XMM Optical Monitor

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PA REPORT ON QUALIFICATION MODEL OF THE TMPSU

Document Number: XMM-OM/MSSL/SP/0154.01 22 October 1997

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1. INTRODUCTION

The QM TMPSU was demonstrated to MSSL during an acceptance review meeting held at CSL on 29 August 1997. Minutes of this meeting were produced by Steve Roose reference MT/CSL/OM/4014-97. A short functional test was conducted successfully, however two particular short comings were identified, the use of PVC coated wire in the unit and the absence of jack-posts on the external connectors. Sparnex internal NCRs were raised for these deficiencies and delivery of the unit to MSSL was agreed by all parties pending the clearance of these particular NCRs.

The qualification model of the TMPSU was delivered to MSSL during the week beginning 1 September 1997, together with some documentation.

2. UNIT INSPECTION.

On immediate inspection at MSSL, it was clear that the unit did not conform to the mechanical arrangement defined in SK 1142 issue 2 (the mounting holes were positioned incorrectly) and an NCR was raised. This NCR, (Number 53), also recorded the fact that jack-posts had not been fitted to the two external connectors, as is required and as was promised at the acceptance review meeting held at CSL on 29 August 1997.
The unit was subsequently returned to CSL for corrective action.
It was returned again to MSSL on 18 September 1997, mechanically conforming to SK 1142, but still with no jack-posts fitted.
On 14 October we opened the unit to fit jack-posts to the connectors. The jack-posts could not be fitted because retaining nuts having the wrong thread had been soldered to the rear of the connector. Whilst the unit was open, the unit was investigated further and there were a number of areas where the standard of construction and workmanship were considered to be unsatisfactory and the most significant of these are itemised below. Generally the quality of soldering was poor and certainly not to the ESA PSS-01-708 standard:-

1. Fig 1.1
   The leads on the resistors are not correctly stress relieved to PSS 708 par 6.2.1.

2. Fig 1.2
   The leads on the resistors are not correctly stress relieved to PSS 708 par 6.2.1, in addition there is excessive solder on the joints for the vertically mounted resistors.

3. Fig 1.3
   The inter-board connector looks as though it is not mating correctly. It appears that an extra stand off has been added to clear a high profile component which has caused the connector to almost be come de-mated.
   There is no strain relief on the soldered connection to the power transistor on the base (connection nearest the camera). The lead is bent up out of line with the other connections.

4. Fig 2.4
This is a close up of a nut soldered to a D type connector. This is not an approved process. The thread is damaged. The thread is the wrong type for mating to the jack-post!
There is solder residue remaining.

5. Fig 3.1
Excessive solder has been applied (PSS 708 par 8.3). Dirt and rubbish has been encapsulated on the board surface.

6. Fig 3.2
Excessive solder has been applied (PSS 708 par 8.3). Dirt and rubbish has been encapsulated on the board surface.

7. Fig 4.1
There is melted insulation on a wire link an on wires to the power transistors. This indicates that this insulation is almost certainly PVC and not PTFE as required, as requested and as promised by Sparnex at the meeting on 29 August 1997.
This photograph again highlights the strain relief problem on the lead to the power transistor. The inter board connector mating problem can also be seen. This connector is not known to us as an approved type and may not be vacuum compatible.

8. Fig 2.3
Excessive solder applied (PSS 708 par 8.3).

9 Figs 2.1 and 2.2
Cleanliness problem.

The paint finish on the outside of the box was not to a good standard.

3. DOCUMENTATION

No Certificate of Conformance or inspection records were supplied.

Mass Report.
The reported mass in document XMM-OM/SX/MP/0001 issue 3 was 1875g. The MSSL measured mass of the unit was 1953g.

Vibration.
In report XMM-OM/SX/TR/0001 issue 1, it states in the summary that “After repair of Two broken solder connections, the XMM-OM TMPSU successfully completed the qualification test”. No NCR was raised to record and report these failures and there has been no report as to what the problem was and what corrective action was taken.

Declared Components List.
After repeated requests and the supply of samples, the DCL is still not presented correctly. The majority of Detailed Specification and Generic Specification entries are not there. Also there appears to be components entered that are not ESA qualified and for which no PAD has been submitted.

PADs
There are still a number of PADs outstanding, reference the fax from Jan Minnee, XMM/FAX/084/jm, dated 19 September 1997.

Functional & Environmental Tests
Engineers' reports required.

4. CONCLUSION

There are significant deficiencies in this unit. which has been submitted as a Qualification Model for the XMM-OM programme. Some of these are:-

- NCRs have not been cleared.
- The quality of workmanship is inadequate.
- There appears to be unapproved parts used, specifically PVC coated wire and unknown connectors.
- There was a distinct lack of cleanliness observed prior to conformally coating the printed circuit boards.
- There has been insufficient PA visibility of changes to the unit, for example no NCRs were raised for the solder failures during vibration testing.

In the light of these inadequacies, we conclude that this QM unit does not fulfil its role of qualifying a flight design.

FIG 1.1

FIG 1.2

FIG 1.3

FIG 2.4

FIG 3.1

FIG 3.2

FIG 4.1

FIG 2.3

FIG 2.1