

# Solar-B EIS

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## MTM/TTM build specification Version 2.0

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## Change Record

ISSUE	DATE	PAGES CHANGED	COMMENTS
01	13 Mar 2001	All New	
1	29 May 2001	All <b>SO PLEASE READ</b>	Update taking comments from telecons and RAL meetings over the last 2 months
		1	Distribution changed to include Helen Mapson, Jason Tandy and Graham Willis
		2	This table and Scope section shortened Applicable documents updated
		3	'Responsible' column added to table Table changes: Operational heaters set at 12 for FM. Thermal sensors set at 25 for MTM/TTM. Internal Accelerometers and Microphones in MTM will be removed for TTM. Table notes updated
2	20 June 2001	3	Note 5 under table – change of survival heater positions and heater channels used. Added note on sensor positions.
		5	Updated things to consider page (removed previously resolved issues and added new issues)
		6	Added MLI fit check and EGSE to flow diagram

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### 1. Scope

This document provides the build specification for the MTM/TTM models of the Solar-B EIS instrument. It also shows the detailed build plan and procedures which are required to achieve the cleanliness requirements, these match as closely as possible those that will be followed during the FM build programme. With this in mind the FM procedures as they are understood at present are also shown here.

### 2. Applicable Documents

- [1] MSSSL/SLB-EIS/SP011                      EIS System Definition
- [2] MSSSL/SLB-EIS/PA003.01                Cleanliness Control Plan
- [3] MSSSL/SLB-EIS/PA002.01                Solar B – EIS Product Assurance Plan



### 3. MTM/TTM model description

The following is a list of components that will be included in the MTM and TTM configurations of the MTM/TTM model. This list is taken from the 'EIS system definition' document [1] (this document will be updated to include minor changes which are introduced here):

Component of EIS	Acronym	FM	MTM	TTM	Responsible
Enclosure	ENC	✓	As flight	As flight	BU
Baffles	BFn	✓	As flight	As flight	BU
Launch Lock	LOK	✓	As flight	As flight	BU
Clamshell	CLM	✓	As flight	As flight	BU
HOPs	HOPn	HOP1, HOP2, HOP3 <sup>0</sup>	Dummy mass	As MTM	BU
Front Filter Assembly	FFA	✓	Only 1 of 4 filters <sup>1</sup>	As MTM	NRL
Mirror Assembly	MIR	✓	Dummy mass	As MTM	NRL
Slit Assembly	SLA	✓	} Dummy mass	As MTM	NRL
Focal Plane Filter Assembly	FPF	✓			MSSL
Shutter Assembly	SHT	✓			NRL
Grating Assembly	GRA	✓	Dummy mass	As MTM	NRL
Alignment Cube	CUB	✓	As flight	As flight	NRL
CCDs (long $\lambda$ (A) and short $\lambda$ (B))	CCD	✓ (CCDA & CCDB)	Dummy masses	As MTM	MSSL
Focal Plane Assembly	FPA	✓	As flight	As flight	MSSL
Readout Electronics	ROE	✓	Dummy mass	As MTM	MSSL
Quartz Crystal Monitors	QCMn	QCM1 and QCM2	QCM1 <sup>2</sup>	As MTM	RAL
Mechs. & Heater Controller	MHC	✓	Dummy mass	As MTM	MSSL
Instrument Wiring Harness	WIR	✓	MTM/TTM vers. <sup>3</sup>	As MTM	MSSL
Instrument Purge Harness	PUR	✓	As flight	As flight	BU
Instrument Vacuum Harness	VAC	✓	As flight	As flight	NRL
Multilayer Insulation	MLI	✓	As flight	As flight	BU
Operational Heaters	OPHn	12	12 (+ use as survival)	As MTM	BU
Survival Heaters	SUHn	5 (ENC) <sup>5</sup>	0 (see op. Heaters)	As MTM	BU
Bakeout heaters	BKHn	2 (ENC on CCDs)	0	As MTM	MSSL
EIS Thermal Sensors	ETSn	24(ENC) + 8(MHC) <sup>4</sup>	25	As MTM	MSSL/BU
S/C Thermal Sensors	STSn	7 (ENC) + 2 (ICU)		As MTM	MSSL/BU
Survival Thermal Sensors	SUSn	3 (ENC)	0	As MTM	MSSL/BU
CCD Temperature Sensors	CTSn	2 (ENC on CCDs) <sup>6</sup>	0	As MTM	MSSL
<b>Additional items</b>					
Accelerometers	ACCn	✗	7 int. + 7 ext. <sup>7</sup>	✗	BU
Microphones	MICn	✗	2 <sup>8</sup>	✗	BU
Witness Plates	WIPn	✗	TBD <sup>9</sup>	✗	RAL
Distortion Monitors	DISn	✗	✗	TBD <sup>10</sup>	BU

0. HOP1 is launch lock, HOP2 is front clamshell (external) door, HOP3 is rear clamshell (internal) door.

1. Only one of the 90° sector filters will be used for MTM/TTM testing. It will also be present for qualification tests of the Engineering Model Clamshell which will be used in the MTM/TTM testing.

2. QCM1 is that which mounts to the -X surface of the spectrometer enclosure (designation and choice).

3. The MTM/TTM harness has yet to be defined but will try to allow for the additional items without the need for extra enclosure feed-throughs. Position and size of feedthroughs on the structure itself will be the same as FM.

4. The 8 thermal sensors available to the MHC have yet to be assigned.

5. These operate off 3 s/c heater ports: #1 – Mirror Ass. & Grating Ass (sensor on mirror), #2 – Grating (sensor on grating) and #3 – Mirror and CCD (sensor on mirror). See ICD. The positions for these and the operational heaters are yet to be defined.

6. Controlled via the ICU (as are the Bakeout heaters)

7. Type as supplied by MSFC. Internal sensors to be removed for TTM. See [6]

8. Type B&K 4938 mounted inside the enclosure. To be removed for TTM. See [5]

9. This depends on whether it is necessary for cleanliness control.

10. No., type and position to be defined by BU.

## 4. Build Procedures

In the following 2 diagrams the procedures for the FM build and the MTM/TTM build are outlined. Where possible target dates that fit in with the schedule at Birmingham have been shown. Also shown is where delivered items will be considered clean and should have documentation to show this. To avoid unnecessary bureaucracy on the part of the providers it is hoped that the 'cleanliness working group' will be able to oversee this aspect and provide the necessary documentation for external agencies. In both of these diagrams I have concentrated on the EIS instrument itself. It is assumed that the test facilities are adequately equipped and to the desired standard. Where extra effort is needed in terms of facilities this will be highlighted in the more detailed test procedures. In light of this it should be explicitly said that it is expected that a TQCM will be available during all thermal vacuum tests.

At present there is no explicit links between this document and other documents pertaining to MTM/TTM or FM build schedules, i.e. the handling plan, the cleanliness control plan, etc. I hope that this will come out of the comments received.

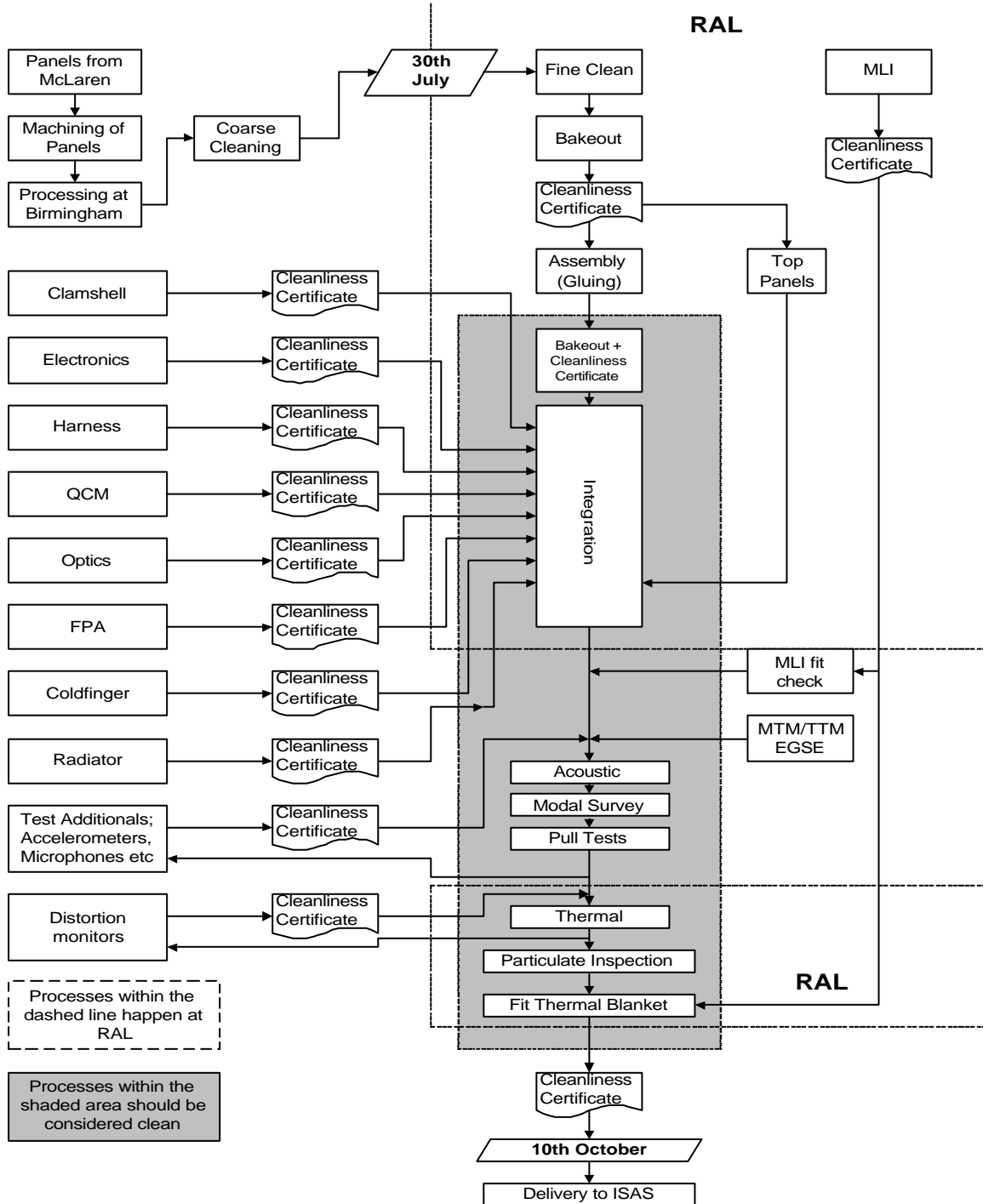
I will try to review this document at the teleconferences between now and the 28<sup>th</sup> March and in detail

### Things to still consider: (completed tasks are crossed out)

1. Position of MTM/TTM heater pads – *still need detailed info for harnessing*
2. Position of MTM/TTM thermal sensors – *still need details for harnessing*
3. Position of microphone for acoustic test - *detailed positioning up to BU.*
4. Position of internal accelerometers for acoustic test - *detailed positioning up to BU.*
5. Harnessing for all of above (NB although not in procedures it is assumed that much of this happens near the beginning of the assembly process so that any glue used goes through a bakeout. This may not be feasible for all items. The harnessing itself is done after the electronics boxes/dummy masses are in place at present, the bosses/harness clamps are likely to be glued so will have to be added before the final assembly bake)
6. Discussion on how we monitor cleanliness (it is important to test cleanliness between all steps in the procedure to identify potential contaminating stages), this is marked as 'to be verified' in section 6.2.4 of the 'cleanliness plan' [2]. Ideally this will be a very short test that can be carried out at short notice so not to interrupt the process (i.e. taking the QCM recording device to the instrument, is it portable?). Monitoring of cleanliness will be the responsibility of RAL.
7. Detailed handling procedures (especially within UK, i.e. movement from BU to RAL to test houses etc.)
8. MTM/TTM EGSE. In the mechanical tests it is assumed that the test houses will provide any EGSE requirement. It is believed that the RAL thermal vacuum facility has a monitoring system comparable with the Thermal Sensors used in EIS (there is an Action on BU to confirm this). For any other testing, i.e. distortion monitors BU will provide the necessary test equipment. Cleanliness monitoring will be the responsibility of RAL. *Review requirements of MTM/TTM EGSE at RAL meeting.*
9. Mounting template: this should be checked for alignment against the FM model during the FM phase. I haven't updated the flow diagram as a comprehensive FM plan will be produced nearer the time and the idea behind this exercise was to mimic the FM plan during the initial phases of the integration to prove the cleanliness and handling plan. *The question then arises as to whether there is a need to do an alignment check of this type during MTM/TMM?*

**PLEASE ADD TO THIS LIST ANY OTHER ITEMS OF DISCUSSION**

# MTM Build Procedure



# FM Build Procedure

