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# BC-SIM-PL-005
# SIMBIO-SYS Checkout#03
# Test Summary

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# Approvation

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# 1. Introduction

## 1.1. Scope

In this document we describe all the tests to be performed during the Instrument CheckOut (ICO) # 03 for the Spectrometers and Imagers for MPO BepiColombo Integrated Observatory SYStem (SIMBIO-SYS).

## 1.2. Reference Document

**[RD.1]** BC-SIM-TN-003_-_Reports_and_Note_Layout_and_Flow, 10.20371/INAF/TechRep/36

**[RD.2]** BC-SIM-GAF-MA-002 10 001 – SIMBIO-SYS User Manual

**[RD.3]** BC-SIM-TR-021_-_SIMBIO-SYS_ICO#02_Test_Report_Issue1_Revision0, 10.20371/INAF/TechRep/146

**[RD.4]** BC-SIM-TR-018_-_HRIC_ICO#02_report, 10.20371/INAF/TechRep/134

**[RD.5]** BC-SIM-TR-019_-_STC_ICO#02_report, 10.20371/INAF/TechRep/138

**[RD.6]** BC-SIM-TN-008_-_SIMBIO-SYS_FOP_update_after_ICO#02, 10.20371/INAF/TechRep/162

**[RD.7]** BC-ASD-SP-00176

**[RD.8]** BC-SIM-PL-002_-_SIMBIO-SYS_Checkout_01_Test_Summary_Issue1_Revision0, 10.20371/INAF/TechRep/64

**[RD.9]** BC-SIM-PL-004_-_SIMBIO-SYS_Checkout_02_Test_Summary_Issue1_Revision0, 10.20371/INAF/TechRep/100

**[RD.10]**BC-SIM-TR-010_-_SIMBIO-SYS_deltaNECP_Test_Report_Issue1_Revision0, 10.20371/INAF/TechRep/83

## 1.3.  Acronyms

| | |
|---|---|
| **APID** | Application Process IDentifier |
| **ASW** | Application SoftWare |
| **CSV** | Comma Separated Values |
| **FPA** | Focal Plane Assembly |
| **FOP** | Flight Operation Procedure |
| **HK** | HouseKeeping |
| **HRIC** | High spatial Resolution Imaging Channel |
| **ICO** | Instrument CheckOut |
| **LFB** | Low Freq Behaviour (*See Section 4.2[RD.3]*) |
| **ME** | Main Electronics |
| **NECP** | Near Earth Commissioning Phase |
| **OBCP** | On-Board Control Procedure |
| **POR** | Payload Direct Operation Request |
| **PDS** | Planetary Data System |
| **PE** | Proximity Electronics |
| **PNG** | Portable Network Graphics |
| **PSC** | Packet Sequence Control |
| **SIMBIO-SYS** | Spectrometers and Imagers for MPO BepiColombo Integrated Observatory SYStem |
| **SSC** | Source Sequence Count |
| **STC** | STereo imaging Channel |
| **TC** | Telecommand |
| **TEC** | Thermo-Electric Cooler |
| **TM** | Telemetry |
| **VIHI** | VIsible and Hyper-spectral Imaging channel |
| **XML** | eXtensible Markup Language |

## 1.4.  Document format and Repository

This document is compliant with the SIMBIO-SYS Report and Note Layout and Flow [RD.1] and will be archived both on the INAF Open Access repository and the SIMBIO-SYS team Archive.

## 1.5.  Document Organization

This document is organized in sections whose topics are listed as follows:

- Section 2 – ICO#03 objective, with a brief description (see Section 8.2.2 of [RD.2] for details) of the functional tests we are going to execute
- Section 3 – ICO#03 implementation and validation, with:
  - a brief description of which Flight Operation Procedures (FOPs) and Payload Operation Requests (PORs) we are going to use to perform the required test
  - the results of the sequence validation using a Simulation Software developed within the team
  - an estimation of the required resources in terms of Data Volume, duration and expected number of frames for each sequence
- Section 4 – ICO#03 timeline, with the list of activities to be performed logically ordered to optimize instrument activations and test duration

# 2. Test objective

The scope of the SIMBIO ICO#03 is the periodic (i.e., third) verification of the health status of the instrument at channel and system level. Few performance tests are also planned to monitor the evolution of some key instrument parameters.

## 2.1. Functional Test

During the ICO#03 the SIMBIO-SYS functionality shall be verified by means of dedicated Functional Test procedures on the following elements:
- HRIC, with the verification of:
    - PE, TEC and detector activation
    - memory/registers status
    - science acquisition capability
- STC, with the verification of:
    - PE, TEC and detector activation
    - memory/registers status
    - science acquisition capability

## 2.2. Performance Test

During the ICO#03 the SIMBIO-SYS performance shall be verified by means of minimal Performance test procedures on the following elements:
- HRIC, with the verification of Dark Current (DC) behaviour for a reduced set of the nominal Integration Time (IT)
- STC, with the verification of:
    - DC behaviour in the Global Mapping (GM) operation mode with high and nominal Repetition Time (RT)
    - DC behaviour in the Color Mode (CM) operation mode with high RT
    - detector blooming capability
- VIHI, with the verification of:
    - General performances and operability of all the major subsystems (TEC, Detector, Shutter, Lamp and LED).

## 2.3.  Interchannel Test

During the ICO#02 (see [RD.3] Section 4.2 and more specific reports [RD.4] and [RD.5], it was discovered a Low Frequency Behaviour (LFB) of the reset level of the STC and HRIC detectors: a periodic signal fluctuation whose origin is not yet understood. To determine if there is an internal common source that produce such effect, it has been prepared a specific test that foresees STC and HRIC to acquire data independently and in parallel to identify if the fluctuation is superimposable (i.e., in phase) or not. In the first case, the noise source is common and must be found within the SIMBIO-SYS power units; in the second case, the noise source is external and must be found with the S/C team responsible.

# 3.  Test implementation

## 3.1.  Tools

Tests reported in the following sub-sessions shall be executed by means of proper FOPs, On-Board Control Procedures (OBCPs) and PORs listed in the following subsections and described in [RD.4], [RD.7] and Annexed files.

## 3.2.  Available resources

As per ESA-ESOC official communication, the SIMBIO-SYS ICO#03 test will take place on week 26 (i.e., from 22 to 26 of June 2020) and the available time and Data-Volume resources will be:
- test duration: about 7 hours
- Data-Volume: 20 Gb

## 3.3. SIMBIO-SYS Functional Tests

## 3.3.1. HRIC Functional Test

### 3.3.1.1. Scope

The aim of this test is:
- to check the status and the functionality of the following electric components of the channel:
  - Proximity Electronic (PE),
  - Detector and
  - Thermo-Electric Cooler (TEC);
- to modify some configuration parameters;
- to perform a science acquisition.

### 3.3.1.2. Preparation

To execute this test SIMBIO-SYS shall be in the following status:

| Unit | Status |
|---|---|
| ME | ON (on the MAIN channel) |
| HRIC | OFF |
| STC | OFF |
| VIHI | OFF |

Waiting for SIMBIO-SYS ME Application SoftWare (ASW) update which should also affect the parameters for the correct TEC activation, a dedicated TCs sequence has been prepared to upload the nominal TEC parameters. With reference to the **ESA-ESOC recommendation on the POR generation for the ICOs activities** (i.e., minimize the number of produced PORs to simplify their import and verification) this sequence has been included in the POR used for the test (see following section).

### 3.3.1.3. Description

As for ICO#02 (see [RD.7]), a POR with **SPOT ID BPSS00513** and named **SIMBIOSYS_hric_functional_test_ICO#03** has been prepared (instead of using SS-TST-010 FOP – see [RD.4]) which contains the following operations:

1. SIMBIO-SYS ME switch-on via OBCP
2. the dedicated TC sequence for the nominal TEC parameters upload
3. the HRIC functional test with a sequence of FOPs call that implements the checks listed in Section 3.3.1.1.

### 3.3.1.4. Validation

The POR **SIMBIOSYS_hric_functional_test_ICO#03** has been validated by means of a Simulation Software and produces the following results:

| Sequence duration | | | | | 00:37:00 |
|---|---|---|---|---|---|
| **Sequence Data Volume** | | | | | |
| **-** | **ME** | **HRIC** | **STC** | **VIHI** | **Overall** |
| **Science** | - | 0.4784 [Gb] | 0 [Mb] | 0 [Mb] | 0.4784 [Gb] |
| **HK** | 0.0248 [Mb] | 0.8371 [Mb] | 0 [Mb] | 0 [Mb] | 0.8619 [Mb] |
| **Total** | 0.0248 [Mb] | 0.4792 [Gb] | 0 [Mb] | 0 [Mb] | 0.4793 [Gb] |

*To note that above resources computation has to be considered as upper limits since for their computation the Simulation Software needs to introduce some fake TCs (i.e., ME and channel switch-on) in order to reproduce the correct SIMBIO-SYS state for the analysis.*

### 3.3.1.5. Expected Science data

In the following table it is reported the number of frames that are expected to be produced during the test:

| HRIC | | STC | | VIHI | |
|---|---|---|---|---|---|
| **TC** | **# frames** | **TC** | **# frames** | **TC** | **# frames** |
| 1 | 360 | | | | |
| 2 | 360 | | | | |
| 3 | 10 | | | | |
| **-** | **730** | | | | |

## 3.3.2.   STC Functional Test

### 3.3.2.1.   Scope

The aim of this test is:
- to check the status and the functionality of the following electric components of the channel:
    - PE,
    - Detector and
    - TEC;
- to modify some configuration parameters;
- to perform some science acquisitions in nominal modes.

### 3.3.2.2.   Preparation

To execute this test SIMBIO-SYS shall be in the following status:

| Unit | Status |
|---|---|
| ME | ON (on the MAIN channel) |
| HRIC | OFF |
| STC | OFF |
| VIHI | OFF |

See Section 3.3.1.2.

### 3.3.2.3.   Description

A POR with **SPOT ID BPSS00518** and named **SIMBIOSYS- STC_init and func_ICO#03** has been prepared which contains the following operations:
1. the dedicated TC sequence for the TEC parameters upload
2. the STC functional test via FOP SS-TST-020 whose details can be found in [RD.6].

### 3.3.2.4.    Validation

The POR **SIMBIOSYS- STC_init and func_ICO#03** has been validated by means of a Simulation Software and produces the following results:

| Sequence duration | | | | | 00:21:19 |
|---|---|---|---|---|---|
| **Sequence Data Volume** | | | | | |
| **-** | **ME** | **HRIC** | **STC** | **VIHI** | **Overall** |
| **Science** | - | 0 [Mb] | 0.0615 [Gb] | 0 [Mb] | 0.0615 [Gb] |
| **HK** | 0.0210 [Mb] | 0 [Mb] | 0.5441 [Mb] | 0 [Mb] | 0.5651 [Mb] |
| **Total** | 0.0210 [Mb] | 0 [Mb] | 0.0621 [Gb] | 0 [Mb] | 0.0621 [Gb] |

*To note that above resources computation has to be considered as upper limits since for their computation the Simulation Software needs to introduce some fake TCs (i.e., ME and channel switch-on) in order to reproduce the correct SIMBIO-SYS state for the analysis.*

### 3.3.2.5.    Expected Science data

In the following table it is reported the number of frames that are expected to be produced during the test:

| HRIC | | STC | | VIHI | |
|---|---|---|---|---|---|
| **TC** | **# frames** | **TC** | **# frames** | **TC** | **# frames** |
| **-** | - | 1 | 30 | - | - |
| | | 2 | 30 | | |
| | | 3 | 125 | | |
| | | 4 | 55 | | |
| | | - | 240 | | |

## 3.4.    SIMBIO-SYS Performance Tests

### 3.4.1.    HRIC Performance Test

#### 3.4.1.1.    Scope

The aim of this test is to perform several acquisitions in dark condition and variable integration times to monitor the DC evolution during the cruise phase.

#### 3.4.1.2.    Preparation

To execute this test SIMBIO-SYS shall be in the following status:

| Unit | Status |
|---|---|
| ME | ON (on the MAIN channel) |
| HRIC | ON |
| STC | OFF |
| VIHI | OFF |

See Section 3.4.1.2.

#### 3.4.1.3.    Description

A POR with **SPOT ID BPSS00514** and named **SIMBIOSYS_hric_dc_test_ICO#03** has been prepared which contains repeated acquisition with different Integration Time (IT).

## 3.4.1.4.    Validation

The POR **SIMBIOSYS_hric_dc_test_ICO#03** has been validated by means of a Simulation Software and produces the following results:

| Sequence duration | | | | | 00:16:10 |
|---|---|---|---|---|---|
| **Sequence Data Volume** | | | | | |
| **-** | **ME** | **HRIC** | **STC** | **VIHI** | **Overall** |
| **Science** | - | 4.5233 [Gb] | 0 [Mb] | 0 [Mb] | 4.5233 [Gb] |
| **HK** | 0.0358 [Mb] | 0.0503 [Mb] | 0 [Mb] | 0 [Mb] | 0.0861 [Mb] |
| **Total** | 0.0358 [Mb] | 4.5233 [Gb] | 0 [Mb] | 0 [Mb] | 4.5234 [Gb] |

*To note that above resources computation has to be considered as upper limits since for their computation the Simulation Software needs to introduce some fake TCs (i.e., ME and channel switch-on) in order to reproduce the correct SIMBIO-SYS state for the analysis.*

## 3.4.1.5.    Expected Science data

In the following table it is reported the number of frames that are expected to be produced during the test:

| HRIC | | STC | | VIHI | |
|---|---|---|---|---|---|
| **TC** | **# frames** | **TC** | **# frames** | **TC** | **# frames** |
| 1 | 10 | | | | |
| 2 | 10 | | | | |
| 3 | 10 | | | | |
| 4 | 10 | | | | |
| 5 | 10 | | | | |
| 6 | 10 | | | | |
| 7 | 10 | | | | |
| 8 | 10 | | | | |
| 9 | 10 | | | | |
| 10 | 10 | | | | |
| 11 | 10 | | | | |
| 12 | 10 | | | | |
| 13 | 10 | | | | |
| 14 | 10 | | | | |
| 15 | 10 | | | | |
| 16 | 10 | | | | |
| 17 | 10 | | | | |
| 18 | 30 | | | | |
| 19 | 30 | | | | |
| 20 | 30 | | | | |

| 21 | 30 | | | | |
|---|---|---|---|---|---|
| 22 | 30 | | | | |
| 23 | 30 | | | | |
| 24 | 30 | | | | |
| 25 | 30 | | | | |
| 26 | 30 | | | | |
| 27 | 30 | | | | |
| 28 | 30 | | | | |
| 29 | 30 | | | | |
| 30 | 30 | | | | |
| 31 | 30 | | | | |
| 32 | 30 | | | | |
| 33 | 30 | | | | |
| 34 | 30 | | | | |
| - | 680 | | | | |

## 3.4.2.    STC Performance Test

### 3.4.2.1.    Scope

The aim of this test is to acquire the Dark Current in order to study its evolution during cruise phase.

### 3.4.2.2.    Preparation

To execute this test SIMBIO-SYS shall be in the following status:

| Unit | Status |
|---|---|
| ME | ON (on the MAIN channel) |
| HRIC | OFF |
| STC | ON |
| VIHI | OFF |

See Section 3.4.1.2.

### 3.4.2.3.    Description

A POR with **SPOT ID BPSS00511** and named **SIMBIO-SYS - STC _Perf-GMCM-Blooming ICO3** has been prepared which contains repeated acquisition with different Integration Time (IT).

### 3.4.2.4.    Validation

The POR **SIMBIO-SYS - STC _Perf-GMCM-Blooming ICO3** has been validated by means of a Simulation Software and produces the following results:

| Sequence duration | | | 01:47:00 | | |
|---|---|---|---|---|---|
| **Sequence Data Volume** | | | | | |
| **-** | **ME** | **HRIC** | **STC** | **VIHI** | **Overall** |
| **Science** | - | 0 [Mb] | 4.2870 [Gb] | 0 [Mb] | 4.2870 [Gb] |
| **HK** | 0.6068 [Mb] | 0 [Mb] | 0.8378 [Mb] | 0 [Mb] | 1.4446 [Mb] |
| **Total** | 0.6068 [Mb] | 0 [Mb] | 4.2879 [Gb] | 0 [Mb] | 4.2885 [Gb] |

*To note that above resources computation has to be considered as upper limits since for their computation the Simulation Software needs to introduce some fake TCs (i.e., ME and channel switch-on) in order to reproduce the correct SIMBIO-SYS state for the analysis.*

### 3.4.2.5. Expected Science data

In the following table it is reported the number of frames that are expected to be produced during the test:

| HRIC | | STC | | VIHI | |
|---|---|---|---|---|---|
| TC | # frames | TC | # frames | TC | # frames |
| | | 1 | 30 | | |
| | | 2 | 30 | | |
| | | 3 | 30 | | |
| | | 4 | 30 | | |
| | | 5 | 30 | | |
| | | 6 | 30 | | |
| | | 7 | 30 | | |
| | | 8 | 30 | | |
| | | 9 | 30 | | |
| | | 10 | 30 | | |
| | | 11 | 30 | | |
| | | 12 | 30 | | |
| | | 13 | 30 | | |
| | | 14 | 30 | | |
| | | 15 | 30 | | |
| | | 16 | 30 | | |
| | | 17 | 30 | | |
| | | 18 | 30 | | |
| | | 19 | 30 | | |
| | | 20 | 30 | | |
| | | 21 | 30 | | |
| | | 22 | 15 | | |
| | | 23 | 15 | | |
| | | 24 | 15 | | |
| | | 25 | 15 | | |
| | | 26 | 15 | | |
| | | 27 | 15 | | |
| | | 28 | 15 | | |
| | | 29 | 15 | | |
| | | 30 | 15 | | |
| | | 31 | 15 | | |
| | | 32 | 15 | | |
| | | 33 | 15 | | |

| | | 34 | 15 | | |
|---|---|---|---|---|---|
| | | 35 | 15 | | |
| | | 36 | 15 | | |
| | | 37 | 15 | | |
| | | 38 | 15 | | |
| | | 39 | 15 | | |
| | | 40 | 15 | | |
| | | 41 | 15 | | |
| | | 42 | 15 | | |
| | | 43 | 50 | | |
| | | 44 | 50 | | |
| | | 45 | 50 | | |
| | | 46 | 50 | | |
| | | 47 | 50 | | |
| | | 48 | 50 | | |
| | | 49 | 50 | | |
| | | 50 | 50 | | |
| | | 51 | 50 | | |
| | | 52 | 50 | | |
| | | 53 | 50 | | |
| | | 54 | 50 | | |
| | | 55 | 50 | | |
| | | 56 | 50 | | |
| | | 57 | 50 | | |
| | | 58 | 50 | | |
| | | 59 | 50 | | |
| | | 60 | 20 | | |
| | | 61 | 20 | | |
| | | 62 | 20 | | |
| | | 63 | 20 | | |
| | | 64 | 50 | | |
| | | 65 | 50 | | |
| | | 66 | 50 | | |
| | | 67 | 50 | | |
| | | 68 | 50 | | |
| | | 69 | 50 | | |
| | | 70 | 50 | | |
| | | 71 | 50 | | |
| | | 72 | 50 | | |

| | | | | |
|---|---|---|---|---|
| | | 73 | 50 | |
| | | 74 | 50 | |
| | | 75 | 50 | |
| | | 76 | 50 | |
| | | 77 | 50 | |
| | | 78 | 50 | |
| | | 79 | 50 | |
| | | 80 | 50 | |
| | | 81 | 20 | |
| | | 82 | 20 | |
| | | 83 | 20 | |
| | | 84 | 20 | |
| | | 85 | 5 | |
| | | 86 | 5 | |
| | | 87 | 5 | |
| | | 88 | 5 | |
| | | 89 | 5 | |
| | | 90 | 5 | |
| | | 91 | 5 | |
| | | 92 | 5 | |
| | | 93 | 5 | |
| | | 94 | 5 | |
| | | 95 | 5 | |
| | | 96 | 5 | |
| | | 97 | 5 | |
| | | 98 | 5 | |
| | | 99 | 5 | |
| | | 100 | 5 | |
| | | 101 | 5 | |
| | | 102 | 5 | |
| | | 103 | 5 | |
| | | 104 | 5 | |
| | | 105 | 5 | |
| | | - | 2910 | |

### 3.4.3. VIHI Performance Test

## 3.4.3.1. Scope

This test combines functional and performance verification.

The part related to the Functional test implies operation of TEC, Detector, Shutter, Lamp and LED during the internal calibration which provides the Performance verification part of the test.

The aim of this test is mainly to compare the detector performance using the on-board default parameters (Vdet_com=2590 and Vdet_adj=1490) and the ones recommended by the Prime (i.e., Lonardo Finmeccanica) and reported in the User Manual ([RD.2] paragraph 8.3.1.110), (Vdet_com=2606 and Vdet_adj=1365). This goal will be achieved running two times the calibration procedure SS-TST-031, first time with default on board detector parameters, second time with the updated parameters. Comparing the behaviour of the detector responses it will be possible to verify if effectively the updated parameter will improve the performances or not.

## 3.4.3.2. Preparation

To execute this test SIMBIO-SYS shall be in the following status:

| Unit | Status |
|---|---|
| ME | ON (on the MAIN channel) |
| HRIC | OFF |
| STC | OFF |
| VIHI | OFF |

See Section 3.3.1.2.

In addition, like what has been agreed for the cameras (see as Section 3.3.1.2 of [RD.9]), in order to close the issue 1 of [RD.10] (see section 4.2) it was decided, with the support of the ESOC colleagues and the S/C Prime Astrium, to update also for the VIHI channel the on-board thermal thresholds of the heaters that controls the SIMBIO-SYS thermal environment, to guarantee the correct delta-temperature requirement for the TEC "soft-activation" (i.e., 7K see section 8.3.2.2 of [RD.2]). In particular, the temperature range of thermistor line 19 (which correspond to heater line 12 – VIHI cold finger) was increased of 8K with respect to previous ICOs (from -58/-57°C to -50/-51 °C).

## 3.4.3.3.    Description

A POR with **SPOT ID BPSS00522** and named **SIMBIOSYS_vihi_test_ICO#03** has been prepared which contains the following operations:
- VIHI PE switch-on
- Upload VIHI TEC nominal parameters
- VIHI detector and TEC switch-on
- perform a functional test
- verify detector performance with recommended detector settings

## 3.4.3.4.    Validation

The POR **SIMBIOSYS_vihi_test_ICO#03** has been validated by means of a Simulation Software and produces the following results:

| Sequence duration | | | | 01:26:05 | |
|---|---|---|---|---|---|
| **Sequence Data Volume** | | | | | |
| **-** | **ME** | **HRIC** | **STC** | **VIHI** | **Overall** |
| **Science** | - | 0 [Mb] | 0 [Mb] | 1.6641 [Gb] | 1.6641 [Gb] |
| **HK** | 0.1966 [Mb] | 0 [Mb] | 0 [Mb] | 3.0061 [Mb] | 3.2026 [Mb] |
| **Total** | 0.1966 [Mb] | 0 [Mb] | 0 [Mb] | 1.6671 [Gb] | 1.6673 [Gb] |

*To note that above resources computation have to be considered as upper limits since for their computation the Simulation Software needs to introduce some fake TCs (i.e., ME and channel switch-on) in order to reproduce the correct SIMBIO-SYS state for the analysis.*

## 3.4.3.5.    Expected Science data

In the following table it is reported the number of frames that are expected to be produced during the test:

| HRIC | | STC | | VIHI | |
|---|---|---|---|---|---|
| **TC** | **# frames** | **TC** | **# frames** | **TC** | **# frames** |
| | | | | 1 | 16 |
| | | | | 2 | 16 |
| | | | | 3 | 16 |
| | | | | 4 | 12 |
| | | | | 5 | 60 |
| | | | | 6 | 60 |
| | | | | 7 | 60 |
| | | | | 8 | 60 |

| | | | | | |
|---|---|---|---|---|---|
| | | | | 9 | 60 |
| | | | | 10 | 60 |
| | | | | 11 | 60 |
| | | | | 12 | 60 |
| | | | | 13 | 60 |
| | | | | 14 | 60 |
| | | | | 15 | 60 |
| | | | | 16 | 60 |
| | | | | 17 | 60 |
| | | | | 18 | 16 |
| | | | | 19 | 16 |
| | | | | 20 | 16 |
| | | | | 21 | 12 |
| | | | | 22 | 60 |
| | | | | 23 | 60 |
| | | | | 24 | 60 |
| | | | | 25 | 60 |
| | | | | 26 | 60 |
| | | | | 27 | 60 |
| | | | | 28 | 60 |
| | | | | 29 | 60 |
| | | | | 30 | 60 |
| | | | | 31 | 60 |
| | | | | 32 | 60 |
| | | | | 33 | 60 |
| | | | | 34 | 60 |
| | | | | - | 1680 |

## 3.5. SIMBIO-SYS Interchannel Test

### 3.5.1. Scope

The aim of this test is to evaluate if the detector reset fluctuations present on both HRIC and STC channels are in phase or not, indicating, in the first case a common source internal to the SIMBIO-SYS power supply system or, in the second case an external (i.e., S/C) origin.

### 3.5.2. Preparation

To execute this test SIMBIO-SYS shall be in the following status:

| Unit | Status |
|---|---|
| ME | ON (on the MAIN channel) |
| HRIC | OFF |
| STC | OFF |
| VIHI | OFF |

See Section 3.3.1.2.

### 3.5.3. Description

A POR with **SPOT ID BPSS00523** and named **SIMBIOSYS_hric-stc_interference_test_ICO#03** has been prepared which contains the following operations:
- STC switch-on via OBCP
- HRIC switch-on via OBCP
- perform acquisition with STC and HRIC alone and in parallel
- STC switch-off via OBCP
- HRIC switch-off via OBCP
- ME switch-off via OBCP

## 3.5.4.    Validation

The POR **SIMBIOSYS_hric-stc_interference_test_ICO#03** has been validated by means of a Simulation Software and produces the following results:

| Sequence duration | | | | | 00:54:55 |
|---|---|---|---|---|---|
| **Sequence Data Volume** | | | | | |
| **-** | **ME** | **HRIC** | **STC** | **VIHI** | **Overall** |
| **Science** | - | 0.2949 [Gb] | 0.2742 [Gb] | 0 [Mb] | 0.5691 [Gb] |
| **HK** | 0.2192 [Mb] | 0.1064 [Mb] | 0.1064 [Mb] | 0 [Mb] | 0.4320 [Mb] |
| **Total** | 0.2192 [Mb] | 0.2950 [Gb] | 0.2743 [Gb] | 0 [Mb] | 0.5695 [Gb] |

*To note that above resources computation have to be considered as upper limits since for their computation the Simulation Software needs to introduce some fake TCs (i.e., ME and channel switch-on) in order to reproduce the correct SIMBIO-SYS state for the analysis.*

## 3.5.4.1.    Expected Science data

In the following table it is reported the number of frames that are expected to be produced during the test:

| HRIC | | STC | | VIHI | |
|---|---|---|---|---|---|
| **TC** | **# frames** | **TC** | **# frames** | **TC** | **# frames** |
| 1 | 450 | 1 | 1350 | - | - |
| - | 450 | - | 1350 | | |

# 4. Timeline

With reference to the tests described in the previous sections, the following timeline applies:

| ID | Description | Estimated duration | Estimated Data Volume | XML file |
|---|---|---|---|---|
| 1. **SIMBIOSYS_hric_functional_test_ICO#03** | HRIC TEC init and functional test with memory read/write tests and 3 Science acquisitions | 00:37:00 | 0.4793 [Gb] | ¤ BPSS00513_00202.BC |
| 2. **SIMBIOSYS_hric_dc_test_ICO#03** | HRIC DC verification | 00:16:10 | 4.5234 [Gb] | ¤ BPSS00514_00202.BC |
| 3. **SIMBIOSYS- STC_init and func_ICO#03** | STC TEC init and functional test with memory read/write tests and several Science acquisitions | 00:21:19 | 0.0621 [Gb] | ¤ BPSS00518_00202.BC |

| | | | | | |
|---|---|---|---|---|---|
| 4. **SIMBIO-SYS - STC _Perf-GMCM-Blooming ICO3** | STC DC verification (nominal filters) | 01:47:00 | 4.2885 [Gb] | ¤ BPSS00511_00202.BC |
| 5. **SIMBIOSYS_vihi_test_ICO#03** | VIHI nominal TEC parameters upload and VIHI performance verification with default and updated detector parameters | 01:26:05 | 1.6673 [Gb] | ¤ BPSS00522_00202.BC |
| 6. **SIMBIOSYS_hric-stc_interference_test_ICO#03** | STC/HRIC parallel acquisitions for LFB study | 00:54:55 | 0.5695 [Gb] | ¤ BPSS00523_00202.BC |