

BC-SIM-PL-008

SIMBIO-SYS Checkout#05

Test Summary

Michele Zusi¹, Emanuele Simioni², Vincenzo Della Corte¹,
Andrea Cicchetti¹, Romolo Politi¹,
Gabriele Cremonese², Fabrizio Capaccioni¹, Alain Doressoundiram³,
Pasquale Palumbo⁴, Cristina Re², Mathieu Vincendon⁵

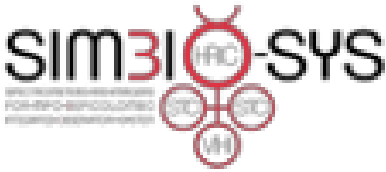
¹INAF-IAPS - Via Fosso del Cavaliere 100, 00133, Rome, Italy

²INAF-OAPd - Vicolo Osservatorio 5, 35122, Padua, Italy

³LESIA (Observatoire de Paris - PSL, Laboratoire d'Études Spatiales et d'Instrumentation en Astrophysique), 92195 Meudon Cedex, France

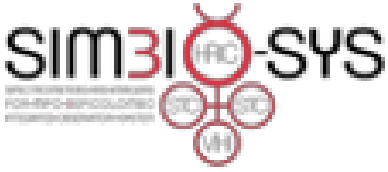
⁴Università Parthenope, Centro Direzionale Isola C4, 80133, Naples, Italy

⁵CNRS (Institut d'Astrophysique Spatiale), Université Paris Sud, 91405, Orsay, France

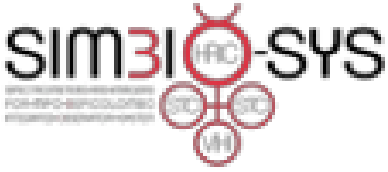
	Document	BC-SIM-PL-008 SIMBIO-SYS Checkout#05 Test Summary		
	Date	17/05/2024		
	Issue	1	Revision	0
	Page	1/28		

Index

Approval	3
Document change record	3
1. Introduction	4
1.1. Scope	4
1.2. Reference Document	4
1.3. Acronyms	5
1.4. Document format and Repository	6
1.5. Document Organization	6
2. Test objective	7
2.1. Functional Test	7
2.2. Performance Test	7
2.3. Interchannel Test	8
3. Test implementation	9
3.1. Tools	9
3.2. Available resources	9
3.3. SIMBIO-SYS Functional Tests	10
3.3.1. HRC Functional Test	10
3.3.1.1. Scope	10
3.3.1.2. Preparation	10
3.3.1.3. Description	11
3.3.1.4. Validation	11
3.3.1.5. Expected Science data	11
3.3.2. STC Functional Test	12
3.3.2.1. Scope	12
3.3.2.2. Preparation	12
3.3.2.3. Description	12
3.3.2.4. Validation	13
3.3.2.5. Expected Science data	13
3.4. SIMBIO-SYS Performance Tests	14

	Document	BC-SIM-PL-008 SIMBIO-SYS Checkout#05 Test Summary		
	Date	17/05/2024		
	Issue	1	Revision	0
	Page	2/29		

3.4.1.	HRIC Performance 1 Test	14
3.4.1.1.	Scope	14
3.4.1.2.	Preparation	14
3.4.1.3.	Description	14
3.4.1.4.	Validation	15
3.4.1.5.	Expected Science data	15
3.4.2.	HRIC Performance 2 Test	16
3.4.2.1.	Scope	16
3.4.2.2.	Preparation	16
3.4.2.3.	Description	16
3.4.2.4.	Validation	17
3.4.2.5.	Expected Science data	17
3.4.3.	STC Performance Test	18
3.4.3.1.	Scope	18
3.4.3.2.	Preparation	18
3.4.3.3.	Description	18
3.4.3.4.	Validation	19
3.4.3.5.	Expected Science data	19
3.4.4.	STC LFB Test	21
3.4.4.1.	Scope	21
3.4.4.2.	Preparation	21
3.4.4.3.	Description	21
3.4.4.4.	Validation	22
3.4.4.5.	Expected Science data	22
3.4.5.	VIHI Performance Test	23
3.4.5.1.	Scope	23
3.4.5.2.	Preparation	23
3.4.5.3.	Description	23
3.4.5.4.	Validation	24

	Document	BC-SIM-PL-008 SIMBIO-SYS Checkout#05 Test Summary		
	Date	17/05/2024		
	Issue	1	Revision	0
	Page	3/29		

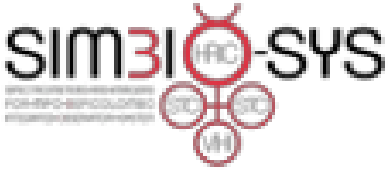
3.4.5.5. Expected Science data	24
3.5. SIMBIO-SYS Interchannel Test	26
3.5.1. Scope	26
3.5.2. Preparation	26
3.5.3. Description	26
3.5.4. Validation	27
3.5.5. Expected Science data	27
4. Timeline	28

Approvation

Document generation flow	
Edited by	
	Michele Zusi
	Emanuele Simioni
	Romolo Politi
Approved by	
	Gabriele Cremonese

Document change record

Issue	Revision	Date	Affected pages	Change description
1	0	17/05/2024	All	First issue

	Document	BC-SIM-PL-008 SIMBIO-SYS Checkout#05 Test Summary		
	Date	17/05/2024		
	Issue	1	Revision	0
	Page	4/29		

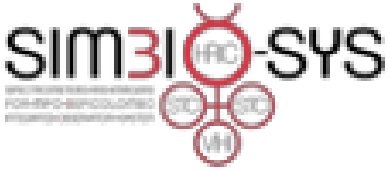
1. Introduction

1.1. Scope

In this document we describe all the tests to be performed during the Instrument CheckOut (ICO) # 05 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/179](https://doi.org/10.20371/INAF/TechRep/179)
- [RD.2]** BC-SIM-GAF-MA-002 10 001 – SIMBIO-SYS User Manual
- [RD.3]** BC-SIM-TR-002_-_HRIC_NECP_report,
[10.20371/INAF/TechRep/32](https://doi.org/10.20371/INAF/TechRep/32)
- [RD.4]** BC-SIM-TR-012_-_HRIC_ICO#01_report,
[10.20371/INAF/TechRep/97](https://doi.org/10.20371/INAF/TechRep/97)
- [RD.5]** BC-SIM-TR-018_-_HRIC_ICO#02_report,
[10.20371/INAF/TechRep/134](https://doi.org/10.20371/INAF/TechRep/134)
- [RD.6]** BC-SIM-TR-025_-_HRIC_ICO#03_report,
[10.20371/INAF/TechRep/190](https://doi.org/10.20371/INAF/TechRep/190)
- [RD.7]** BC-SIM-TR-007_-_STC_dNECP_report,
[10.20371/INAF/TechRep/71](https://doi.org/10.20371/INAF/TechRep/71)
- [RD.8]** BC-SIM-TR-026_-_STC_ICO#03_report,
[10.20371/INAF/TechRep/186](https://doi.org/10.20371/INAF/TechRep/186)
- [RD.9]** BC-SIM-TN-008_-_SIMBIO-SYS_FOP_update_after_ICO#02,
[10.20371/INAF/TechRep/162](https://doi.org/10.20371/INAF/TechRep/162)
- [RD.10]** BC-ASD-SP-00176
- [RD.11]** BC-SIM-PL-007_-_SIMBIO-SYS_Checkout_04b_Test_Summary_Issue1_Revision0,
[10.5281/zenodo.10035541](https://doi.org/10.5281/zenodo.10035541)

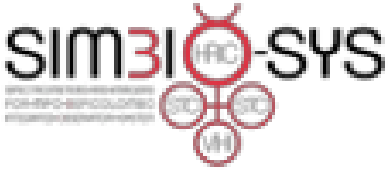
	Document	BC-SIM-PL-008 SIMBIO-SYS Checkout#05 Test Summary		
	Date	17/05/2024		
	Issue	1	Revision	0
	Page	5/29		

[RD.12] BC-SIM-PL-006_-_SIMBIO-SYS_Checkout_04_Test_Summary_Issue1_Revision0,
[10.20371/INAF/TechRep/204](https://doi.org/10.20371/INAF/TechRep/204)

[RD.13] BC-SIM-TR-038_-_SIMBIO-SYS_ICO4b_Interchannel_Test_Report_Issue1_Revision0,
[10.5281/zenodo.10649965](https://doi.org/10.5281/zenodo.10649965)

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
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	VIisible and Hyper-spectral Imaging channel
XML	eXtensible Markup Language

	Document	BC-SIM-PL-008 SIMBIO-SYS Checkout#05 Test Summary		
	Date	17/05/2024		
	Issue	1	Revision	0
	Page	6/29		

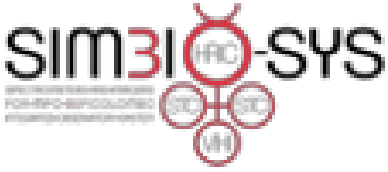
1.4. Document format and Repository

This document is compliant with the SIMBIO-SYS Report and Note Layout and Flow [RD.1] and will be archived on the SIMBIO-SYS ZENODO community (<https://zenodo.org/communities/?p=SIMBIO-SYS>), 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#05 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#05 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#05 timeline, with the list of activities to be performed logically ordered to optimize instrument activations and test duration

	Document	BC-SIM-PL-008 SIMBIO-SYS Checkout#05 Test Summary		
	Date	17/05/2024		
	Issue	1	Revision	0
	Page	7/29		

2. Test objective

The scope of the SIMBIO ICO#05 is the periodic (i.e., fifth) 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

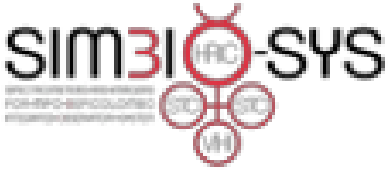
During the ICO#05 the SIMBIO-SYS functionality shall be verified by means of dedicated Functional Test procedures on the following elements:

- 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#05 the SIMBIO-SYS performance shall be verified by means of minimal Performance test procedures on the following elements:

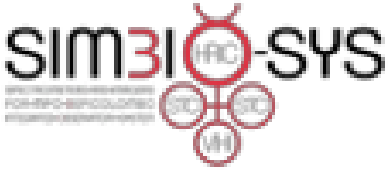
- HRIC:
 - with the verification of the Dark Current (DC) behaviour for a reduced set of the nominal Integration Time (IT)
 - with the evaluation of the detector reset fluctuation (i.e., Low Frequency Behaviour – LFB, see[RD.3], [RD.4], [RD.5] and [RD.6]) dependence with respect to the Repetition Time (RT)
- STC:
 - with the verification of the DC behaviour in a specific region of the detector

	Document	BC-SIM-PL-008 SIMBIO-SYS Checkout#05 Test Summary		
	Date	17/05/2024		
	Issue	1	Revision	0
	Page	8/29		

- with the evaluation of the LFB (see [RD.7] and [RD.8]) dependence with respect to the RT
- VIHI, with the verification of:
 - General performances and operability of all the major subsystems (TEC, Detector, Shutter, Lamp and LED).

2.3. Interchannel Test

The goal of this test is to verify the effects of mutual operativity of the SIMBIO-SYS channels in all configurations (i.e., HRIC/STC, HRIC/VIHI and STC/VIHI) and to evaluate the interference effects between the cameras in specific RT configurations.

	Document	BC-SIM-PL-008 SIMBIO-SYS Checkout#05 Test Summary		
	Date	17/05/2024		
	Issue	1	Revision	0
	Page	9/29		

3. Test implementation

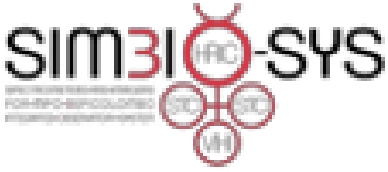
3.1. Tools

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.9], [RD.10] and Annexed files.

3.2. Available resources

As per ESA-ESOC official communication by Silvano Manganelli emails, the SIMBIO-SYS ICO#05 test will take place on 14/06/2022 at 13:00:00 UTC and the available time and Data-Volume resources will be:

- test duration: 8 hours
- Data-Volume: 350 Mbytes

	Document	BC-SIM-PL-008 SIMBIO-SYS Checkout#05 Test Summary		
	Date	17/05/2024		
	Issue	1	Revision	0
	Page	10/29		

3.3. SIMBIO-SYS Functional Tests

3.3.1. HRIC Functional Test

3.3.1.1. Scope

The aim of this test is:

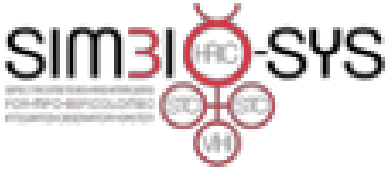
- to check the status and the functionality of the following electric components of the channel:
 - Proximity Electronic (PE),
 - Detector and
 - Thermo-Electric Cooler (TEC);
- to modify some configuration parameters;
- to perform a science acquisition.

3.3.1.2. Preparation

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

Unit	Status
ME	OFF (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 initialization step in following section).

	Document	BC-SIM-PL-008 SIMBIO-SYS Checkout#05 Test Summary		
	Date	17/05/2024		
	Issue	1	Revision	0
	Page	11/29		

3.3.1.3. Description

A POR with **SPOT ID BPSS00844** and named **SIMBIOSYS_HRIC_ICO#05_functional_test** has been prepared 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_ICO#05_functional_test** has been validated by means of a Simulation Software and produces the following results:

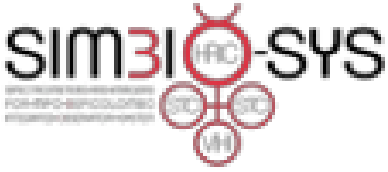
Sequence duration			00:28:15		
Sequence Data Volume					
-	ME	HRIC	STC	VIHI	Overall
Science	-	0.0236 [Gb]	0 [Mb]	0 [Mb]	0.0236 [Gb]
HK	0.0189 [Mb]	0.5935 [Mb]	0 [Mb]	0 [Mb]	0.6124 [Mb]
Total	0.0189 [Mb]	0.0242 [Gb]	0 [Mb]	0 [Mb]	0.0242 [Gb]

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.

3.3.1.5. 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	180				
-	180				

	Document	BC-SIM-PL-008 SIMBIO-SYS Checkout#05 Test Summary		
	Date	17/05/2024		
	Issue	1	Revision	0
	Page	12/29		

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:
 - Proximity Electronic (PE),
 - Detector and
 - Thermo-Electric Cooler (TEC);
- to modify some configuration parameters;
- to perform a science acquisition.

3.3.2.2. Preparation

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

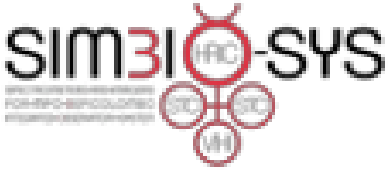
Unit	Status
ME	OFF (on the MAIN channel)
HRIC	OFF
STC	OFF
VIHI	OFF

See Section 3.3.1.2.

3.3.2.3. Description

A POR with **SPOT ID BPSS00874** and named **SIMBIOSYS_STC_ICO#05_init and func** 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.8 FOP2].
3. a science TC in continuous mode stopped by a STC Stop Science.

	Document	BC-SIM-PL-008 SIMBIO-SYS Checkout#05 Test Summary		
	Date	17/05/2024		
	Issue	1	Revision	0
	Page	13/29		

3.3.2.4. Validation

The POR **SIMBIOSYS_STC_ICO#05_init and func** has been validated by means of a Simulation Software and produces the following results:

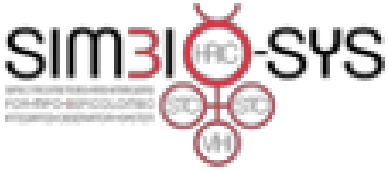
Sequence duration				00:46:51	
Sequence Data Volume					
-	ME	HRIC	STC	VIHI	Overall
Science	-	0 [Mb]	0.0626 [Gb]	0 [Mb]	0.0626 [Gb]
HK	0.0314 [Mb]	0 [Mb]	0.6004 [Mb]	0 [Mb]	0.6319 [Mb]
Total	0.0314 [Mb]	0 [Mb]	0.0632 [Gb]	0 [Mb]	0.0633 [Gb]

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.

3.3.2.5. 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	33		
		3	60		
		4	60		
		5	270		
		Total	453		

	Document	BC-SIM-PL-008 SIMBIO-SYS Checkout#05 Test Summary		
	Date	17/05/2024		
	Issue	1	Revision	0
	Page	14/29		

3.4. SIMBIO-SYS Performance Tests

3.4.1. HRIC Performance 1 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

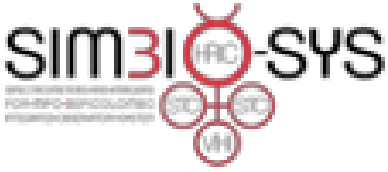
To execute this test SIMBIO-SYS shall be in the following status:

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

See Section 3.3.1.2.

3.4.1.3. Description

A POR with **SPOT ID BPSS00845** and named **SIMBIOSYS_HRIC_ICO#05_dc_test** has been prepared which contains repeated acquisition with different Integration Time (IT).

	Document	BC-SIM-PL-008 SIMBIO-SYS Checkout#05 Test Summary		
	Date	17/05/2024		
	Issue	1	Revision	0
	Page	15/29		

3.4.1.4. Validation

The POR **SIMBIOSYS_HRIC_ICO#05_dc_test** has been validated by means of a Simulation Software and produces the following results:

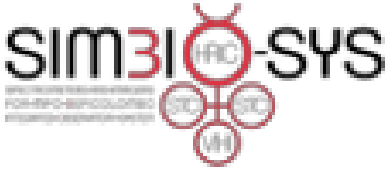
Sequence duration				00:01:30	
Sequence Data Volume					
-	ME	HRIC	STC	VIHI	Overall
Science	-	1.4864 [Gb]	0 [Mb]	0 [Mb]	1.4864 [Gb]
HK	0.0165 [Mb]	0.4703 [Mb]	0 [Mb]	0 [Mb]	0.4869 [Mb]
Total	0.0165 [Mb]	1.4868 [Gb]	0 [Mb]	0 [Mb]	1.4868 [Gb]

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.

3.4.1.5. 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	9				
2	9				
3	9				
4	9				
5	9				
6	9				
7	9				
8	9				
9	9				
-	81				

	Document	BC-SIM-PL-008 SIMBIO-SYS Checkout#05 Test Summary		
	Date	17/05/2024		
	Issue	1	Revision	0
	Page	16/29		

3.4.2. HRIC Performance 2 Test

3.4.2.1. Scope

The aim of this test is evaluate the HRIC LFB effect dependence with respect to the RT.

3.4.2.2. Preparation

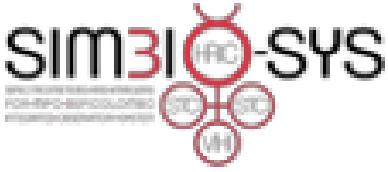
To execute this test SIMBIO-SYS shall be in the following status:

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

See Section 3.3.1.2.

3.4.2.3. Description

A POR with **SPOT ID BPSS00846** and named **SIMBIOSYS_HRIC_ICO#05_LFB_test** has been prepared which contains repeated acquisition with different RT. In particular, for this test 4 RTs has been considered which are the minimum, the maximum and the nominal ones for the FPAN and the BB filters.

	Document	BC-SIM-PL-008 SIMBIO-SYS Checkout#05 Test Summary		
	Date	17/05/2024		
	Issue	1	Revision	0
	Page	17/29		

3.4.2.4. Validation

The POR **SIMBIOSYS_HRIC_ICO#05_LFB_test** has been validated by means of a Simulation Software and produces the following results:

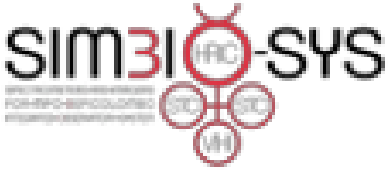
Sequence duration				00:24:10	
Sequence Data Volume					
-	ME	HRIC	STC	VIHI	Overall
Science	-	0.0233 [Gb]	0 [Mb]	0 [Mb]	0.0233 [Gb]
HK	0.0319 [Mb]	1.0329 [Mb]	0 [Mb]	0 [Mb]	1.0648 [Mb]
Total	0.0319 [Mb]	0.0234 [Gb]	0 [Mb]	0 [Mb]	0.0234 [Gb]

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.

3.4.2.5. 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	525				
2	105				
3	52				
-	682				

	Document	BC-SIM-PL-008 SIMBIO-SYS Checkout#05 Test Summary		
	Date	17/05/2024		
	Issue	1	Revision	0
	Page	18/29		

3.4.3. STC Performance Test

3.4.3.1. 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.

3.4.3.2. Preparation

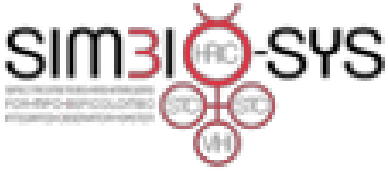
To execute this test SIMBIO-SYS shall be in the following status:

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

See Section 3.3.1.2.

3.4.3.3. Description

A POR with **SPOT ID BPSS00840** and named **SIMBIOSYS_STC_ICO#05_Performance** has been prepared which contains repeated acquisition with different Integration Time (IT).

	Document	BC-SIM-PL-008 SIMBIO-SYS Checkout#05 Test Summary		
	Date	17/05/2024		
	Issue	1	Revision	0
	Page	19/29		

3.4.3.4. Validation

The POR **SIMBIOSYS_STC_ICO#05_Performance** has been validated by means of a Simulation Software and produces the following results:

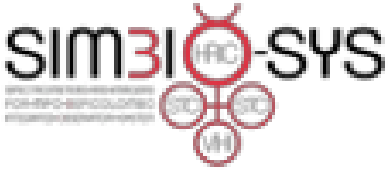
Sequence duration				00:16:46	
Sequence Data Volume					
-	ME	HRIC	STC	VIHI	Overall
Science	-	0 [Mb]	0.6262 [Gb]	0 [Mb]	0.6262 [Gb]
HK	0.0271 [Mb]	0 [Mb]	0.9084 [Mb]	0 [Mb]	0.9355 [Mb]
Total	0.0271 [Mb]	0 [Mb]	0.6271 [Gb]	0 [Mb]	0.6271 [Gb]

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.

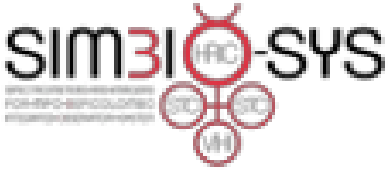
3.4.3.5. Expected Science data

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	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	20		
		16	20		
		17	20		
		18	20		
		19	20		

	Document	BC-SIM-PL-008 SIMBIO-SYS Checkout#05 Test Summary		
	Date	17/05/2024		
	Issue	1	Revision	0
	Page	20/29		

		20	20		
		21	20		
		22	20		
		23	20		
		24	20		
		25	20		
		26	20		
		27	20		
		28	20		
		-	700		

	Document	BC-SIM-PL-008 SIMBIO-SYS Checkout#05 Test Summary		
	Date	17/05/2024		
	Issue	1	Revision	0
	Page	21/29		

3.4.4. STC LFB Test

3.4.4.1. Scope

The aim of this test is evaluate the STC LFB effect dependence with respect to the RT.

3.4.4.2. Preparation

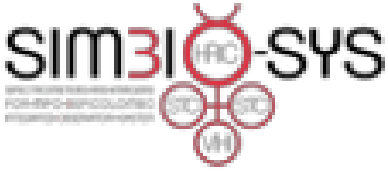
To execute this test SIMBIO-SYS shall be in the following status:

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

See Section 3.3.1.2.

3.4.4.3. Description

A POR with **SPOT ID BPSS00873** and named **SIMBIOSYS_STC_ICO#05_LFB_test** has been prepared which contains repeated acquisition with different RT.

	Document	BC-SIM-PL-008 SIMBIO-SYS Checkout#05 Test Summary		
	Date	17/05/2024		
	Issue	1	Revision	0
	Page	22/29		

3.4.4.4. Validation

The POR **SIMBIOSYS_STC_ICO#05_LFB_test** has been validated by means of a Simulation Software and produces the following results:

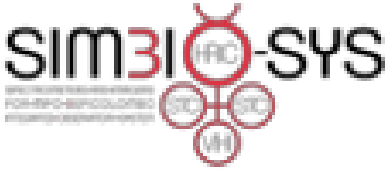
Sequence duration				00:24:03	
Sequence Data Volume					
-	ME	HRIC	STC	VIHI	Overall
Science	-	0 [Mb]	0.0025 [Gb]	0 [Mb]	0.0025 [Gb]
HK	0.0317 [Mb]	0 [Mb]	1.0251 [Mb]	0 [Mb]	1.0567 [Mb]
Total	0.0317 [Mb]	0 [Mb]	0.0036 [Gb]	0 [Mb]	0.0036 [Gb]

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.

3.4.4.5. 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	525		
		2	60		
		3	35		
		Total	620		

	Document	BC-SIM-PL-008 SIMBIO-SYS Checkout#05 Test Summary		
	Date	17/05/2024		
	Issue	1	Revision	0
	Page	23/29		

3.4.5. VIH Performance Test

3.4.5.1. Scope

The test will be the repetition of the one planned in [RD.11].

3.4.5.2. Preparation

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

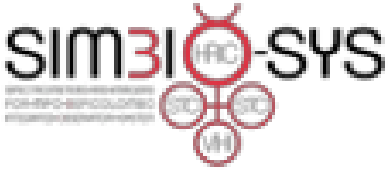
Unit	Status
ME	OFF (on the MAIN channel)
HRIC	OFF
STC	OFF
VIHI	OFF

See Section 3.3.1.2.

3.4.5.3. Description

A POR with **SPOT ID BPSS00847** and named **SIMBIOSYS_VIHI_ICO#05_Performance** has been prepared which contains the following operations:

1. VIH Power On and initialisation (TEC parameters upload)
2. Dark Frame Acquisition; Dark storage and no Dark Subtraction
3. Dark Frame Acquisition; no Dark storage and Dark Subtraction.
4. Dark Frame Acquisition; no Dark storage and Dark Subtraction;
5. Dark Frame Acquisition; Dark storage; no Dark Subtraction
6. Power ON LAMP
7. Frame Acquisition, no dark acquisition, Dark subtraction and IBR=0
8. Frame Acquisition, no dark acquisition, no Dark subtraction and IBR=32
9. Frame Acquisition, no dark acquisition, Dark subtraction, Spatial and Spectra Binning, Binning sequence of frame x1 and IBR=0
10. Frame Acquisition, no dark acquisition, Dark subtraction, Spatial and Spectra Binning, Binning sequence of frame x1 and IBR=32

	Document	BC-SIM-PL-008 SIMBIO-SYS Checkout#05 Test Summary		
	Date	17/05/2024		
	Issue	1	Revision	0
	Page	24/29		

- 11.Frame Acquisition, no dark acquisition, Dark subtraction, Spatial and Spectra Binning, Binning sequence of frame x1 and IBR=63
- 12.Frame Acquisition, no dark acquisition, Dark subtraction, Spatial and Spectra Binning, Binning sequence of frame x2 and IBR=0
- 13.Frame Acquisition, no dark acquisition, Dark subtraction, Spatial and Spectra Binning, Binning sequence of frame x2 and IBR=32
- 14.Frame Acquisition, no dark acquisition, Dark subtraction, Spatial and Spectra Binning, Binning sequence of frame x2 and IBR=63
- 15.Power OFF LAMP
- 16.Power Off VIHI

3.4.5.4. Validation

The POR **SIMBIOSYS_VIHI_ICO#05_Performance** has been validated by means of a Simulation Software and produces the following results:

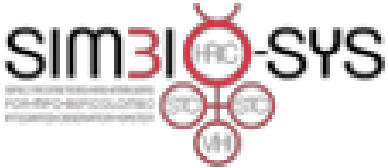
Sequence duration		00:18:20			
Sequence Data Volume					
-	ME	HRIC	STC	VIHI	Overall
Science	-	0 [Mb]	0 [Mb]	0.0916 [Gb]	0.0916 [Gb]
HK	0.0223 [Mb]	0 [Mb]	0 [Mb]	0.6659 [Mb]	0.6882 [Mb]
Total	0.0223 [Mb]	0 [Mb]	0 [Mb]	0.0923 [Gb]	0.0923 [Gb]

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.

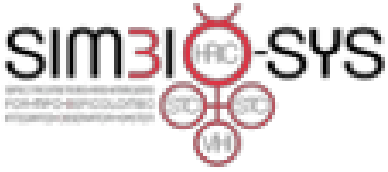
3.4.5.5. Expected Science data

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	23
				2	23
				3	18
				4	10
				5	10
				6	10

	Document	BC-SIM-PL-008 SIMBIO-SYS Checkout#05 Test Summary		
	Date	17/05/2024		
	Issue	1	Revision	0
	Page	25/29		

				7	10
				8	10
				9	10
				10	10
				11	10
				12	10
				-	154

	Document	BC-SIM-PL-008 SIMBIO-SYS Checkout#05 Test Summary		
	Date	17/05/2024		
	Issue	1	Revision	0
	Page	26/29		

3.5. SIMBIO-SYS Interchannel Test

3.5.1. Scope

In SIMBIO-SYS ICO#04 and ICO#04b (see [RD.11] and [RD.12]) a test was planned to verify if and how SIMBIP-SYS channels mutual affect their operativity. In SIMBIO-SYS ICO#04b Test Report ([RD.13]) it is reported that a mutual interference occurs while the channels operate.

The aim of this test is to:

- Verify and quantify the interchannel interference in all configurations (i.e., HRIC/STC, STC/VIHI and HRIC/VIHI)
- Evaluate the RT conditions in which HRIC/STC interference occurs.

3.5.2. Preparation

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

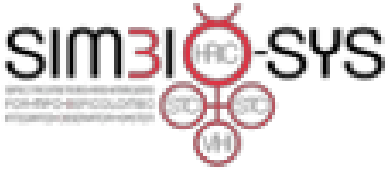
Unit	Status
ME	ON (on the MAIN channel)
HRIC	OFF
STC	OFF
VIHI	OFF

See Section 3.3.1.2.

3.5.3. Description

A POR with **SPOT ID BPSS00875** and named **SIMBIOSYS_ALL_ICO#05_Interchannel test** has been prepared which contains the following operations:

- STC power on and initialization
- VIHI and STC acquire in parallel (with fixed configuration)
- STC power off, HRIC power on and initialization
- VIHI and HRIC acquire in parallel (with fixed configuration)
- VIHI power off, STC power on and initialization

	Document	BC-SIM-PL-008 SIMBIO-SYS Checkout#05 Test Summary		
	Date	17/05/2024		
	Issue	1	Revision	0
	Page	27/29		

6. STC and HRIC acquire in parallel (with different RT configurations)

3.5.4. Validation

The POR **SIMBIOSYS_ALL_ICO#05_Interchannel test** has been validated by means of a Simulation Software and produces the following results:

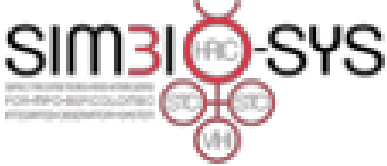
Sequence duration				02:55:30	
Sequence Data Volume					
-	ME	HRIC	STC	VIHI	Overall
Science	-	0.130 [Gb]	0.271 [Gb]	0.030 [Gb]	0.431 [Gb]
HK	0.1328 [Mb]	2.746 [Mb]	2.331 [Mb]	0.155 [Mb]	5.365 [Mb]
Total	0.1328 [Mb]	0.133 [Gb]	0.273 [Gb]	0.030 [Mb]	0.436 [Gb]

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.

3.5.5. Expected Science data

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

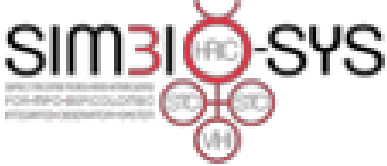
HRIC		STC		VIHI	
TC	# frames	TC	# frames	TC	# frames
1	1213	1	3640	1	600
2	2769	2	8340	2	600
				3	620
				4	600
				5	600
				6	620
-	3982	-	11980	-	3640

	Document	BC-SIM-PL-008 SIMBIO-SYS Checkout#05 Test Summary		
	Date	17/05/2024		
	Issue	1	Revision	0
	Page	28/29		

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_ICO#05_functional_test	SIMBIO-SYS ME switch-on via OBCP, HRIC nominal TEC parameters upload and HRIC functional test with memory read/write tests and 1 Science acquisition	00:28:15	0.0242 [Gb]	✕ BPSS00844_00204.BC
2. SIMBIOSYS_HRIC_ICO#05_dc_test	HRIC DC verification	00:01:30	1.4868 [Gb]	✕ BPSS00845_00204.BC
3. SIMBIOSYS_HRIC_ICO#05_LFB_test	HRIC LFB test	00:24:10	0.0234 [Gb]	✕ BPSS00846_00204.BC
4. SIMBIOSYS_STC_ICO#05_init and func	STC nominal TEC parameters upload and STC functional test with memory read/write tests and several Science acquisitions	00:31:51	0.0633 [Gb]	✕ BPSS00874_00204.BC

	Document	BC-SIM-PL-008 SIMBIO-SYS Checkout#05 Test Summary		
	Date	17/05/2024		
	Issue	1	Revision	0
	Page	29/29		

ID	Description	Estimated duration	Estimated Data Volume	XML file
5. SIMBIOSYS_STC_ICO#05_Performance	STC DC monitoring.	00:16:46	0.6271 [Gb]	✕ BPSS00840_00204.BC
6. SIMBIOSYS_STC_ICO#05_LFB_test	STC LFB test	00:24:03	0.0036 [Gb]	✕ BPSS00873_00204.BC
7. SIMBIOSYS_VIHI_ICO#05_Performance	VIHI nominal TEC parameters upload and VIHI performance verification with nominal operative parameters	00:18:20	0.0923 [Gb]	✕ BPSS00847_00204.BC
8. SIMBIOSYS_ALL_ICO#05_Interchannel test	Channels nominal TEC parameters upload and Science acquisitions in several RT configurations	02:55:30	0.436 [Gb]	✕ BPSS00875_00203.BC