

## **Product Assurance Topics**

- *Status on PA documentation***
- *Reliability and Safety***
- *EEE Parts, Materials and Processes***
- *Cleanliness and Contamination***
- *Software QA***
- *Configuration Management***
- *Critical issues***

### Status on PA documentation

| Suppliers                    | LFI →         |               |               |             |               |               |               | SCS →     |               |
|------------------------------|---------------|---------------|---------------|-------------|---------------|---------------|---------------|-----------|---------------|
|                              | JBO           | SAN           | MiliLab       | Laben (TRM) | Laben         | IAC           | PST           | JPL (TMJ) | ISN (SCE)     |
| PA Documents                 |               |               |               |             |               |               |               |           |               |
| Compl. Matrix to LFI PA Plan | February 2002 | February 2002 | -             | -           | July 2001     | -             | July 2001     | -         | -             |
| Dedared Components List      | March 2002    | February 2002 | February 2001 | July 2001   | March 2002    | February 2002 | March 2002    | -         | February 2002 |
| Dedared Materials List       | Dec. 2001     | February 2002 | -             | July 2001   | October 2001  | July 2001     | February 2002 | May 2001  | February 2002 |
| Dedared Processes List       | Dec. 2001     | February 2002 | -             | -           | October 2001  | July 2001     | February 2002 | May 2001  | February 2002 |
| FMECA                        | February 2002 | February 2002 | -             | -           | January 2001  | July 2001     | January 2001  | Nov. 2000 | February 2002 |
| Critical Items List          | February 2002 | February 2002 | -             | -           | Dec. 2001     | July 2001     | Dec. 2001     | Nov. 2000 | -             |
| Manufacturing Flow Chart     | February 2002 | March 2002    | -             | -           | February 2001 | November 2001 | -             | -         | -             |

## ***Reliability and Safety***

- **The LFI System FMECA issue 1 shall be completely reviewed at the light of the new configuration approach under finalisation.**

**In particular the next issue of the document will take into account: the new redundancy approach, the reduction on the DC/DC converters numbers and the relevant power switching philosophy.**

**As soon as the design and in particular the DAE subsystem shall be consolidated the analysis shall be produced.**

- **Up to know the FMECAs at supplier level have not pointed out any single point failure (No input from MilliLab, JPL foreseen an updating?).**
- **JPL Safety Data Package is under way: foreseen delivery in June 2002 (Cooler element CDR). Hazard Analyses have been prepared for the current design baseline.**

## ***EEE Parts, Materials and Processes***

- **An internal review on the available data about the LFI EEE, Materials and Processes was held at PST level during January and February.**
- **Following the above and after clarifications provided by the LFI Suppliers (Laben, SAN/MIER, JBO, IAC/CRISA) it is decided to update the LFI:**
  - **Declared Component List**
  - **Materials and Mechanical Parts List**
  - **Processes List**
- **More details with respect to the first issue are provided inside the lists following the design status of art and ESA comments.**
- **MilliLab have not yet provided any input for the Materials/Mechanical Parts, and Processes. This aspect is considered critical by PST.**

## ***Cleanliness and Contamination***

- **Requirements settled during the Cleanliness and Contamination Working Group and inserted in the last issue of the LFI PA Plan**
- **Molecular contamination parameters not yet frozen at LFI level**
- **Molecular contamination effects on LFI is on the way; status provided just after the “LFI Design Status & I/F consolidation Meeting” at Bologna (end of March 2002)**

## **Software QA**

- **The SWs belong to the SCE and REBA subsystems**
- **The Suppliers' declared approach follow the ESA BSSC (96)2**
- **Difficulties to obtain visibility on SW QA activities from IAC (REBA) and ISN (SCE) up to now**
- **An HW/SW interaction analysis at Supplier level is requested for the IBDR**

## ***Configuration Management***

- **LFI CADM Plan, issue 3 emitted in final version after ESA Review**
- **LFI System CIDL to be finalised**
- **Configuration items data storing in real time from Suppliers**
- **LFI Product Tree, already aware by the Suppliers, updated taking into account definition of LFI part numbers down to subsystems and per model philosophy.**

## Critical issues

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| LFI SUPPLIER | CRITICAL CATEGORY             | ITEM IDENTIFICATION  | RISK  | ACTIVITY FORESEEN OR IMPLEMENTED  |
|--------------|-------------------------------|--|---|---|
| IASF         | A<br>(= Safety & Reliability) | 4K Reference Load, see (1)   | No data on the behaviour of the 4K Ref. Load materials at 4 Kelvin  | Evaluation/Qualification Program to be finalised. Collaboration IASF-ESA for a test campaign started.   |
| JBO          | A                             | 30 & 44 GHz FEMs   | No data on the behaviour of the FEMs at 20 Kelvin.  | Evaluation/Qualification Program to be finalised, see (5).<br>Review as per Annex 12 of (8).<br>Updated (6).  |
| JBO          | A                             | 30 & 44 GHz FEMs:<br>• InP LNA HEMTs, see (2)  | <ul style="list-style-type: none"> <li>No data available on the space qualification of the InP LNAs and their behaviour at 20 Kelvin.</li> <li>ESD.</li> </ul>  | <ul style="list-style-type: none"> <li>Evaluation/Qualification Program to be finalised, see (5). Review as per Annex 12 of (8). Updated (6).</li> <li>Handling procedure to be finalised.</li> </ul> |
| YLI          | A                             | 70 GHz FEMs  | No data on the behaviour of the FEMs at 20 Kelvin.  | Evaluation/Qualification Program to be finalised, see (5) and (9).  |
| YLI          | A                             | 70 GHz FEMs:<br>• InP LNA HEMTs, see (2)   | <ul style="list-style-type: none"> <li>No data available on the space qualification of the InP LNAs and their behaviour at 20 Kelvin.</li> <li>ESD.</li> </ul>  | <ul style="list-style-type: none"> <li>Evaluation/Qualification Program to be finalised, see (5).</li> <li>Handling procedure to be proposed.</li> </ul>  |
| LAB (TRW)    | A                             | 100 GHz FEMs   | No data on the behaviour of the FEMs at 20 Kelvin.  | Evaluation/Qualification Program to be proposed, see (5).   |
| LAB (TRW)    | A                             | 100 GHz FEMs:<br>• InP LNA HEMTs, see Instrument Science Verification Review (10-11/11/1999) | <ul style="list-style-type: none"> <li>Not sufficient but partial data exist on the space qualification of the InP LNAs and their behaviour at 20 Kelvin (data distribution restricted).</li> <li>ESD.</li> </ul> | <ul style="list-style-type: none"> <li>Evaluation/Qualification Program to be finalised, see (5).</li> <li>Handling procedure to be finalised.</li> </ul>   |



## Critical issues

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|     |                                  |   |  |   |
|-----|----------------------------------|---|--|---|
| LAB | A                                | DAE unit:<br>• Multichip Modules (MCM)                | Manufacturing processes.   | Qualification program in progress, completion foreseen within 2002.   |
| LAB | A                                | DAE unit:<br>• RT54SX32S, FPGA, 208/256 pins          | Extension of the mounting process on PCBs of the parts with more than 196 pins.  | Qualification program in progress, completion foreseen within first half of 2002.   |
| JPL | B<br>(= Fracture Critical Items) | Sorption Cooler System: Mechanical Thermal Unit (MTU) | <ul style="list-style-type: none"> <li>• Pressurised vessels and cryogenic subsystems</li> <li>• Internal surface of the unit are very susceptible to both molecular and particulate contamination.</li> </ul> | Safety and Hazard Analyses under way following current design baseline. Safety Data Packages as per (10). Contamination Control Plan: see (11). |

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|--|------------------------------------|
| (1): Planck LFI Declared Materials & Mechanical Parts List     | PL-LFI-PST-LI-011, issue 2.0       |
| (2): Planck LFI Declared Components List                       | PL-LFI-PST-LI-012, issue 2.0       |
| (3): Planck LFI Declared Processes List                        | PL-LFI-PST-LI-013, issue 2.0       |
| (4): Planck LFI FMECA  | PL-LFI-PST-AN-001, issue 1.0       |
| (5): InP LNA Evaluation Proposal                               | PL-LFI-PST-TN-008, issue draft 0.1 |
| (6): 30 & 44 GHz LNA Qualification Plan                        | PL-LFI-JOD-PL-002, issue draft 0.3 |
| (7): A proposal for mechanical test on adhesive for 4KRL       | PL-LFI-TES-TN-006, issue draft 0.1 |
| (8): LFI System Interface Meeting                              | PL-LFI-PST-MM/01-016               |
| (9): MilliLab / Ylinen Response to InP LNA Evaluation Proposal | PLA-lfi-YLIN-PR-0278-01            |
| (10): JPL FIRST / Planck Project Safety Plan                   | D-16875, Revision A                |
| (11): JPL Herschel / Planck Contamination Control Plan         | JPL D-19156 (April 13, 2001)       |