AOCS Meeting ESTEC 11 April 2000

Attendance:

Anders Elfving, Douwe Beintema, Helmut Feuchtgruber

- FIRST pointing modes doc = Annex to IID-A and/or Spacecraft System Spec.
- If one instrument at a time APE and AME should be v similar.
- P7: goals should be met for many conditions. Design that's not capable of meeting goal will not be acceptable.
- HF: must avoid ISO experience where S/W writte with spec in mind was not compatible with the achieved pointing accuracy.
- Tracking solar system object (10 arcsec/min) is equivalent to inertial pointing
- HIFI smallest beam (if lose band 7) needs 1.4" APE - goals are nearly OK for HIFI
- MJG: what about drift during a scan? E.g. 5 minute scan? - want to be able to overlay many linear scans to enhance S/N.
- Would like to be able to overlay several scans with accuracy greater then AME
- Will specify AME as fixed component and component dependent on scan rate
  3.1 at zero rate linearly varying to 5 at max. Similarly for the goal figures.
- Because of long thermal time constants, system will never actually come into thermo-elastic equilibrium
- HF: Issue of which PV activities can and can't be done durinf the transfer orbit
  AE: Sometimes Sun and Earth aspect angles not dame so pointing restrictions but otherwise as for on-orbit
- P11: Peaking up   .
  Will be used to improve the pointing throughout the mission
  AE: Would like to delete this requirement - operationally very difficult
  Contractor is act ually expected to meet the goals and will be obliged to state under which conditions the goals can be met.
  Cost is in the verification rather than the H/W or the S/W
  Conclusion: APE goals don't' require peaking up but requiremetns do
  No handshake needed - system complexity could be IK.
  SPIRE and HIFI need it. PACS not so important.
- SPIRE wants to keep 1 arcmin/sec as max speed
- AE: ESA looking at changing +/-30° to -25 to +35 - otherwise sunshield constraint means that if thruster fails then could get sunlight on the secondary. Would like to have 5° margin.
- Raster with OFF : should read d = 4 arcmin not 1 as on the viewgraph
- Different dwell times?
  Makes commanding more complex
  Could do it by explicit commanding of each position
- Can we nod and raster at the same time? OK can cammand each point as normal inertial point and do an nod on top.
- Nodding and position switching will be iplemented in the same way from a practical point of view (just different parameters). In fact raster, nodding and posn switching will be done with same S/W on board.
- MJG:could we change the 4' to 8'? EF: It's not fundamental - should be OK - change to 8.
- Max length of line scanning: 110° poses big problems with crosstalk between the wheels etc. GP: 110° requirement was from Lemke - applies only to 1-D scan.
  MJG: Happy with 20°
  EF: Will put 10° as baseline .**Action:** SPIRE and PACS to confirn their requirements on this number.
- On-target flag: nobody wants it as everything will be implemented as fixed time observations.

Spacecraft thermistors:

SPIRE IID-B includes thermometers that are to be read out by the spacecraft. Should we pull them out and just put them on the straps - it's the strap temperature than we really want to know. Then we can take them out of our cryoharness.

Data rate: Need clear statement in the IID-A. And nead to know how muchn is available for real science data.

Review plan:
Action: KJK send review plan doc to TP tomorrow

TP: Want instrument **Design Description Document**, going to subsystem level. Design specification is a design description.

Could we put in a bit of description in each of the *Subsystem Specification Documents*?
Otto sees it as something that becomes part of user manual.

Also need   Design and development plan
                 IID-Bs
                 Design justification file?
                 Preliminary ICDs
                 (one) OBS URD.
                 GSE description (we're including AIV facility as subsystem)

ISVR documentaion deadline:.
HIFI ISVR is May 25
PACS will be done (redone in Sept. after their re-design)
HIFI will not be complete
SPIRE will not be complete -will want to say that have all documentation and nothing strange to prevent formal completion.

Action: SPIRE to provide Inst Desc. Doc. by mid. May.

Afternoon part of SPIRE technical meeting:

Updates from this morning:
Possibility of use of brass for wires outside cryostat. SPIRE to specify R for T1 inside and T2 outside (tomorrow).

IID-A and -B:
TP: *FIRST/Planck System Requirements Specification* is top level
IID-A and Bs are applicable documents
But IID-A doesn't require a specific design, whereas IID-B does.
Therefore in some senses the IID-B is higher

BMS: We need to go through our IID-A comments. Some of the interfaces are unacceptable.

Parallel mode:
PACS Prime
SPIRE parallel with say 10 kbs in passive mode
SPIRE cooler must be operating
All other (partner) modes defunct

Peak-up mode:
BMS: Internally we need to decide whether we need it (complication of the OBS). Is it really worthwhile?

AVM:

KJK:
- We propose DPU and DRCU simulator.
- There is a DRCU available as it's delivered for our CQM.
- Deliver H/W simulator of FPU for functional checks.
- DRCU simulator can produce "realistic" science data.

TP: Do we lose anything by not simulating the full DRCU?
KJK: Our DSP in the DRCU has no S/W, just tables that it needs to work with, so effectively no S/W.
Also, by simulating DRCU can simulate failures, peaking up etc..
TP: A guy is working on S/C needs - should get him to look at this issue.
He also wants EMC/grounding fidelity
Action: KJK to tidy up little document on this and pass to Thomas to get AVM guy comments.
TP will consider AVM requirements

CQM:
Action: BMS to send note on CQM quality to TP

Development plan:
BW: Supports are critical. Plan engineering testing of A-frame ASAP. Wan to test this year.
Strength and conductance measuremetns by October this year. Need to take 2-mm contraction into account. Have asked RAL for costing for test programme.

BW would like srtucture test before CQM - essentailly an STM. Warm vibration test with all mechanisms except FTS mech as dummy masses to verify eigenfrequencies, transfer functions etc. (will be the CQM FPU except for these mass dummies).
This poses schedule problems, but may gain time if it's successful, because could start production of protoflight structure earlier.

TP: What are similar plans for other subsystems?
BSM?: BMS: They don't know yet.
Detectors?:
Cooler?: KJK expecting dev. plan on Friday
FTS?: Ok on paper
Mirrors: OK
Calibrators:
DRCU: LAS do BSM and FTS. CEA to the rest. Breadboard system in collab with JPL.
Schedule is as at WE review (late without good reason says TP).

KJK will have all DPs on Friday.
TP: When can I have it?
Action: KJK to get overall DP to Thomas by 8 May.

Chapter 9 of IID-A: Could be modified with more test/schedule/deliverables information to make it easier for Prime to propose.

IID-A comments:

- Warm boxes: EM should be there for testing continuation and should be able to repair and return a WE box within 3 weeks.

- Mass of units: BW: Why accuracy of 1% on mass - 2% is more common.
  TP: Request waiver if out of spec. Will try to get good answer as to why it's 1%.

- Mathematical model format?
  NASTRAN not available at MSSL. Can we use ESATAN?
  TP: Probably - prime will be asked to use ESATAN.

- Section 9.5.5.2 - BMS to put the requirements into the IID-B.

- Various other points - can't keep up . . .

- All documents will be changed to 3 hrs out of 24. It amounts to contratined operation not no operation.

- All SPIRE packets will be time-tagged by us wrt spacecraft time provided to us.

- Alignment plan: BMS: can't verify it cold . . . .
  Point taken . . . . Dornier planning to use side windows only if they can . . .
  Action: BMS to send info/recommendations on alignment plan - before Easter.

- Chap. 10 - management issues
  SPIRE has different ideas - e.g., on reviews
  Note: Thomas sent out a revised document summarising reviews last week . . .
  Later start of Phase B
  Iteration on ESA reviews - made more compatible with spacecraft reviews

- DB: Could we implement 5-point as a standard raster.
  Call 5-point macro and then implement pointing offset update request for this observation only?
  OK - then it's not linked to any specific "peak-up" obsevation.
- Actions from last meeting:
  GP: Input for simulations - typical observation profiles.
  AE: Not really needed
  - Elaborate on peak up mode - covered today - closed.
  - Typical observation profiles - main points also covered today - closed.
  - Others - also closed.

Action: MJG provide updated viewgraphs to Anders tomorrow.

Solar system tracking: 30 km s^{-1} at 1 AU is 2.5 arcsec/minute

10"/sec. = 600"/min = 10'/min = 1 degree in 6 minutes
60"/sec = 1 degree in 1 minute