I designed original; changes are well understood

Wagner: how comprehensive is the set of test vectors?

Cook: there is a comprehensive test fixture developed for STEREO; not there yet, but we will put parts through this comprehensive tests

Wagner: is it possible to do the comprehensive test before you commit to silicon

Cook: we will do the entire test, but may not be automated

Cook: it will be a gate before we go into silicon fab

Wagner: DACs are used to control HV outputs, which is in the science data stream, affects performance; DACs can be used to calibrate PHASICs; HK is assumed to measure very noisy things (power supply voltage, supply to digital logic); what is the concern about cross talk on the HK chip? Both science and HK stuff sensed by the same chip...

Cook: noisy signals can be LPFed before they go to the HK chip

Precision voltages are LPFed in the PHASIC itself; current is low, so it is effective

Noise is removed at the PHASIC

In reality, we aren't using LPFs because the delta sigma modulator provides good LPF by itself

Wagner: you've tried to think of cross talk signals, and you're happy with separation between noisy/clean signals?

Cook: yes; aimed at very precise DC measurements, so there was a lot of attention to this

Kecman portion

Wagner: have you given a BOM to the parts folks

Kecman: yes

Hersman: LVPS discussion?

Weidner: there is a power presentation

Wagner: what are the NTEs?

Dickinson: It's in Scott's slide

Wagner: what is the status of the internal electrical ICD

Kecman: we have a draft version of the spec that describes the internal connections

Wagner: have your board designers seen this draft

Kecman: small team has worked on the designs at all levels

Wagner: are there EICDs at the instrument levels?

Kecman: yes

Gurnee: mostly

[Wagner does not seem satisfied]

Hill: Hi has separate services for Op and Power

Kecman: at the time this diagram was made they were combined, but they are

separate

Davis 15: EPI-Hi Software - 2:57 - 3:27

Hari Nair: do you have a separate Safe Mode, or how do you respond to a fault
S/C sends ITF frames that indicate "autonomy" or "full ops" modes
Nair: if something goes wrong, who decides that something is wrong
Davis: depends on where we're at in the orbit; in encounter mode
Hersman: what's the advantage of delay in patch file incorporation
Davis: test code before re-burn
Floor is David Artis
Floor: do you plan on more than 1 code image?
Davis: yes; 2
Floor: do you have watchdog timers?
Davis: yes
Floor: MISC computers - do they store more than 1 code image?
Davis: code images are managed by the DPU MISC; is always booted serially by the DPU; DPU maintains all code images
Wortman: any concerns w/testing the software simulating high event rate periods
Davis: calibration presentation; we have [inadvertently] tested this in STEREO testing; ensure the whole energy ranges are used in instrument testing/calibration
Wortman: didn't see anything in requirements of 16-bit shift register, capturing the history of the discriminator output
Davis: might not be in requirements yet, but is understood
Wortman: no special requirements for high rate modes?
Davis: same dynamic threshold philosophy as LET/HET on STEREO
Mason: on the rates, Wiedenbeck showed extreme events, up to 10E6 protons/sq*cm2; how does this square with rate of 9600 events
Davis: some other part of the code creates the sample size on the front end; HW does the sampling
Hersman: how many different boot images do you have?
Davis: 2 per MISC, 4 MISCs in EPI-Hi; 8 total boot images; some might be the same
Wagner: do MISCs contain identical SW?
Davis: no
Wagner: is it parametric differences or fundamental differences?
Davis: parametric; calibration curves
Wagner: other than parameters being different, is it possible to make parameters separate and make a single FSW image?
Davis: they are very similar, but should be unique FSW codes
Wagner: concerned with maintaining 4 sets of code
Davis/Brown: table is stored in MRAM, piece of code that uncompresses them into SRAM
Hersman: if it meets the requirements, it is up to the designer
Brown: we are calling things code that aren't necessarily considered code in the vernacular
Hersman: are you personally comfortable with the margins?
Davis: yes

Shuman 16: EPI-Hi Mechanical - 3:36 - 4:05

29 slides
Persons: how do you attach the slices?
Shuman: there will be perimeter flanges around the mounting holes; double lip

for RF shielding

Persons: how large are the fasteners, how much are they spaced?

Shuman: #2/#4 spaced about 2" apart

Hill: are there any tight tolerances on the board stack

Shuman: they are pretty loose

Persons: holes that support the board: does it continue from board to board?

Shuman: no; that mounts to box; various boards have various mounts

Persons: you have spacers between each board? Requires you have tight build tolerances on your boards

Shuman: yes; only have a stack-up of 3 boards; could have a couple mil build-up across each board, but you only have 3 on 1 side, and 2 on the other

Persons: have you done a stress analysis of the G10 piece?

Shuman: preliminary analysis was done; defer to Alexander's presentation

Hersman: are there venting holes on the detectors?

Shuman: yes

Persons: are both the grey and yellow silicon?

Shuman: grey is silicon, yellow is flex PCB mount

Persons: CTE mismatch between silicon and PCB?

Shuman: shelf can't move, but glue has compliance, allows enough room in mounts for detectors; mounted the same way as on STEREO

Persons: over the same thermal range?

Shuman: survival is worse, operating are well within STEREO enviro

Hill: how do you get the detectors in this?

Shuman: made up of several different pieces; stacked

Pins will align all the detectors

Hersman: do you need any covers for launch?

Shuman: foils have been through acoustic testing, which we think is the worst enviro

Mason: is there a metal coating? It looks like 2 layers

Shuman: there is a VDA coating on the window, but it is the melt from the polyimide

Hersman: when do covers get removed?

Shuman: just before flight; when they pull red tag covers

Hersman: Does EPI-Lo require covers?

Dickinson: yes

Persons: do you plan on a blow-down/launch evacuation test for the telescope?

Shuman: we do a test like this

Hill: what is bolt slip

Shuman: instrument shifting on bracket, telescopes on mounts, etc.

Mason: mentioned acoustic testing; does EPI-Lo do acoustic testing? What about concern of thin foils sensitivity to launch

Gurnee: there is heritage of doing this with thinner foils; we will test when integrated as an instrument

Do 17: ISIS Power - 4:07 - 4:21

32 Slides

Wagner: slide 5: in EPI-Hi block diagram, there are called out 6 boards; did we hear about the Bias supply?

Kecman: yes

Wagner: slide 13: are the nominal load currents stable, or duty cycled/switching/variability

Kecman: mostly DC

Wagner: this is different than the telemetry word that indicates a high current

Gurnee: it is a safing system for the instruments
Hersman: why the LVDS fault propagation mitigation
Dickinson: Levied by S/C
Hersman: do you have requirement to survive 40V?
Do: yes, and we can test it
Hersman: DC-DC is custom?
Do: yes
Hersman: are you the sole designer? Packaging?
Do: yes, but I have help with layouts and packaging
Hersman: is an EM LVPS delivered to EPI-Hi
Do: yes

Gurnee 18: EMI/EMC - 4:22 - 4:30
9 slides
Hersman: EPI-Lo doesn't have any heaters?
Gurnee: they are survival heaters
Hersman: who installs heaters? Wires on the connectors? Is this an external harness?
Gurnee: haven't looked at the shielding yet
Wagner: what are the oscillators on the instruments?
Gurnee/Kecman: answered
Wagner: do you get beat frequencies with having 4 oscillators in EPI-Hi?
Kecman: it is the heritage design, and it worked then
Susana: is EMI testing performed at the box level?
Dickinson: yes

Alexander 19: ISIS Structural - 4:31 -
21 slides
Persons: what code do you use? Higher order TETs?
Alexander: ANSYS; automatic mesh; might have been low order TETs
Persons: most likely these frequencies are high; consider running with mid-sized TETs
Hersman: is everyone else using the same tools
Alexander: EPI-Hi + bracket will be easy; will work with EPI-Lo on this
Hill: is there a way to transfer FEMs between EPI-Lo + SwRI
Persons: There are 2 ways APL can help
@ Persons: action to APL on how to do this
@Hill: fasteners between each box model: suggest you re-run this (slide 9)
Hersman: margins of safety: is that okay?
Persons/Hill: they should all be positive, but they don't have to be high
@Hill: do you have a coupling requirement to tune frequency of bracket so it doesn't couple
Alexander: not sure where this requirement is; currently not a concern
Persons: do you have a plan for adjusting the bracket?
Alexander: depends on specifics, but we've looked at several options
Persons: as long as you qualify your system at the highest height, you'll be okay
Hersman: what is the material of the bolts to S/C; do you use G10 washers?
Alexander: driven by thermal; G10 washers don't affect structural
Persons: these are monolithic models? When you put real models, you might get dangerously close to 80 Hz; bracket might need to be thicker
Alexander: yes; the uncertainty mass is untapped to help address this
Persons: you need to plan to do several iterations with actual structural models of instruments
Alexander: agreed

Persons: force limited standard vibration? Run by Chung-Lee
Alexander: just put in a notch; we have discussed this w/Project
Hersman: why are Factors of Safety different?
Alexander: wording is different in EDTRD; 1.4 is the right number for everything
Persons: have you tried to find 7075? An alternative material is 7050?
Alexander: haven't tried yet, but thanks for the tip; aircraft vendors are where we're looking
Hersman: units? Same material between EM/FM?
Weidner: 2 EM brackets, this will determine how many FMs we make; same material, unless anything changed

DAY 2

Dirks 20: ISIS Thermal - 7:57 -
27 slides
Hersman, Holtzman: where are the MLI blankets?
Dirks: no MLI blankets between instruments and bracket
Hill: is the bracket blanketed?
Dirks: blanketed to space-facing surfaces
Hersman: blanket on bottom of instrument between inst/S/C: how is it mounted
Dirks: continuous piece on S/C deck; they will be secured with buttons and capture
Holtzman: where are the radiators?
Dirks: points them out; EPI-Lo collimators may act as radiating surfaces; there is a trade
Holtzman: slide 7: is there a gap between EPI-Hi? Where is the closeout
Dirks: yes; small
Holtzman: is S/A stowed? Do you run it stowed/deployed
Dirks: we run what S/C gives us; they have both deployed/stowed configuration
Holtzman: redundancy in heater? Configuration of heaters?
Dirks: no redundancy
Hill: do you demonstrate cold turn-on?
Dirks: yes
Hersman: is this op temp?
Dirks: yes; test temps and allowable flight temps
Peddie: in encounter mode, what is your expected operating range?
Dirks: drives environment: state of power of things around us; if stuff around us is off, we will run cooler
Holtzman: how do you have a thermally isolated ground strap?
Dirks: not sure we have a design that works yet
Holtzman: have you used Z93 before?
Dirks: hasn't used the conductive version; used Z93 often
Holtzman: what does the conductive version mean?
Dirks: it is a slight reformulation
Petro: previous experience with MLI layers?
Dirks: we've used it before; no material we are using for the first time
Holtzman: what's the Z93 on the apertures?
Dirks: on the isolator
Petro: how do you ensure board components are modelled in the correct position?
Dirks: as of now, boards are linear power spread; for CDR, we'll do board analyses with power per component
Petro: what is CBE for you?
Dirks: current best estimate

Holtzman: what are the typical gradients in a wedge?
Dirks: about 5 deg from outside surface to SSD
Holtzman: where is the heat source for EPI-Lo op?
Dirks: it's on the board; operational; heaters located on dome
Hill: did you run a startup case/low power case?
Dirks: bounded by simulations that were run
Holtzman: will the dead-band be selectable in flight?
Dirks: it could be
Wagner: GI ICD S/C power min says 24V
Dirks: heaters are 26V

Dickinson 21: AI&T - 15mins

Fix EDTRD blacked out lines: ensure Pressure Profile and Thermal Vacuum Balance should NOT be greyed out

Christian 22: Flight ops - 8:57 - 9:12

Brown: have you thought about magnetic field data?
Christian: we will work closely with other teams; we will coordinate; still discussion on specifics; Mag instrument knows we want mag field data; we haven't formed specifics; we will before CDR
Wagner: 2 autonomous power-downs: 1) HV power down, 2) S/C turns instrument off. Has team thought about what data they want to see from S/C to help diagnose problems?
Christian: we've worked with the S/C on this; we have plans to be able to get some diagnosis interactions/memory dump
Wagner: mission ops knows not to power us up w/o permissions
Christian: this is not the plan; they've worked with us before
Nair: is there possibility of filling storage?
Christian: we monitor how much space there is in ITF; we will fill our allocation, but monitor the fill level
Nair: what about missed downlinks?
Christian: this is on the S/C (Kinnison chimes in)
Brown: are Lo/Hi allocations kept separate?
Christian: S/C keeps them separate

Gurnee 23: GSE - 9:12 - 9:20

Wagner: EGSE for EPI-Hi/Lo - are they providing GSE to instrument I&T?
Gurnee: yes
Wagner: have you looked at resource allocations? Is GSE required for EM that is also required for FM?
Gurnee: it's in series
Wagner: Do you start FM board development after I&T of EM?
Gurnee: you can use uncertified GSE for EM
@ Wagner: are you confident you won't be double booking GSE?
Gurnee: good point
Wagner: you will need a S/C simulator to verify EPI-Hi/Lo; only have so many emulators
Gurnee: we've thought about it

Angold 24: Verification - 9:42 - 9:55

16 slides
Hill: Who verifies requirements for the bracket?
Angold: SwRI

Petro: do you have specific test plans?
Dickinson/McComas/Angold: we will put these together closer to the test; they will be reviewed at the pre-test meeting
Hill: how is program requiring verification of the enviro requirements?
Angold:

Mitchell 25: EPI-Lo Calibration - 9:56 - 10:11
19 slides
Petro: Where is the Calibration Plan?
Kinnison: it is a CDR deliverable
Petro: when do you plan tests at different facilities?
Mitchell: it's in our schedule; we've used folks before on several past programs
Petro: can't calibrate over full range of energies; how do you justify performance in the gap in energies that are not being tested; are you performing analysis?
Mitchell: several ways; we can do over the entire energy ranges; there is overlap in the ranges; alpha source is a good measurement because it is continuous in energy
Wortman: how mature is the FSW when you do cal?
Mitchell: in the last several instruments, FSW has been very mature; Hayes is way ahead of the curve and has a lot of reuse
Petro: reassured by doing pre/post qualification calibration
Hersman: do you have any early flight maneuvers that you need?
Mitchell: no; we are looking for SEP events; change in S/C attitude doesn't help us
Hersman: do you have safety concerns on the sun line?
Mitchell: at 1AU where we do these maneuvers, enviro we have is not too unlike encounter environment; instrument should operate fine in all enviros

Mewaldt 26: EPI-Hi Calibration - 10:12 - 10:32
19 slides
Wagner: what is the TBR acronym
Mewaldt: to be reviewed
Petro: you are using modeling in ranges of energy ranges that are not covered by earth testing?
Mewaldt: yes
Petro: you aren't substituting modeling at particular energies?
Mewaldt: you can model detector response based geometry
Wortman: if you have to swap out a detector, will you return to Michigan to recalibrate?
Mewaldt: we will measure in lab w/alpha particles; if we know the wafer thickness, we will know the sensitivity, and do not have to go back to Michigan
Petro: what is the energy resolution?
Mewaldt: 2000 channels at low gain: 10ths of a %; we will put them in broader bins for statistics.

Gerhardus 27: Performance Assurance - 10:33 - 10:45
15 slides
Wagner: CM process being implemented?
Dickinson: yes

Dickinson 28: Risks - 10:45 -11:08
Petro: Are TRL6 items tracked as items?
Dickinson: individual technology development are tracked as risks

Angold 29: Action Items - 11:09 - 11:15
10 slides
No questions

McNutt 29b: Walk-on TRL development - 11:15 - 11:25
Petro: [Observations] do you have something similar related to EPI-Hi?
McNutt: talk to EPI-Hi
McComas: technical info is there; not the table
Petro: definition of TRL6 (new issue) is different from what we have done so far; not at TRL6 at PDR; discussion was based on old document; doesn't have updated information in current document;
McComas: this is a project question; should not be an ISIS issue
Petro: there is a specific requirement that instrument must be TRL 6 to pass PDR; she has pointed out specific areas where ISIS is not TRL6; pointing out a non-compliant situation. Calls out a [something] EM
Floor: what you have brought up is open to interpretation
McComas: test article was adequately flight like as to provide TRL on FM unit
Floor: article has gone beyond simple breadboard (which is requirement)
Petro: suggests that this is brought up with the independent board
Petro: otherwise, they are perfectly on task

Weidner 30: Instrument Development Status - 11:25 - 11:42
Wagner: after EM AI&T is complete, do you have plans for EM models?
Weidner: institutions keep them as path finders for scripting and operations
Wagner: if you have plans to use EMs during flight development, GSE scheduling may become an issue; i.e. proton simulator
Weidner: FW GSE is separate from the instruments/GSE
Hersman: we didn't discuss cost
Patrick Hill: Instruments aren't require to discuss cost
McComas: we work very closely with project on cost
PH: ISIS hasn't used any reserves on the cost
Hersman: what percentage reserves do you have on the whole project
PH/Weidner/McComas: 205
Hersman: do you have leins? Cost risks?
Weidner: accelerator facilities are upgraded
Petro: we are not to weigh any costs at ISIS review board
PH: it is intentionally left to the Project level

McComas closes PDR

Hersman 31: Debrief - 1:22 - 1:40
TRL6 issue: Is ISIS at TRL6? 6 yes's, 3 no's, 1 abstain
All others are unamious that ISIS passed
Individual comments:

Mason: 8-10 action items covering a number of technical issues
Major one: What about off pointing; what could cause this, how long would it take to react; what is effect of sunlight on sensor? Mitigation strategy?
Second: EPI-Lo pointing strategy; primary response function at funny angle to intermagnetic field; not aware of heritage in the pointing philosophy
Third: number of concerns regarding the thin foils, acoustic risk, stray light analysis (mostly EPI-Lo)

Wagner: excellent job; background in electrical
Major issue: optocouplers; spoke w/Tumlinson Re: transient glitches; no RFA; is glitch possible? Would it cause problems
RFA: create EPI-Lo internal electrical ICD; important because power supply cards are built by another institution… [confusion]
Level of development is CDR in most cases

Nair: no issues

Brown: FSW, ground support
He was happy with everything; saving more for MOC/SOC PDR

Wortman: missing FSW requirement from EPI-Hi - detecting cross talk
Lots of heritage for both instruments
Lots of experience
Good job

Holtzman: overall good job
A few AI concerns

Hill: Mechanical; good job
Everything looks fine; concern about bracket to instrument ICDs and maturity; how do you verify mechanically it's going to be okay

Persons: echo's Hill
Process of FEM analysis, combining models from different organizations; ask ISIS to re-run FEM analysis with different boundary conditions/element usage

Petro: instrument system, science
Pleased with development of these two instruments
Didn't see anything that concerns her; strong heritage
Major problem: TRL6 philosophy
1 RFA

Hersman: enjoyed review; had challenges
TRL6 issue is beyond scope of ISIS to resolve
Assigning action to us, ISIS can elevate
Congratulations on excellent presentations
Exciting instrument, great science; thanks

McComas: formal conclusion

Reviewers (from stage right to left):
Susanna Petro
Dave Persons
Stuart Hill
Alan Holtzman
Kristin Wortman
Chris Hersman
Lawrence Brown
Hari Nair
Ken Wagner

Glenn Mason

DICKINSON OBSERVATIONS

- David Do is not on the org chart (and didn't have a name tag)
- Ed Stone not in ISIS Science Team
- Very little information on EPI-Hi bias supply
- Why is Alexander using 7.74kg when ISIS NTE is 9.384?
- EDTRD: Engineering Model (EM) testing **shall** appropriately represent the cycles for each component, and will be approved on a case by case basis by the SPP Thermal Engineer [EDTRD_0210]. For Engineering Model thermal vacuum cycle testing, the number of required test cycles depends on the failure mechanism. For a structural failure, four times the number of on-orbit cycles is required. For a thermal failure, two times the number of on-orbit cycles is required. If the failure is neither structural nor thermal, six cycles is required. See Table 2-1 for the number of on-orbit cycles.
- Petro is most concerned with TRL
- MCPs are not included in the limited life item list
- Becker suggests we produce a color coded instrument model indicating where instrument components are fabricated