Solar B - EIS

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MODEL PHILOSOPHY AND TEST PLAN

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1. INTRODUCTION

This document identifies the model philosophy for the EIS instrument and outlines the test plan associated with each model.

2. RELEVANT DOCUMENTS

MSSL/SLB-EIS/PA002	Product Assurance Plan
MSSL/SLB-EIS/SP003	Interface Control Document
MSSL/SLB-EIS/SP007	EIS Science Requirements
SLB-124	Environmental Conditions for Solar-B

3. MODEL PHILOSOPHY

There are three deliverable models in the Solar B EIS programme. Firstly the Prototype Model, followed by the Mechanical and Thermal Model and finally the Flight Model. Each of these is described in the following paragraphs.

4. PROTOTYPE MODEL

The Prototype Model (PM) is an engineering model the hardware of which will consist of electronics only. Its purpose is to check out the electrical and software interfaces with the spacecraft and all these tests will be conducted as a bench mounted exercise in Japan.
The testing of the PM in Japan will be the only opportunity, prior to the delivery of the Flight Model, to exercise these interfaces with the spacecraft. It will therefore be essential that the major functions of the ICU are present and although it will not be essential to have both Camera and MHC boxes complete, their functionality must be correctly represented.
MSSL is primarily responsible for all the electronics and software, although NRL in the USA are designing and building a substantial part of the prototype Mechanisms and Heater Controller. Commercial quality components will be used for the PM.

5. MECHANICAL/THERMAL MODEL

This will be one model that will be used for both sets of tests. The structure will be built to flight standards although it is anticipated that dummy masses will be substituted for the individual sub-assemblies. The model must be handled as flight, particularly with respect to cleanliness, as in Japan it will be used to check out their flight handling procedures.
Qualification level mechanical testing will be conducted on this model in Japan. Following the mechanical tests, the model will be re-configured in Japan to be the thermal model and the specified thermal test programme will then be conducted.
Birmingham University have the responsibility for the design and build of the structure and for the thermal design of the instrument.

6. FLIGHT MODEL

The flight structure will be delivered to RAL in the UK, together will all the other flight subassemblies. System assembly will take place in the RAL cleanroom facilities followed by system testing of the instrument. Environmental testing of the instrument will also take place in the RAL clean environmental test facilities. The flight model will then be shipped to Japan for integration with the spacecraft and specific electrical and software checks. It will then be transported back to RAL in the UK for calibration. Calibration will be performed in the RAL vacuum facility to a procedure that will be published by RAL and agreed by the consortium. Re-delivery to Japan will take place following this calibration procedure.
NRL in the USA have the responsibility for the design and manufacture of the optical assemblies for the instrument.

7. TEST PLANS

7.1 Prototype Model

7.1.1 ICU TBA
7.1.2 Camera TBA
7.1.3 MHC TBA
7.1.4 Software TBA
7.1.5 Complete Model

UK: Functional checks. Evaluation of interfaces using a spacecraft simulator (procedure TBA)

Japan: Integration and Test (The PM will be evaluated against the interfaces with the spacecraft that are detailed in the Interface Control Document MSSL/SLB-EIS/SP003).
Functional Test
Overall Performance Test

7.2 Mechanical/Thermal Model

UK: Vibration to qualification levels specified in SLB-124

Japan: Vibration to qualification levels specified in SLB-124
Acoustic Tests to qualification levels specified in SLB-124
Low level shock as specified in SLB-124
Thermal balance as specified in SLB-124
Thermal vacuum to qualification levels specified in SLB-124

7.3 Flight Model

UK: **Prior to first delivery:**
Functional checks using spacecraft simulator and optical stimulator (procedure TBA)
EMC evaluation (procedure TBA)
Vibration to acceptance levels specified in SLB-124
Acoustic Tests to acceptance levels specified in SLB-124
Low level shock as specified in SLB-124
Thermal vacuum to acceptance levels specified in SLB-124
Prior to second delivery:
Calibration of the instrument (procedure TBA)

Japan: After first delivery:
Integration and check out of interfaces
Vibration to acceptance levels specified in SLB-124
Acoustic Tests to acceptance levels specified in SLB-124
Low level shock as specified in SLB-124
Thermal vacuum to acceptance levels specified in SLB-124
After second delivery:
Integration with spacecraft and full systems check

Test/Model	PM	MTM/TTM	FM
Electrical interface	Yes		Yes
Software interface	Yes		Yes
EMC			Yes
Quasi-static load test		Yes	
Acoustic test		Yes	Yes
Random vibration test		Yes	Yes
Low frequency shock test		Yes	Yes
Pyrotechnic shock test		Yes	
Thermal balance		Yes	
Thermal cycle		Yes	Yes
Thermal soak		Yes	