

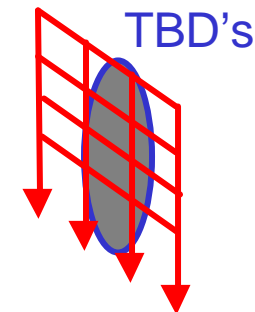
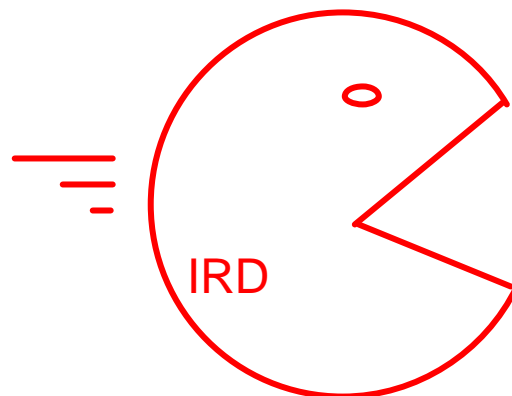
Specification Overview

Ian Pain

Doc pack sec.7

Overview approach

- **Aim: set the stage for BSM Sub systems DDR**
- **Review the Key Drivers**
- **Skim the specification's contents**
- **Look at 'hot spots'**
 - major TBC/TBD's closed
 - TBC/TBD's remaining open
 - issues raised in BSM spec which need feeding upwards
 - not covered - small changes not impacting interfaces



BSM Key drivers

- **4 Kelvin**
- **4 mW**
- **32mm mirror**
- **Mass <1kg**
- **14 Million cycles**
- **Launch on Ariane V, 2007**
- **Cost ~£711k**
- **Accommodate PCAL**
- **No surface >1K hotter**
- **no SPF**
- **Scaling**
 - **1° at the mirror per 50 arcsec on the sky, i.e. 72:1**
- **Chop**
 - **+/-2.4°**
 - **2Hz,**
 - **Settling time <20msec**
- **Jiggle**
 - **+/- 0.6°**
 - **0.5Hz**
 - **Settling time <100 msec**
- **Stability 0.004° (4 hrs)**
- **Resolution 0.0005°.**

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Specification 'hot-spots'

- 4.1.2 - Angular Travel - Jiggle Axis :
 - TBC confirmed as 0.6deg
- 4.1.6 - Holding position/ Drift Constraint
 - quantified as : to within 0.004 degrees rms, for periods of up to 4 hours
- 4.1.8 Position measurement
 - The BSM shall provide measurements of the angular orientation of the mirror surface in both chop and jiggle axes to a resolution of 1/8 of the requirement, 1/4 of the goal. i.e. a requirement of 0.0005°.
 - The rate at which the position measurements need to be made is **TBD**. This requires modelling at instrument level of what is needed to deconvolve the signal. A "past experience estimate" would be 5 - 10 measurements per half chop cycle, i.e. a requirement of 40Hz, a goal of 80Hz.

Specification 'hot-spots'

- 4.1.9 Settling time
 - Chop OK, but jiggle axis has no (?) traceable requirement in IRD
- 4.1.10 Chop repeatability
 - defined repeatability as over 4 hours. Needs feeding upwards.
- 4.2.5 Warm Electronics Power Dissipation
 - is TBD
- 4.2.6 Mirror dimensions
 - The mirror clear diameter after allowing for any obscuration by the baffle shall be greater than 32mm. The clear diameter is the visible diameter (when viewed orthogonal to the mirror surface with the mirror held at the 0,0 position) .
 - The mirror shall include a central hole of no less than 2.8mm diameter to allow the Photometer Calibrator to be seen by the detectors.
- 4.2.10 Baffle
 - The presence of a Baffle is assumed, and will be of the hole-in-plate type if internal component temperatures can meet the requirement of 4.2.3 .
 - ...opening sufficient to allow the 20% oversized beam to cross it with a positive margin of no more than 0.5 mm.

Specification 'hot-spots'

- 4.2.11 Position of the Rotation Axes
 - established accurately within 0.5 mm (TBC) and 0.5° (TBC) of nominal design position.
 - The BSM shall be designed such that it may be repositioned on the SPIRE optical bench within a repeatability of 0.1 mm (TBC) and 0.05° (TBC)
 - Rotational motions of the axes shall produce a de-centre of the axis of rotation of less than (10 microns) (TBC)
- 4.2.12 orthogonality of the rotation axes
 - shall be within 0.15° (TBC).
- 4.2.12 & 4.2.13 Failsafe positions
 - not in IRD, defined in BSM spec only
- added to v3.2 of spec as they are in the IRD as a constraint on all sub-sys
 - 4.2.17 & 4.2.18 Failure modes and reliability
 - 4.3.2 lifetime

Specification 'hot-spots'

- 4.3.2 Ground operational lifetime
 - added figures. These will constrain the SPIRE AIV programme

6 months for subsystem acceptance

6 months for SPIRE acceptance

6 months for HERSCHEL acceptance

Broken down, nominally (TBC):

1M cycles during BSM check out at ATC

1M cycles during BSM check out at RAL

1M cycles during system integration, e.g. checking for cross talk, vibration, EMC.

1M cycles during observing mode checkout.

1M cycles for ESA/Herschel integration.

0.3M cycles spare

Specification ‘hot-spots’

- 4.4.1 data output

Data	Rate	Reference
Chop axis position	requirement 40Hz, TBC goal 80Hz, TBC	This document
Jiggle axis position	requirement 40Hz, TBC goal 80Hz, TBC	This document
Thermometer data	1Hz (TBC)	??? email
Motor voltage (or current, TBD) at a low rate for house-keeping	<100Hz (TBC)	ATC/LAM meeting May.00
Motor voltage (or current, TBD) at a high rate for trouble shooting of transient effects (e.g. control systems tuning)	TBD	ATC/LAM meeting May.00

- 4.4.3 Exported micro-vibration
 - less than 10 micro-g
- 4.4.4 & 4.4.5 EMC & Stray magnetic fields
 - No Specification imposed.....

Specification 'hot-spots'

- 4.7.1 Environment
 - see Spec page 27, 28 for latest load tables.
 - See Spec page 29 for radiation environment tables
- 4.8 Verification Requirements
 - updated in line with new model philosophy
 - option open on STM as whether functional or mass dummy