BSM Design Description, Annex D: Interface Control Document: BSM to Launch-Latch

v 0.1

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1 Scope

This document outlines the ICD between the BSM (ATC) and the Launch Latch (LAM). The ATC's intention is to adopt a common launch to the SPIRE SMEC mechanism and incorporate it into the BSM. As such this document forms more as a vehicle for collaboration on space envelopes than as a true ICD.

The contents of this document are intended for incorporation in the LAM document AD xxx

2 Documents

2.1 Applicable documents

	Title	Author	Reference	Date
AD1	BSM -Launch Latch ICD drawing	I.Pain	ATC drawing number: SPIRE-BSM-021-TBD	TBW
AD2	Launch Latch ICD drawing	LAM	TBD	
AD3	ICD Structure - Mechanical I/F	B.Winter	SPIRE-MSS-PRJ-000xxx v1.0	Apr.01
AD4	SPIRE Harness Definition	D.K.Griffin	SPIRE-RAL-PRJ-000608 v0.3	30.May.01

2.2 *Reference documents*

	Title	Author	Reference	Date
RD 1	Spectrometer Mechanism Design Description	D.Pouliquen	LAM.SPI.PJT.NOT.200008 Ind 3	15.Apr.01

3 Functional Description

The Launch Latch would be used to restrain the BSM mirror motion during launch vibration, to assist in protecting the chop axis flex pivots from damage.

The launch latch should consist of a bi-stable solenoid.

1. In the extended position a pin will engage a hole in the rear of the BSM chop axis and restrain motion. No power should be required to hold this position. The holding force must be sufficient to withstand the BSM lauch loads environment (AD3). A worst case load of 260 G should be considered.
2. In the retracted position the pin will disengage from the hole by a generous margin. . No power should be required to hold this position.
3. It is TBD whether the pin will be a close or open fit in the BSM hole
   - A close fit would restrain all motion, but would be a single point failure
   - A loose fit (with e.g. 1 degree of motion) would not be a SPF but would allow chattering of the chop stage and possible damage to the launch latch pin or the flex pivots.
4. The pin would be retracted by application of an electrical pulse to the coil.
5. Position should be verified by switches.
6. The electronics and coil should have parrallel redundancy

4 Electronic & Electrical Interfaces

As Described in the main body of the design description and in Annex G.

5 Mechanical Interface drawing

The design is to be discussed and agreed. LAM will optimize the design to suit SMEC and ATC will then adapt this design to suit the BSM.

Pending actual drawings, design intent and wish lists are discussed below

LAM Design intent is currently understood to include;

A device based on the candidate launch latch shown in RD1
2mm diameter pin with 3mm of travel
mass < 30 gm
integral micro-switches with
LAM drawings TBD,

Currently the ATC wish-list for mechanical layout would include;

Dimensions compatible with ATC concept drawing SPIRE-BSM-020-001-007
Mass < 50 g m
Front mounting option (or ATC to provide front mounting adaptor)
holding force sufficient to overcome the BSM

6 Mass Properties

BSM can accommodate 50gm without problems. A larger mass could be accommodated with some redesign. A smaller mass would be desirable.

7 Thermal Interface

Cooling of the latch would be provided by contact to the BSM structure bulkhead

7.1 *Finish*

The BSM-Launch latch interface surface (drawing AD2) should be aluminium alloy, grade 6082, coated with electroless nickel (nominally 10 microns) and gold (nominally 5 microns). The interface surface shall provide a precision central hole and two mounting holes, tapped M2.5, with locking inserts.

7.2 *Surface Area*

The contact surface area of the baseplate is TBD

7.3 *Contact Force*

At the contact face an approximate contact force of 920 N (TBC) will be developed by two M2.5 socket head screws torqued to 0.23 (TBC) N-m

8 Harness Routing

The BSM prime and redundant harness are separate. Each harness includes the motor, sensor, thermometry and Launch Latch cables and interfaces via a fully populated 37-way MDM connector, as specified in AD4. The harness is run to the BSM as described in AD3, with a total length of 415 (TBC) mm.

It is TBD whether the latch has a redundant coil. If it does not, then the wires and screen from the latch solenoid will run only to the prime BSM harness' 37 way MDM connector. The BSM prime connector will in effect have spare pins.

A flying lead (TBC) is delivered from the latch to the BSM 37 way connector. The minimum path harness length will be ~140mm, but additional allowance will be required (50-80mm) to allow for removal of the 37 way MDM connector and soldering attachment of the flying lead. The Latch should therefore be delivered with a flying 300mm long. This will be cut to length and terminated by ATC.

The approximate harness runs are shown below (note that cutouts and mounting arrangements are TBD)

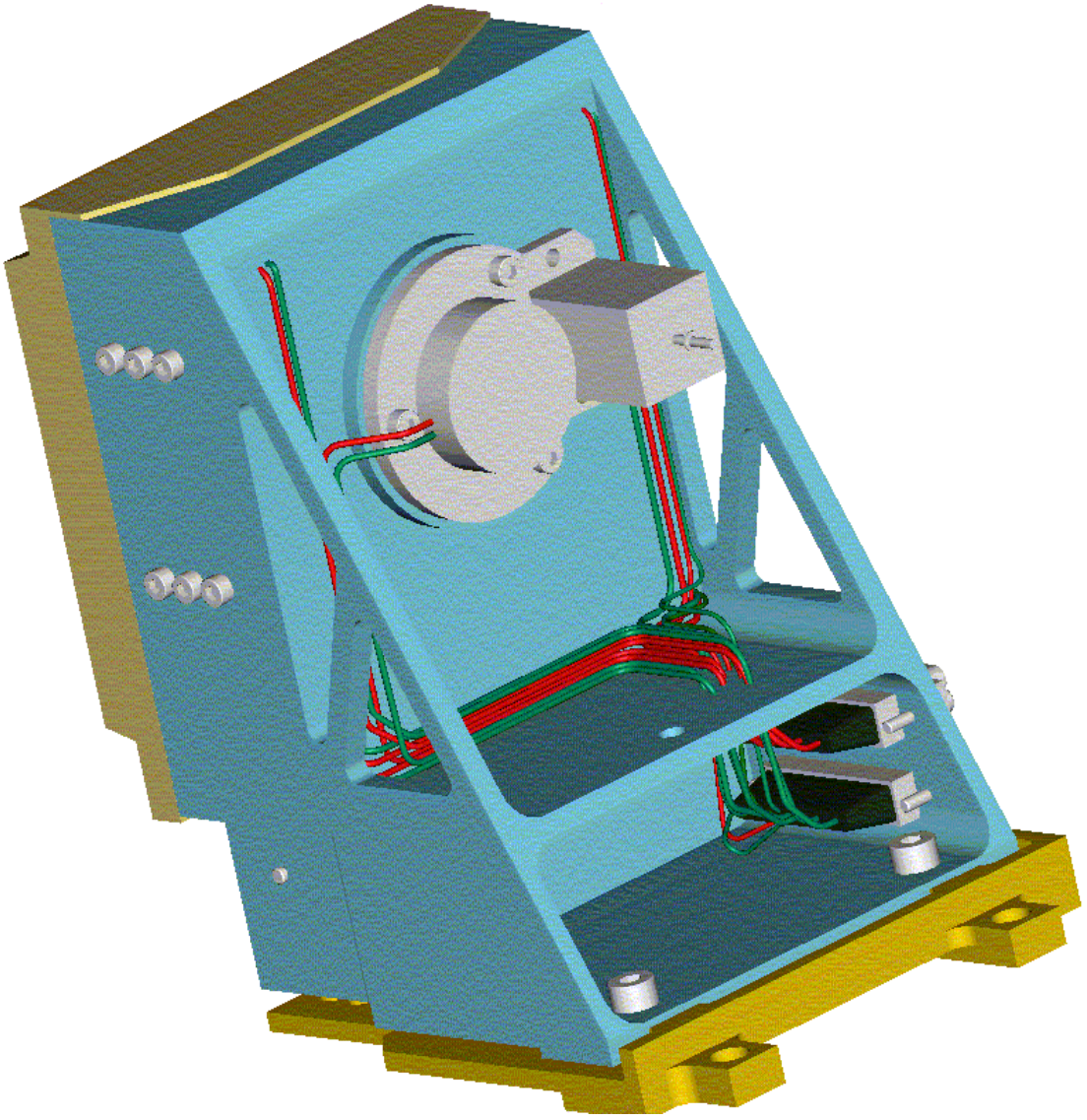

Figure 1 BSM on-board harness run (concept) showing prime and redundant harness runs

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