**INAF**
**IASF-Bologna**
LFI Project System Team

# Planck LFI

**TITLE:** **Quick Look Data Analysis Of LFI performed during SIT**

**DOC. TYPE:** **Test Report**

**PROJECT REF.:** **PL-LFI-PST-RP-028** **PAGE: I of IV, 24**

**ISSUE/REV.:** **1.0** **DATE: October 2007**

| | | |
|---|---|---|
| **Prepared by** | **L. STRINGHETTI**<br>**F. CUTTAIA**<br>**A. GREGORIO**<br>**E. FRANCESCHI**<br>**L. TERENZI**<br>**F. VILLA**<br>**M. SANDRI** | **Date:** October , 2007<br>**Signature:** [redacted] |
| **Agreed by** | **C. BUTLER**<br>**LFI Program Manager** | **Date:** October , 2007<br>**Signature:** [redacted] |
| **Approved by** | **N. MANDOLESI**<br>**LFI Principal Investigator** | **Date:** October , 2007<br>**Signature:** [redacted] |

# DISTRIBUTION LIST

| Recipient | Company / Institute | E-mail address | Sent |
|---|---|---|---|
| N. MANDOLESI | INAF/IASF – Bologna | mandolesi@iasfbo.inaf.it | Yes |
| R.C. BUTLER | INAF/IASF – Bologna | butler@iasfbo.inaf.it | Yes |
| M. BERSANELLI | UNIMI – Milano | marco.bersanelli@mi.infn.it | Yes |
| M. BALASINI | TAS-I – Milan | maurizio.balasini@thalesaleniaspace.com | Yes |
| R. SILVESTRI | TAS-I – Milan | roberto.silvestri@thalesaleniaspace.com | Yes |
| P. LEUTENEGGER | TAS-I – Milan | paolo.leutenegger@thalesaleniaspace.com | Yes |
| M. MICCOLIS | TAS-I – Milan | maurizio.miccolis@thalesaleniaspace.com | Yes |
| G. CAFAGNA | TAS-I – Milan | gaetano.cafagna@thalesaleniaspace.com | Yes |
| A. MENNELLA | UNIMI – Milano | aniello.mennella@fisica.unimi.it | Yes |
| J. PATTERSON | ESA | Janice.Patterson@esa.int | Yes |
| L. PEREZ CUEVAS | ESA | leticia.perez.cuevas@esa.int | Yes |
| O. PIERSANTI | ESA | Osvaldo.Piersanti@esa.int | Yes |
| J.P. CHAMBELLAND | TAS-F Cannes | jean-philippe.chambelland@thalesaleniaspace.com | Yes |
| B. COLLAUDIN | TAS-F Cannes | Bernard.Collaudin@thalesaleniaspace.com | Yes |
| P. RIHET | TAS-F Cannes | Patrick.Rihet@thalesaleniaspace.com | Yes |
| N. SEVILLE | TAS-F Cannes | Norbert.Seville@thalesaleniaspace.com | Yes |
| J.P. HAYET | TAS-F Cannes | Jean-pierre.hayet@thalesaleniaspace.com | Yes |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| LFI System PCC | INAF/IASF – Bologna | lfispcc@iasfbo.inaf.it | Yes |
| | | | |

# CHANGE RECORD

| Issue | Date | Sheet | Description of Change | Release |
|---|---|---|---|---|
| 0.1 | October | All | First Draft of Document | Draft |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

# TABLE OF CONTENTS

# 1 ACRONYMS

| | |
|---|---|
| AIV | Assembly, Integration, Verification |
| ASW | Application Software |
| BEM | Back End Module |
| BEU | Back End Unit |
| CCS | Central Check-out System |
| CDMU | Central Data Management Unit |
| DAE | Data Acquisition Electronics |
| DPU | Digital Processing Unit |
| EGSE | Electrical ground Support Equipment |
| FEM | Front End Module |
| I-EGSE | Instrument EGSE |
| IST | Integrated Satellite Test |
| OBC | On Board Clock |
| RAA | Radiometer Array Assembly |
| REBA | Radiometric Electronic Box Assembly |
| S/C | Spacecraft |
| SCOE | Spacecraft Control and Operation System |
| SPU | Signal Processing Unit |
| SUSW | Start- Up Software |
| SVM | Service Module |
| TBC | To Be Checked |
| TBW | To Be Written |
| TC | Telecommand |
| TM | Telemetry |
| UFT | Unit Functional Test |

# 2 INTRODUCTION

This document has been issued in the frame of ASI contract that has been released for the activities of Planck-LFI Phase E2

## 2.1 Purpose and Scope

Scope of this document is to give a first quick look analysis response of the functionality of the LFI instrument during the SIT Satellite Integrated Tests) Test Campaign
The document is divided in two section. The first section is related to the description of the work done that is to say the description of the LFI Log Book and the description of the performed tests. The second section is the summary of the results of each test coming from both real time and offline data analysis.

## 2.2 Test configuration

The test configuration is the following

SCOS 2 K HPCCS Version TBC
LFI Gatway Version TBC
TQL TBC
LIFE Machine version OM TBC

LFI Personnel involved during the test is:

| | |
|---|---|
| LFI AIV Manager | Luca Stringhetti IASF Bologna stringhetti@iasfbo.inaf.it |
| I-EGSE Engineer | Enrico Franceschi IASF Bologna franceschi@iasfbo.inaf.it |
| LFI IOT | Francesco Cuttaia IASF Bologna cuttaia@iasfbo.inaf.it<br>Anna Gregorio UNITS anna.gregorio@ts.infn.it<br>Luca Terenzi IASF Bologna terenzi@iasfbo.inaf.it |
| TAS-I Support | Paola Battaglia TAS-I paola.battaglia@thalesaleniaspace.com |

# 3 APPLICABLE AND REFERENCE DOCUMENTS

## 3.1 Applicable Documents

[AD1] Herschel/Planck Instrument Interface document Part A
SCI-PT-IIDA-04624 Issue 3.3

[AD2] Herschel/Planck Instrument Interface document Part B
SCI-PT-IIDB-04142 Issue 3.1

[AD3] Herschel/Planck Instrument Interface document Part B
SCI-PT-IIDB-04142 Issue 3.1, Annex 3, ICD 750800115

[AD4] Herschel/Planck Instrument Interface document Part A
SCI-PT-IIDA-04624 Issue 3.3 Annex 10

## 3.2 Reference Documents

[RD1] Planck Instrument Testing at PFM S/C levels
H-P-3-ASP-TN-0676, Issue 1.0

[RD2] Planck LFI User Manual
PL-LFI-PST-MA-001 Issue 2.1

[RD3] Planck LFI REBA Herschel PACS SPU: LFI REBA FMs User's Manual
FPL-MA-1214-04 CRS Issue 1.0

[RD4] LFI- REBA application Software User Manual (SUM)
DS/UM_FIR/178v.4

[RD5] LFI Warm Functional Test Procedure (WFT)
PL-LFI-PST-PR-017_2_1

[RD6] PLM SIT Test Specification
H-P-3-ASP-TS-1421 Issue 2.0

[RD07] IST1 and IST2 Combined LFI HFI tests
PL-LFI-PST-PR-019 Issue 3.1

# 4 SIT Test Execution

For each modular block of procedure test results and conclusions are presented.

## 4.1 Switch on LFI in nominal science (Nominal Unit)

### 4.1.1 Procedure/ Test sequence

| LFI SIT: Switch on (Nominal Unit) | | | | | 1.00.00 | |
|---|---|---|---|---|---|---|
| | Switch ON LFI | | | 1 | 0.39.00 | |
| | Go to Stand By Mode | OFF to standby | 0.32.00 | 1 | 0.32.00 | 0.32.00 |
| | Go to DAE Set Up Mode | Standby to DAE set up | 0.07.00 | 1 | 0.07.00 | 0.39.00 |
| | LFI in Normal Science (Warm test Config..) | | | 1 | 0.19.00 | |
| | Setting Telemetry Rate | Nominal Values | 0.02.00 | 1 | 0.02.00 | 0.41.00 |
| | Event Packet Enabling | | 0.02.00 | 1 | 0.02.00 | 0.43.00 |
| | Definition of science Processing Parameters | Naverage set to 256 | 0.02.00 | 1 | 0.02.00 | 0.45.00 |
| | Changing Processing Type to 1 | | 0.05.00 | 1 | 0.05.00 | 0.50.00 |
| | Spu Connection | | 0.02.00 | 1 | 0.02.00 | 0.52.00 |
| | Science Activation Type 1 | | 0.04.00 | 1 | 0.04.00 | 0.56.00 |
| | RCA Activation | | 0.02.00 | 1 | 0.02.00 | 0.58.00 |
| | Set DAE Default configuration | | 0.02.00 | 1 | 0.02.00 | 1.00.00 |

At the end of the Procedure LFI will stay in listening mode whie HFI and SCS had performed WFT and Healthcheck

### 4.1.2 Results and Conclusions

The procedure has run on the 23nd of october without any problem and the test has finished successfully.

Pass and Fail Criteria

| | |
|---|---|
| No errors from the REBA HW Self check | PASSED |
| No un-expected event Packets | PASSED |
| REBA Power Consumption within the ranges of expected values | PASSED |
| EEPROM Check Sum passed | PASSED |
| REBA synchronization achieved | PASSED |
| DAE Power Consumption within the ranges of expected values | PASSED |
| DAE Synchronization achieved | PASSED |
| The FEM I Drain Currents obtained from Telemetry are within the ranges expected (5%) | PASSED |

| | |
|---|---|
| The DC voltages Outputs (Science Telemetry) are within the ranges expected. (10%) | PASSED |
| No unexpected features in FFT spectrum (Spike, Pop corn noise, currents drops…) | TBC |

| Id w.r.t WFT | | | | |
|---|---|---|---|---|
| **CH** | **<00>** | **<01>** | **<10>** | **<11>** |
| **CH27** | 0.06 | 0.73 | 0.06 | 0.13 |
| **CH24** | 0.14 | 0.11 | 0.17 | 0.14 |
| **CH21** | 0.05 | 0.17 | 0.11 | 0.26 |
| **CH22** | 0.05 | 0.16 | 0.11 | 0.21 |
| **CH23** | 0.06 | 0.10 | 0.17 | 0.17 |
| **CH25** | 0.15 | 0.19 | 0.15 | 0.11 |
| **CH28** | 0.06 | -0.06 | -0.06 | -0.06 |
| **CH20** | 0.05 | 0.05 | 0.10 | 0.00 |
| **CH19** | 0.10 | 0.05 | 0.05 | 0.05 |
| **CH18** | 0.00 | 0.06 | 0.06 | 0.00 |
| **CH26** | 0.18 | 0.08 | 0.15 | 0.11 |

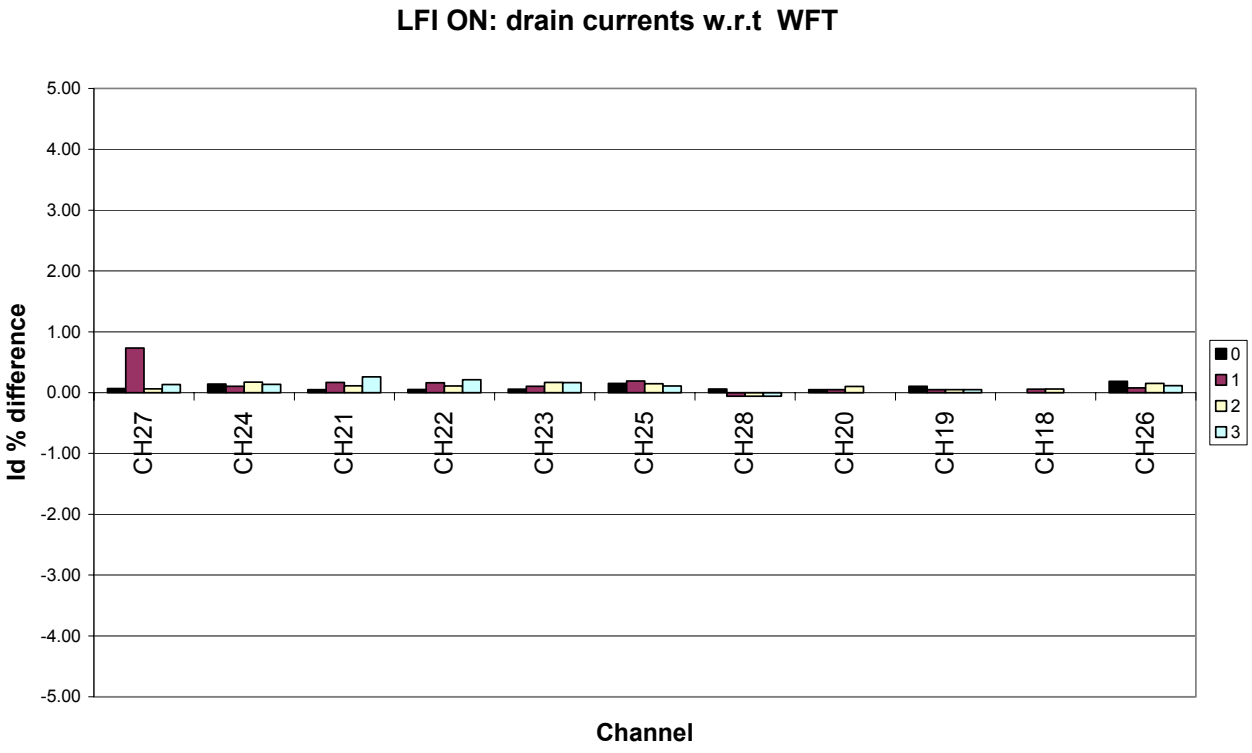



**Figure 1 Drain currents with LFI – N on**

### 4.2 Nominal Science with nominal unit

During this step HFI and SCS are performing their WFT. LFI stays in nominal acquisition acquiring data for analysis.

#### 4.2.1 Procedure/ Test sequence

No test sequence for LFI is requested to be applied here.

#### 4.2.2 Results and Conclusions

Pass and Fail Criteria

| | |
|---|---|
| No un-expected event Packets | PASSED |
| REBA Power Consumption within the ranges of expected values | PASSED |
| DAE Power Consumption within the ranges of expected values | PASSED |
| No unexpected features during HFI activity in Scientific signal | PASSED |
| No unexpected features during SCS activity in Scientific signal | TBC |

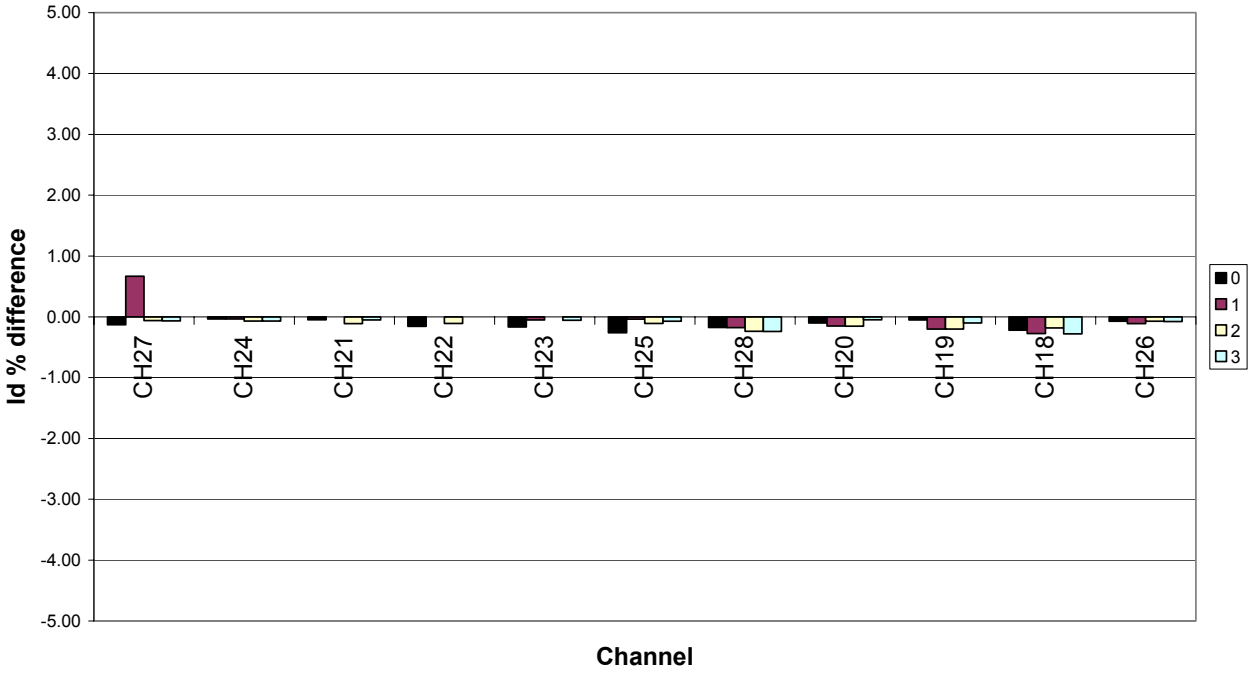
Some NCRs have been raised:

| NCR | Description |
|---|---|
| | Monitored the presence of unexpected spikes during the start up of the SCS electronic. Data analysis on going |

#### 4.2.2.1 Currents monitoring during HFI WFT

| Id w.r.t WFT | | | | |
|---|---|---|---|---|
| CH | <00> | <01> | <10> | <11> |
| CH27 | -0.13 | 0.67 | -0.06 | -0.07 |
| CH24 | -0.03 | -0.04 | -0.07 | -0.07 |
| CH21 | -0.05 | 0.00 | -0.11 | -0.05 |
| CH22 | -0.16 | 0.00 | -0.11 | 0.00 |
| CH23 | -0.17 | -0.05 | 0.00 | -0.06 |
| CH25 | -0.26 | -0.04 | -0.11 | -0.07 |
| CH28 | -0.18 | -0.18 | -0.24 | -0.24 |
| CH20 | -0.10 | -0.15 | -0.15 | -0.05 |
| CH19 | -0.05 | -0.20 | -0.20 | -0.10 |
| CH18 | -0.22 | -0.28 | -0.18 | -0.28 |
| CH26 | -0.07 | -0.11 | -0.07 | -0.08 |

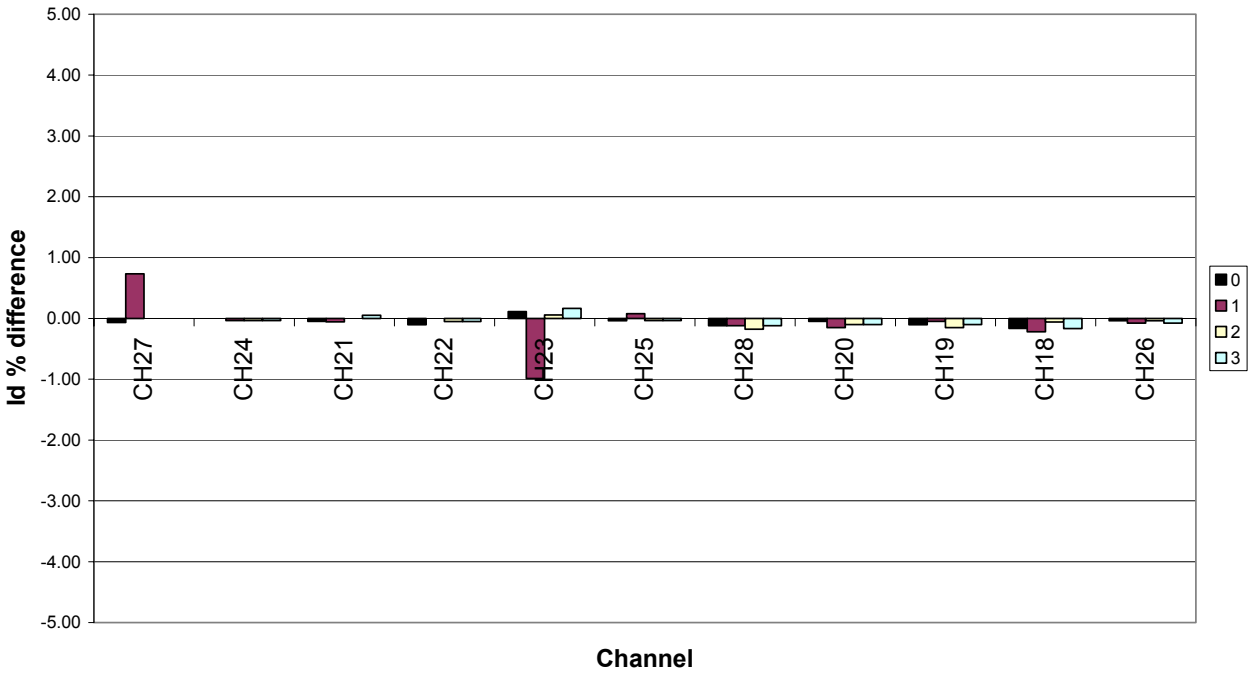
**LFI ON: drain currents w.r.t WFT**



### 4.2.3 Currents monitoring during SCS-N HC

| Id w.r.t WFT | | | | |
|---|---|---|---|---|
| CH | <00> | <01> | <10> | <11> |
| CH27 | -0.06 | 0.73 | 0.00 | 0.00 |
| CH24 | 0.00 | -0.04 | -0.03 | -0.03 |
| CH21 | -0.05 | -0.06 | 0.00 | 0.05 |
| CH22 | -0.10 | 0.00 | -0.05 | -0.05 |
| CH23 | 0.11 | -0.99 | 0.06 | 0.17 |
| CH25 | -0.04 | 0.08 | -0.04 | -0.04 |
| CH28 | -0.12 | -0.12 | -0.18 | -0.12 |
| CH20 | -0.05 | -0.15 | -0.10 | -0.10 |
| CH19 | -0.10 | -0.05 | -0.15 | -0.10 |
| CH18 | -0.16 | -0.22 | -0.06 | -0.17 |
| CH26 | -0.04 | -0.08 | -0.04 | -0.08 |

**LFI ON: drain currents w.r.t WFT**



### 4.3 Switch off of the Nominal Unit

#### 4.3.1 Procedure/ Test sequence

| LFI SIT: Switch off (Nominal Unit) | | | | | 0.20.00 | |
|---|---|---|---|---|---|---|
| | Switch OFF LFI | | | 1 | 0.20.00 | |
| | Science De-Activation | | 0.05.00 | 1 | 0.05.00 | 0.05.00 |
| | RCA De-Activation | | 0.05.00 | 1 | 0.05.00 | 0.10.00 |
| | LFI to Standby | DAE Set Up to Standby | 0.05.00 | 1 | 0.05.00 | 0.15.00 |
| | Switch OFF | Standby to OFF | 0.05.00 | 1 | 0.05.00 | 0.20.00 |

#### 4.3.2 Results and Conclusions

The test was successfully completed.

Pass and Fail Criteria

| | |
|---|---|
| No un-expected event Packets | PASSED |
| No more telemetry coming from LFI | PASSED |

No NCRs have been raised:

### 4.4 LFI Switch on using Redundant Unit

#### 4.4.1 Procedure/ Test sequence

| LFI SIT: Switch on (Redundant Unit) | | | | | 1.20.00 | |
|---|---|---|---|---|---|---|
| | Switch ON LFI | | | 1 | 0.39.00 | |
| | Go to Stand By Mode | OFF to standby | 0.32.00 | 1 | 0.32.00 | 0.32.00 |
| | Go to DAE Set Up Mode | Standby to DAE set up | 0.07.00 | 1 | 0.07.00 | 0.39.00 |
| | LFI in Normal Science (Warm test Config..) | | | 1 | 0.19.00 | |
| | Setting Telemetry Rate | Nominal Values | 0.02.00 | 1 | 0.02.00 | 0.41.00 |
| | Event Packet Enabling | | 0.02.00 | 1 | 0.02.00 | 0.43.00 |
| | Definition of science Processing Parameters | Naverage set to 256 | 0.02.00 | 1 | 0.02.00 | 0.45.00 |
| | Changing Processing Type to 1 | | 0.05.00 | 1 | 0.05.00 | 0.50.00 |
| | Spu Connection | | 0.02.00 | 1 | 0.02.00 | 0.52.00 |
| | Science Activation Type 1 | | 0.04.00 | 1 | 0.04.00 | 0.56.00 |
| | RCA Activation | | 0.02.00 | 1 | 0.02.00 | 0.58.00 |
| | Set DAE Default configuration | | 0.02.00 | 1 | 0.02.00 | 1.00.00 |

#### 4.4.2 Results and Conclusions

The test was successfully completed.

Pass and Fail Criteria

| | |
|---|---|
| No errors from the REBA HW Self check | PASSED |
| No un-expected event Packets | PASSED |
| REBA Power Consumption within the ranges of expected values | PASSED |
| EEPROM Check Sum passed | PASSED |
| REBA synchronization achieved | PASSED |
| DAE Power Consumption within the ranges of expected values | PASSED |
| DAE Synchronization achieved | PASSED |

Some NCRs have been raised:

| NCR | Description |
|---|---|
| TBD | The Default values of the redundant REBA were not the right ones because the WFT, when these values were saved, was performed only using the nominal Unit. The procedure has been corrected on the fly. |
| TBD | Unexpected high magnitude of the pop corn noise in Channel 23 (20mV respect to 2mV). Data analysis on going |
| TBD | One channel of the RCA 25 swaps Reference with Sky in the scientific output without any correlation with physical temperature changes (actually in warm temperature condition there is no change in temperature). Data analysis on going |

### 4.5 Nominal Science with Redundant unit

During this step SCS redundant is performing its health check. LFI stays in nominal acquisition acquiring data for analysis.

#### 4.5.1 Procedure/ Test sequence

No test sequence for LFI is requested to be applied here.

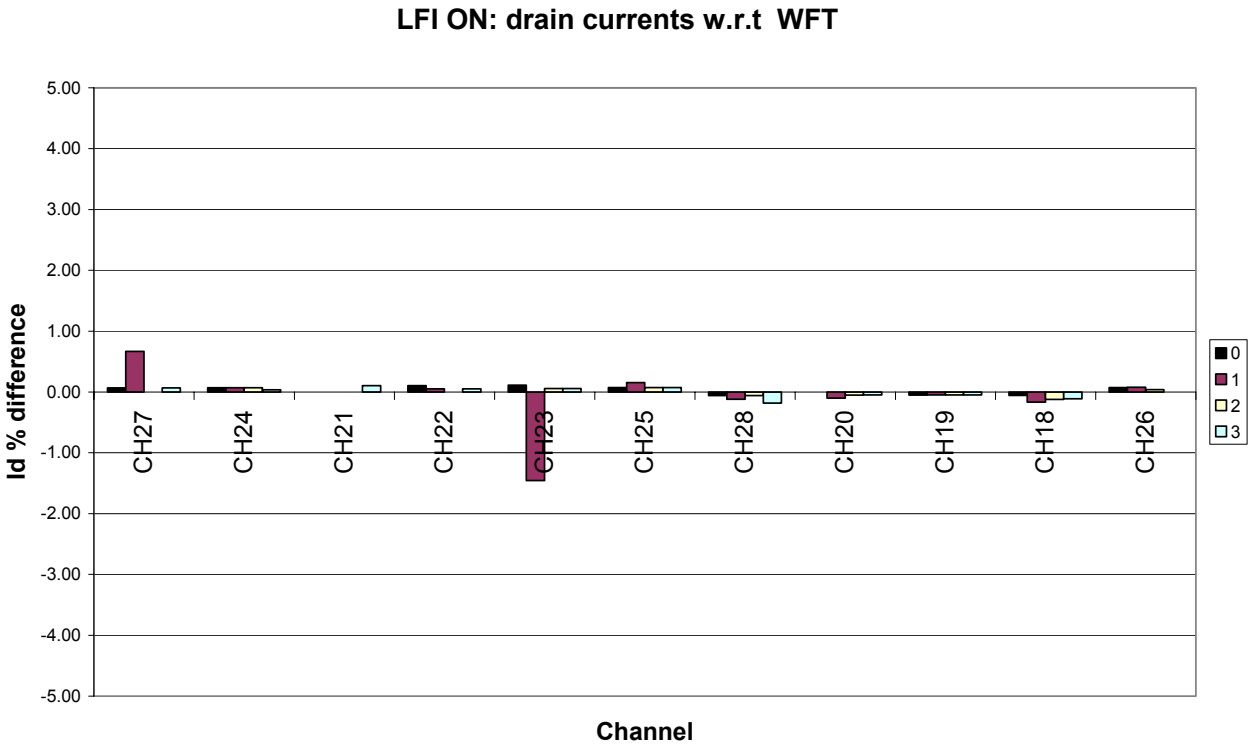
#### 4.5.2 Results and Conclusions

Pass and Fail Criteria

| | |
|---|---|
| No un-expected event Packets | PASSED |
| REBA Power Consumption within the ranges of expected values | PASSED |
| DAE Power Consumption within the ranges of expected values | PASSED |
| No unexpected features during SCS activity in Scientific signal | TBC |

No NCRs have been raised:

| Id w.r.t WFT | | | | |
|---|---|---|---|---|
| **CH** | **<00>** | **<01>** | **<10>** | **<11>** |
| **CH27** | 0.06 | 0.67 | 0.00 | 0.07 |
| **CH24** | 0.07 | 0.07 | 0.07 | 0.03 |
| **CH21** | 0.00 | 0.00 | 0.00 | 0.10 |
| **CH22** | 0.10 | 0.05 | 0.00 | 0.05 |
| **CH23** | 0.11 | -1.46 | 0.06 | 0.06 |
| **CH25** | 0.07 | 0.15 | 0.07 | 0.07 |
| **CH28** | -0.06 | -0.12 | -0.06 | -0.18 |
| **CH20** | 0.00 | -0.10 | -0.05 | -0.05 |
| **CH19** | -0.05 | -0.05 | -0.05 | -0.05 |
| **CH18** | -0.05 | -0.17 | -0.12 | -0.11 |
| **CH26** | 0.07 | 0.08 | 0.04 | 0.00 |




## 4.6 LFI Preparation to AMB02 go to Stand By Mode

### 4.6.1 Procedure/ Test sequence

| LFI SIT: AMB 02 Preparation Go back to Standby Mode | | | | | 0.17.00 | |
|---|---|---|---|---|---|---|
| Switch OFF LFI | | | | 1 | 0.17.00 | |
| | Disable 4KHz Switching | | 0.02.00 | 1 | 0.02.00 | 0.02.00 |
| | Change PS status to zero | | 0.02.00 | 1 | 0.02.00 | 0.04.00 |
| | Update Channel config. (Switch off all ACAs in FEM) | | 0.02.00 | 1 | 0.02.00 | 0.06.00 |
| | Science De-Activation | | 0.02.00 | 1 | 0.02.00 | 0.08.00 |
| | RCA De-Activation | | 0.02.00 | 2 | 0.04.00 | 0.12.00 |
| | Switch off RAA from Satellite | | 0.05.00 | 1 | 0.05.00 | 0.17.00 |

Once LFI is in Stand By mode the following procedure has been executed.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **LFI SIT: AMB02 Preparation Cont. Go to nominal science** | | | | | | **0.24.00** | |
| | **Switch ON LFI** | | | | 1 | **0.07.00** | |
| | | Go to DAE Set Up Mode | Standby to DAE set up | 0.07.00 | 1 | 0.07.00 | 0.07.00 |
| | **LFI in Normal Science (Warm test Config..)** | | | | 1 | **0.17.00** | |
| | | Setting Telemetry Rate | Nominal Values | 0.02.00 | 1 | 0.02.00 | 0.09.00 |
| | | Event Packet Enabling | | 0.02.00 | 1 | 0.02.00 | 0.11.00 |
| | | Definition of science Processing Parameters | Naverage set to 256 | 0.02.00 | 1 | 0.02.00 | 0.13.00 |
| | | Changing Processing Type to 1 | | 0.05.00 | 1 | 0.05.00 | 0.18.00 |
| | | Spu Connection | | 0.02.00 | 1 | 0.02.00 | 0.20.00 |
| | | Science Activation Type 1 | | 0.04.00 | 1 | 0.04.00 | 0.24.00 |

### 4.6.2 Results and Conclusions

The test was successfully completed.

Pass and Fail Criteria

| | |
|---|---|
| No un-expected event Packets | PASSED |
| REBA Power Consumption within the ranges of expected values | PASSED |
| DAE Power Consumption within the ranges of expected values | PASSED |
| DAE Synchronization achieved | PASSED |
| Science production as expected | PASSED |

No NCRs have been raised

## 4.7 LFI Execution of AMB02

### 4.7.1 Procedure/ Test sequence

| LFI SIT: AMB02 execution | | | | | 3.24.00 | |
|---|---|---|---|---|---|---|
| Switch ON LFI | | | | 1 | 0.05.00 | |
| | RCA Activation | | 0.05.00 | 1 | 0.05.00 | 0.05.00 |
| | Perform DAE Initialization | | 0.10.00 | 1 | 0.10.00 | 0.15.00 |
| | Wait for thermalization of power groups | | 0.30.00 | 1 | 0.30.00 | 0.35.00 |
| | Configure DAE (Scwitch ACA on) | | 0.02.00 | 1 | 0.02.00 | 0.37.00 |
| | Wait for thermalization of FPU | | 0.25.00 | 1 | 0.25.00 | 1.02.00 |
| | Enable 4KH switching A/C | | 0.02.00 | 1 | 0.02.00 | 1.04.00 |
| | Acquire data | | 0.30.00 | 1 | 0.30.00 | 1.34.00 |
| | Change PS stauts to one on B/D | | 0.02.00 | 1 | 0.02.00 | 1.36.00 |
| | Acquire data | | 0.30.00 | 1 | 0.30.00 | 2.06.00 |
| | Disable 4KH switching A/C | | 0.02.00 | 1 | 0.02.00 | 2.08.00 |
| | Enable 4KHz switching B/D | | 0.02.00 | 1 | 0.02.00 | 2.10.00 |
| | Change PS status to zero on A/C | | 0.02.00 | 1 | 0.02.00 | 2.12.00 |
| | Acquire data | | 0.30.00 | 1 | 0.30.00 | 2.42.00 |
| | Change PS status to one on A/C | | 0.02.00 | 1 | 0.02.00 | 2.44.00 |
| | Acuire Data | | 0.30.00 | 1 | 0.30.00 | 3.14.00 |

### 4.7.2 Results and Conclusions

The procedure has run on the 23rd of October without any problem and the test has finished successfully.

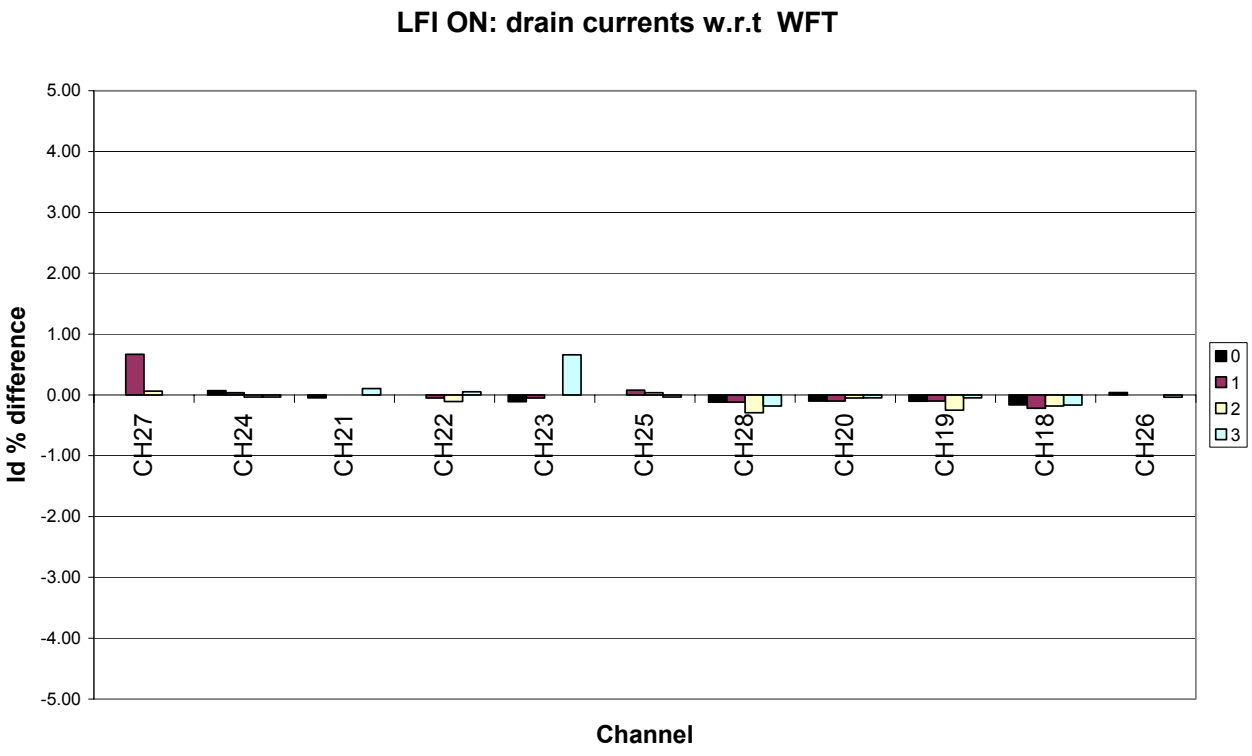
Pass and Fail Criteria

| | |
|---|---|
| No errors from the REBA HW Self check | PASSED |
| No un-expected event Packets | PASSED |
| REBA Power Consumption within the ranges of expected values | PASSED |
| EEPROM Check Sum passed | PASSED |
| REBA synchronization achieved | PASSED |
| DAE Power Consumption within the ranges of expected values | PASSED |
| DAE Synchronization achieved | PASSED |
| The FEM I Drain Currents obtained from Telemetry are within the ranges expected (5%) | PASSED |
| The DC voltages Outputs (Science Telemetry) are within the ranges expected. (10%) | PASSED |
| No unexpected features in FFT spectrum (Spike, Pop corn noise, currents drops…) | TBC |

No NCRs have been raised.

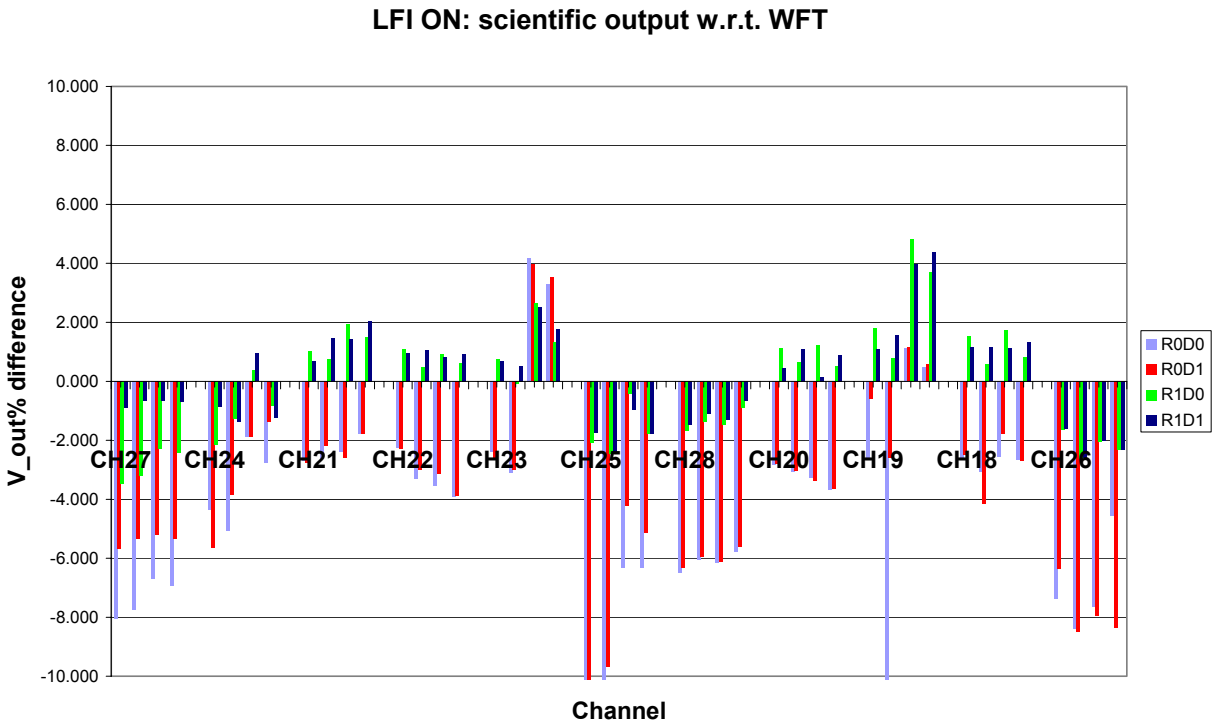
| Id w.r.t WFT | | | | |
|---|---|---|---|---|
| CH | <00> | <01> | <10> | <11> |
| CH27 | 0.00 | 0.67 | 0.06 | 0.00 |
| CH24 | 0.07 | 0.04 | -0.03 | -0.03 |
| CH21 | -0.05 | 0.00 | 0.00 | 0.10 |
| CH22 | 0.00 | -0.05 | -0.11 | 0.05 |
| CH23 | -0.11 | -0.05 | 0.00 | 0.66 |
| CH25 | 0.00 | 0.08 | 0.04 | -0.04 |
| CH28 | -0.12 | -0.12 | -0.29 | -0.18 |
| CH20 | -0.10 | -0.10 | -0.05 | -0.05 |
| CH19 | -0.10 | -0.10 | -0.25 | -0.05 |
| CH18 | -0.16 | -0.22 | -0.18 | -0.17 |
| CH26 | 0.04 | 0.00 | 0.00 | -0.04 |

**Figure 2 currents during AMB02**



| LFI ON VOUT (w.r.t WFT) | | | | | | |
|---|---|---|---|---|---|---|
| | B/D SW | | A/C SW | | average B/D | average A/C |
| | REF | Remarks | Remarks | Remarks | | |
| **CH27** | -8.07 | -5.68 | -100.00 | -100.00 | -6.37 | -100.00 |
| | -7.74 | -5.33 | -100.00 | -100.00 | | |
| | -6.69 | -5.20 | -100.00 | -100.00 | | |
| | -6.92 | -5.33 | -100.00 | -100.00 | | |
| **CH24** | -4.35 | -5.63 | -2.14 | -0.86 | -3.35 | -0.80 |
| | -5.06 | -3.85 | -1.27 | -1.39 | | |
| | -1.89 | -1.89 | 0.38 | 0.94 | | |
| | -2.78 | -1.39 | -0.82 | -1.23 | | |
| **CH21** | -2.71 | -2.75 | 1.02 | 0.68 | -2.36 | 1.35 |
| | -2.62 | -2.21 | 0.75 | 1.48 | | |
| | -2.41 | -2.60 | 1.94 | 1.42 | | |
| | -1.80 | -1.79 | 1.48 | 2.03 | | |
| **CH22** | -2.25 | -2.60 | -100.00 | -100.00 | -2.46 | -75.00 |
| | -3.29 | -1.79 | -100.00 | -100.00 | | |
| | -3.55 | 0.00 | 0.00 | 0.00 | | |
| | -3.92 | -2.28 | -100.00 | -100.00 | | |
| **CH23** | -2.40 | -2.59 | 0.76 | 0.68 | 0.48 | 1.27 |
| | -3.10 | -3.02 | -0.07 | 0.51 | | |
| | 4.18 | 3.97 | 2.64 | 2.52 | | |
| | 3.29 | 3.53 | 1.32 | 1.77 | | |
| **CH25** | -10.71 | -10.61 | -2.10 | -1.74 | -7.90 | -1.71 |
| | -10.23 | -9.67 | -2.45 | -2.43 | | |
| | -6.32 | -4.21 | -0.43 | -0.95 | | |
| | -6.33 | -5.13 | -1.77 | -1.79 | | |
| **CH28** | -6.50 | -6.33 | -1.69 | -1.48 | -6.07 | -1.25 |
| | -6.06 | -5.97 | -1.37 | -1.10 | | |
| | -6.16 | -6.12 | -1.49 | -1.30 | | |
| | -5.79 | -5.61 | -0.90 | -0.66 | | |
| **CH20** | -2.84 | -2.80 | 1.13 | 0.44 | -3.22 | 0.77 |
| | -3.09 | -3.02 | 0.66 | 1.11 | | |
| | -3.29 | -3.39 | 1.21 | 0.16 | | |
| | -3.70 | -3.65 | 0.53 | 0.90 | | |
| **CH19** | -2.59 | -0.60 | 1.81 | 1.11 | -11.60 | 2.77 |
| | -90.33 | -2.61 | 0.79 | 1.56 | | |
| | 1.13 | 1.15 | 4.82 | 3.97 | | |
| | 0.50 | 0.59 | 3.72 | 4.39 | | |
| **CH18** | -2.63 | -2.51 | 1.55 | 1.18 | -2.76 | 1.18 |
| | -3.07 | -4.14 | 0.57 | 1.14 | | |
| | -2.58 | -1.78 | 1.72 | 1.13 | | |
| | -2.67 | -2.71 | 0.81 | 1.33 | | |
| **CH26** | -7.38 | -6.35 | -1.65 | -1.63 | -7.40 | -2.16 |
| | -8.39 | -8.50 | -2.65 | -2.61 | | |
| | -7.65 | -7.96 | -2.04 | -2.01 | | |
| | -4.57 | -8.37 | -2.33 | -2.33 | | |

**Figure 3 Bias and Vout table during test AMB_02**




## 4.8 Nominal Science with Redundant unit

During this step HFI and SCS are switching off. LFI stays in nominal acquisition acquiring data for analysis.

### 4.8.1 Procedure/ Test sequence

No test sequence for LFI has requested to be applied here.

### 4.8.2 Results and Conclusions

Pass and Fail Criteria

| | |
|---|---|
| No un-expected event Packets | |
| REBA Power Consumption within the ranges of expected values | |
| DAE Power Consumption within the ranges of expected values | |
| No unexpected features during SCS activity in Scientific signal | |
| No unexpected features during HFI activity in Scientific signal | |

Some NCRs have been raised:

| NCR | Description |
|---|---|
| | |

### 4.9 Switch off of the Nominal Unit

#### 4.9.1 Procedure/ Test sequence

| LFI SIT: Switch off (Redundant Unit) | | | | | 0.20.00 | |
|---|---|---|---|---|---|---|
| | Switch OFF LFI | | | 1 | 0.20.00 | |
| | Science De-Activation | | 0.05.00 | 1 | 0.05.00 | 0.05.00 |
| | RCA De-Activation | | 0.05.00 | 1 | 0.05.00 | 0.10.00 |
| | LFI to Standby | DAE Set Up to Standby | 0.05.00 | 1 | 0.05.00 | 0.15.00 |
| | Switch OFF | Standby to OFF | 0.05.00 | 1 | 0.05.00 | 0.20.00 |

#### 4.9.2 Results and Conclusions

The test was successfully completed.

Pass and Fail Criteria

| | |
|---|---|
| No un-expected event Packets | PASSED |
| No more telemetry coming from LFI | PASSED |

No NCRs have been raised:

### 4.10 NEW FEATURES

### 4.10.1 Current drops in RCA 23

During all the AMB_0113 and AMB_0114 the RCA23 scientific output detectors R0D1 and R0D1 showed unstable signal level correlated to unexpected drain current variations. The jumps on the signal were higher, up to about 20mV, that the jumps observed during LFI RAA test campaign. The nature of such instabilities is not yet explained but the instabilities seems to be originated by electrical disturbances on the drain circuitry or electromagnetic induced by some other effect. The instability are observed both in the sky and ref signals in the same way, so that it is expected that the differenced data shows a more clean behaviour (to be checked) . It should be noted that some jumps are so high that they have been observed also in the R1 radiometer. For these instabilities an analysis needs to be performed also in relation with the HK electrical and thermal probes to investigated interference between LFI and S/C and HFI.
When drops are evident, Id limits exceeds the requirement . NCR must be raised

### 4.10.2 Packet LOST

LFI28 losing packets at the end of AMB114
During some phases of the SIT a packet lost in scientific output was observed. It was explained as correlated with compression rate in the HFI data. Actually, when the problem on HFI was solved ( changing the compression rate) , voids in data stopped to be shown.
Just at the end of AMB 02 a data lost is observed in LFI 28. a deeper analysis is needed.

### 4.10.3 Scientific output crossing in RCA 25

It was monitored an anomalous feature come out from last SFT test deep analysis. The feature consists in an asymmetric variation of sky and ref signals exiting the same diode. The problem seems to be at first saw not present on the other diode associated to that side of the radiometer. During the entire SIT the asymmetry was observed just once but a deeper analysis is required.
It is a not understood problem., NCR must be raised on this topic.

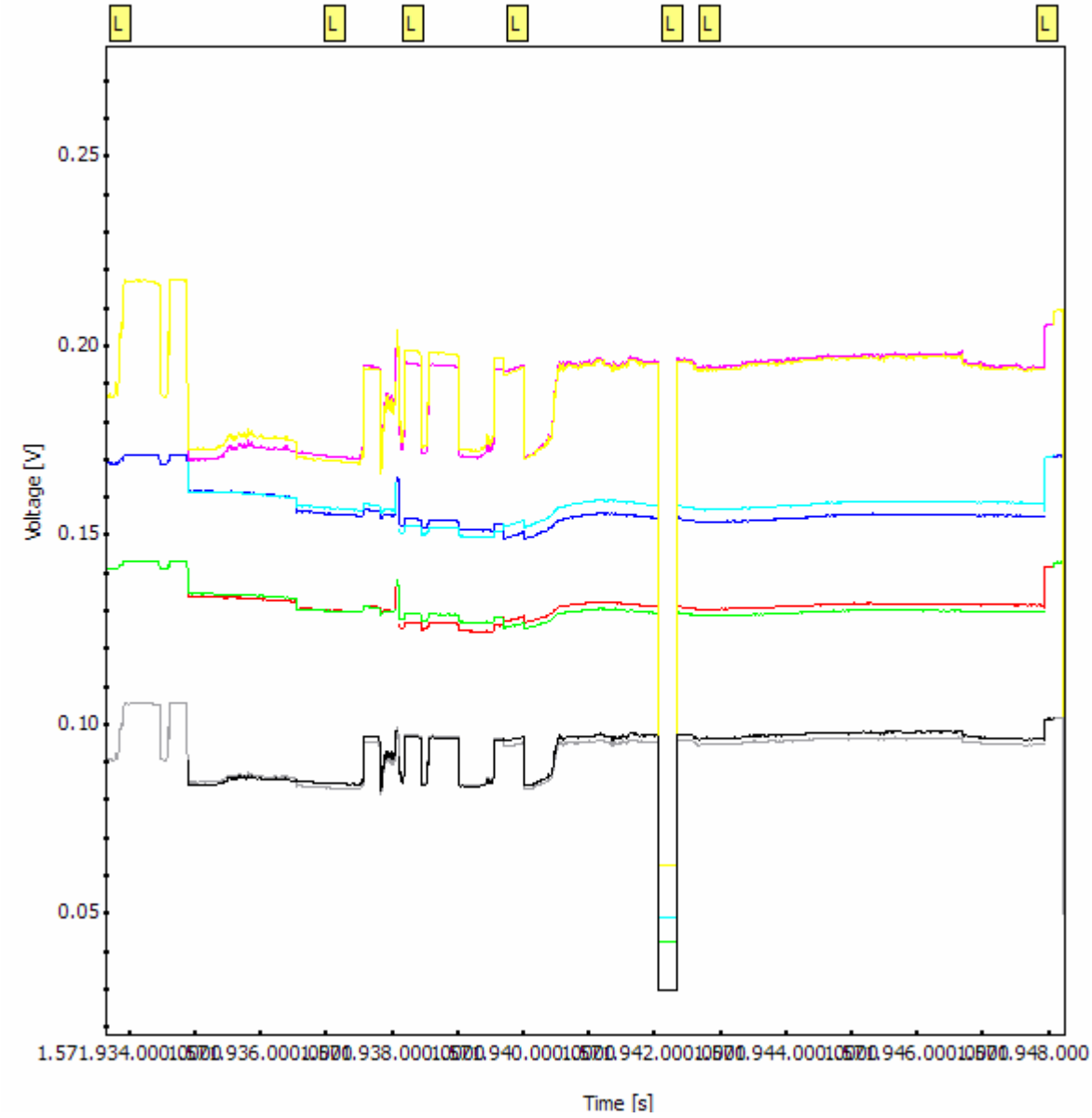



**Figure 4 Voltage changes in RCA 23. changes are observed to anticorrelated with current drops observed in Id.**

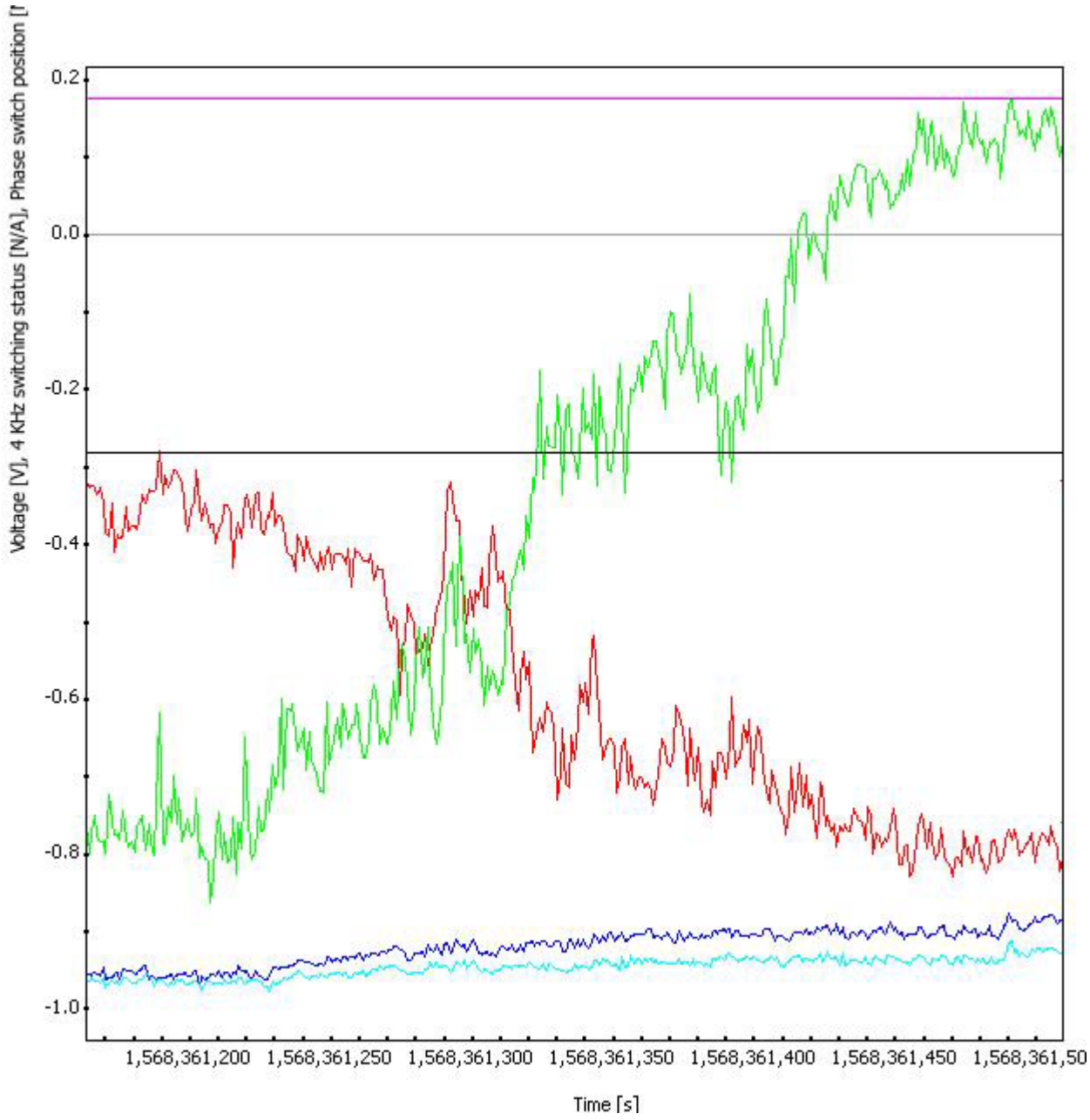



**Figure 5 RCA 25 signal corssing during last SFT**

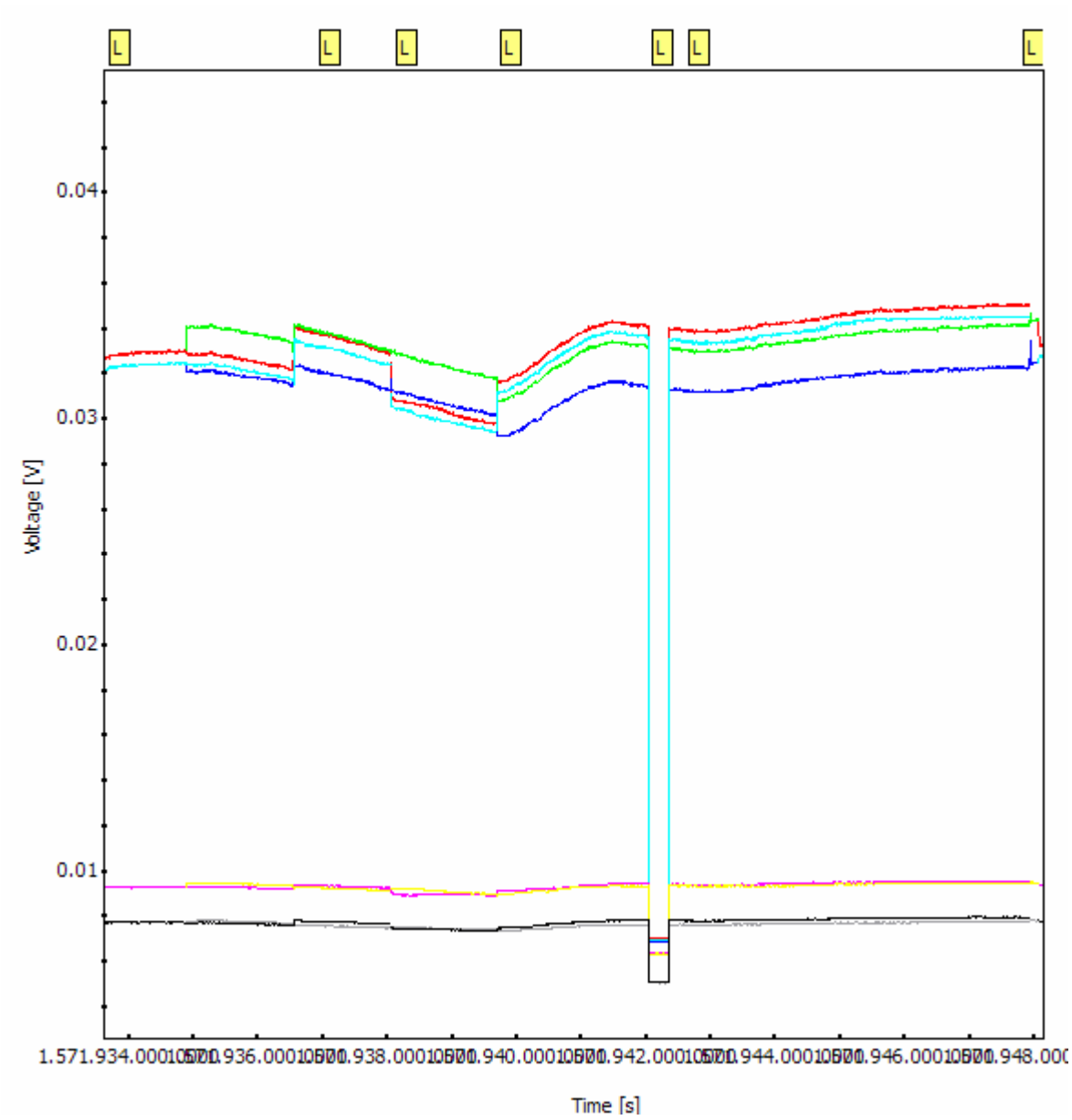
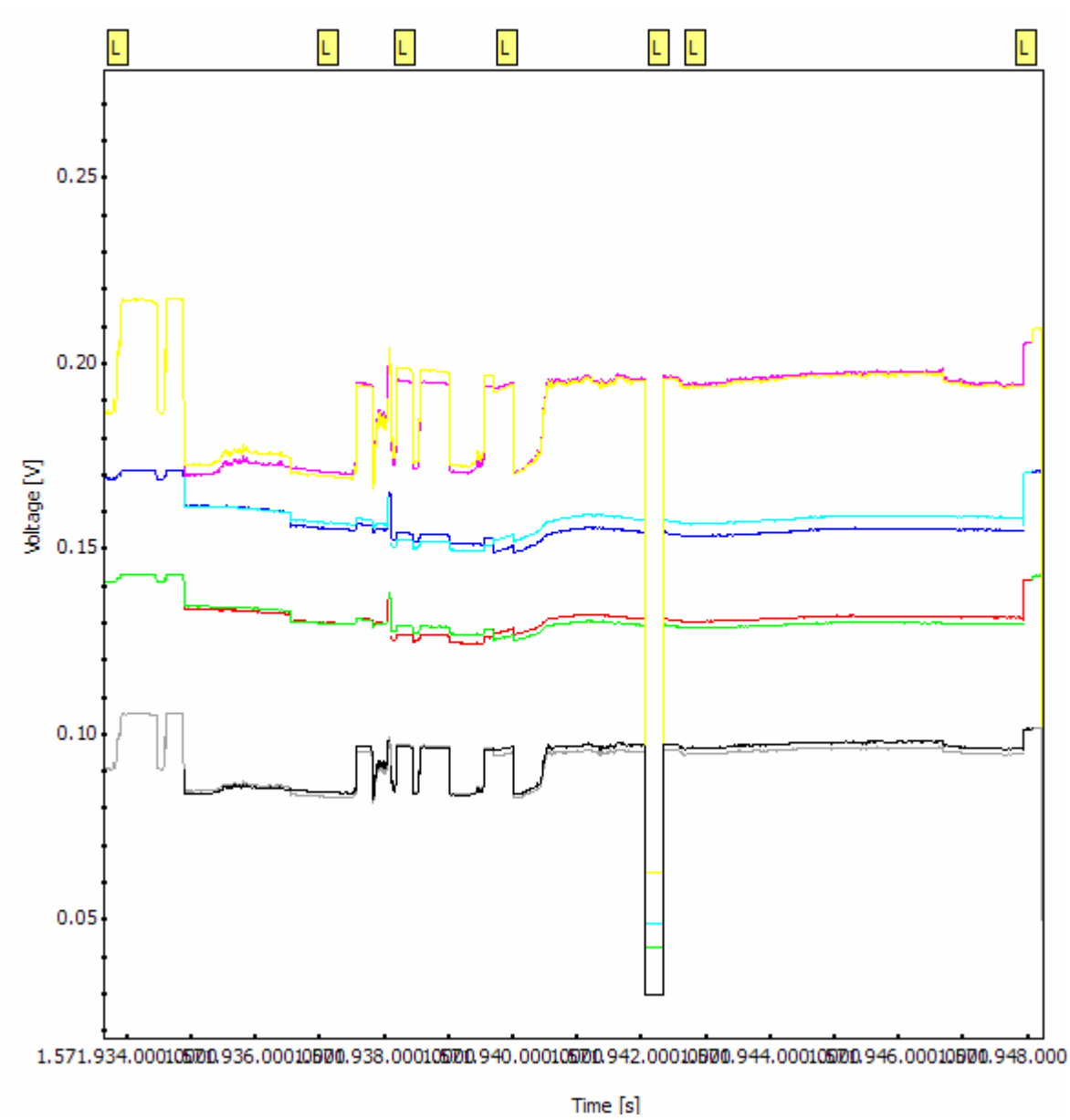



**Figure 6 feature observed in RCA 25**




### 4.10.4 Noise / spikes in signal corresponding to some SCS activities

Noise in signal during some operations of the SCS unit, in particular the redundant unit. This problem must be investigated better cross correlating analysis on LFI data with list of TM sent on SCS units.