HERSCHEL/PACS

SPU HLSW 13.96
Test Report

Document Ref.: PACS-TW-TR-012

Issue: 5.0

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Distribution Record

Issue / Revision	1.0	2.0	3.0	3.1	4.0	5.0	
Distribution Date	14.12.2005	23.01.2006	28.02.2006	28.04.2006	28.09.2006	18.02.2009	

Internal			External		
Department	**Name**	**Qty**	**Company**	**Name**	**Qty**
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			Electronic Archives at Leuven http://pacs.ster.kuleuven.ac.be/Documents		1

Document Change Record

Document Title HERSCHEL/PACS SPU HLSW Test Plan		
Issue	**Date**	**Reason for Change**
1	13/12/2005	HLSW 12.0
2	19/01/2006	HLSW 12.1
3	28/02/2006	HLSW 12.2
3.1	28/04/2006	HLSW 12.2x
4	28/09/2006	HLSW 12.9
5	18/02/2009	HLSW 13.96

Contents

1 Introduction

1.1.General

The Signal Processing Unit (SPU) is responsible for PACS data compression. UVIE/TUVIE is responsible to provide the SPU High Level Software (HLSW), while IAC is responsible to provide the SPU Hardware + the Low Level Software (HW+LLSW).

1.2. Scope

This document describes the test report for the HLSW version _13.96_ on the SPU. The tests take place on _ 30. Jan. 2009 _ at MPE, Garching, Germany.

The LLSW References are:

a. CRISA LLSW drivers version _Draft 1.4_.

b. Start up SW version _Draft 4.7_.

1.3. Purpose

This document reports the test results from checking:

1. The HLSW functionality against the latest SW changes since HLSW version _12.9_ (see release notes)

1.4. Overview of the document

This document is structured as follows:

- In Section 1, the scope of the document and its purpose are given.
- Section 2 depicts the HLSW test setup and the features to be tested.
- Section 3 presents SPU HLSW test procedures.
- In Section 4, the HLSW modules are listed.
- The provided documentation with the HLSW is given in Section 5.
- Section 6 shows the final test report.

1.5.Acronyms and Abbreviations

ADSP	Analog device DSP
ASW	Application SoftWare
AVM	Avionic Model
BOL	BOLometers
CPU	Central Processing Unit
CRE	Cold Readout Electronics
CSL	Centre Spatial de Liège
DEC/MEC	Detector Controller/Mechanisms Controller
DPU	Digital Processing Unit
DRCU	Detector Readout and Control Unit
DSP	Digital Signal Processor
EEPROM	Electrically Erasable Programmable Read Only Memory
EGSE	Electrical Ground Support Equipment
FCU	FPU Control Unit
FIRST	Far Infrared and Sub-millimeter Telescope
FPU	Focal Plane Unit
FS	Flight Spare
GUI	Graphical User Interface
HIFI	Heterodyne Instrument for HERSCHEL (HiFi instrument)
HK	House-Keeping
HLSW	High Level SW
HS	High Speed
HW	HardWare
I/F	Interface
IAC	Instituto de Astrofísica de Canarias
ID	Identification
IFSI	Istituto di Fisica dello Spazio Interplanetario
JR	Joanneum Research
LLSW	Low Level SW
MFCU	Mechanisms and Focal plane electronics Control Unit
NCR	Non Conformance Report
OBS	On-Board Software
PACS	Photodetector Array Camera and Spectrometer
PFM	Proto-Flight Model
PHC	PhotoConductors
PMA	Program Memory Address
PMD	Program Memory Data
PRIP	Pattern Recognition and Image Processing
PROM	Programmable Read Only Memory
QA	Quality Assurance
QM	Qualification Model
RAM	Random Access Memory
ROM	Read Only Memory
SPIRE	Spectral and Photometric Imaging Receiver
SPU	Signal Processing Unit
SW	SoftWare
SWL	Short WaveLength
TBC	To Be Confirmed
TBD	To Be Defined
TBU	To Be Updated
TBW	To Be Written
TC	Test Case
TM	TeleMetry
TP	Test Procedure
TUVIE	Technical UVIE
UR	User Requirement
URD	User Requirements Document
UVIE	University of Vienna
WE	Warm Electronics

1.6.References

1.6.1. Applicable Documents

AD001	PACS-TW-TS-001	HERSCHEL/PACS SPU HLSW Test Plan (issue 4, 29.05.2002)
AD002	PACS-TW-SR-001	HERSCHEL/PACS SPU HLSW User Requirement Document (issue 3.1, 25.03.2004)
AD003	PACS-TW-GS-001	HERSCHEL/PACS SPU HLSW Specifications Document
AD004	PACS-TW-HM-002	HERSCHEL/PACS SPU HLSW User Manual

1.6.2. Reference Documents

RD001	BSSC(96)2	Guide to applying the ESA software engineering standards to small software projects
RD002	Not Referenced	Virtuoso Emulator User Manual
RD003	IFSI/OBS/PL/2000-2001	DPU/ICU On Board SW PA Plan
RD004	PACS-ME-LI-005	List of PACS Housekeeping and Telecommands
RD005	PACS-TW-TS-003	HERSCHEL/PACS SPU HLSW Acceptance Test Plan for AVM Delivery
RD006	PACS-TW-HM-002	HERSCHEL/PACS SPU HLSW User Manual

2 Environmental requirements

In this section, the HW and SW equipment needed for the SPU HLSW acceptance test are described. The test is performed at MPE in Germany. The test set-up is depicted in the Figure 1.

1. Nominal ILT EGSE
    a. The EGSE HW configuration is _CDMS simulator_
    b. The EGSE SW is _SCOS2000 with MIB 8.6N_ running on _irsun01_
2. DPU _AVM1_ connected to _CDMS simulator_.
    a. The DPU OBSW version is _9.01_ dated of _ _
    b. The DPU Boot SW version is _ _ dated of _ _
    c. The DPU SUSW version is _ _ dated of _ _
3. SPU _EM_
    a. SPU HLSW version _13.96 _ runs on the _SWL board_
    b. The DMC simulator runs on the _LWL board_. The DMC simulator SW version is _ _ dated of _ _ (It also simulates the red photometers).
4. 1 PC for SPU HLSW and DMC simulator upload and maintenance (provided by UVIE/TUVIE)
5. 6 simulated data files, based on CQM ILT data (provided by MPE+UVIE/TUVIE)
    a. 4 spectroscopy test files (SPEC_SIM_0001.BIN, SPEC_SIM_0002.BIN, SPEC_SIM_0003.BIN and SPEC_SIM_0004.BIN).
    b. 2 files for photometry tests (PHOT_SIM_0001.BIN and PHOT_SIM_0002.BIN).
6. 4 detector tables are used 4001.tcl, 4003.tcl, 4007.tcl and 6256.tcl.
7. An interface to update the DMC header parameters both in photometry and spectroscopy

2.1.PC#1

This computer is used to support the test by uploading and maintaining both SPU HLSW and DMC simulator. An integrated 4Link board is responsible for the data transfer between the PC and the SPU _EM_. A Communication Exe using the 4Link drivers is executed before running the simulator.

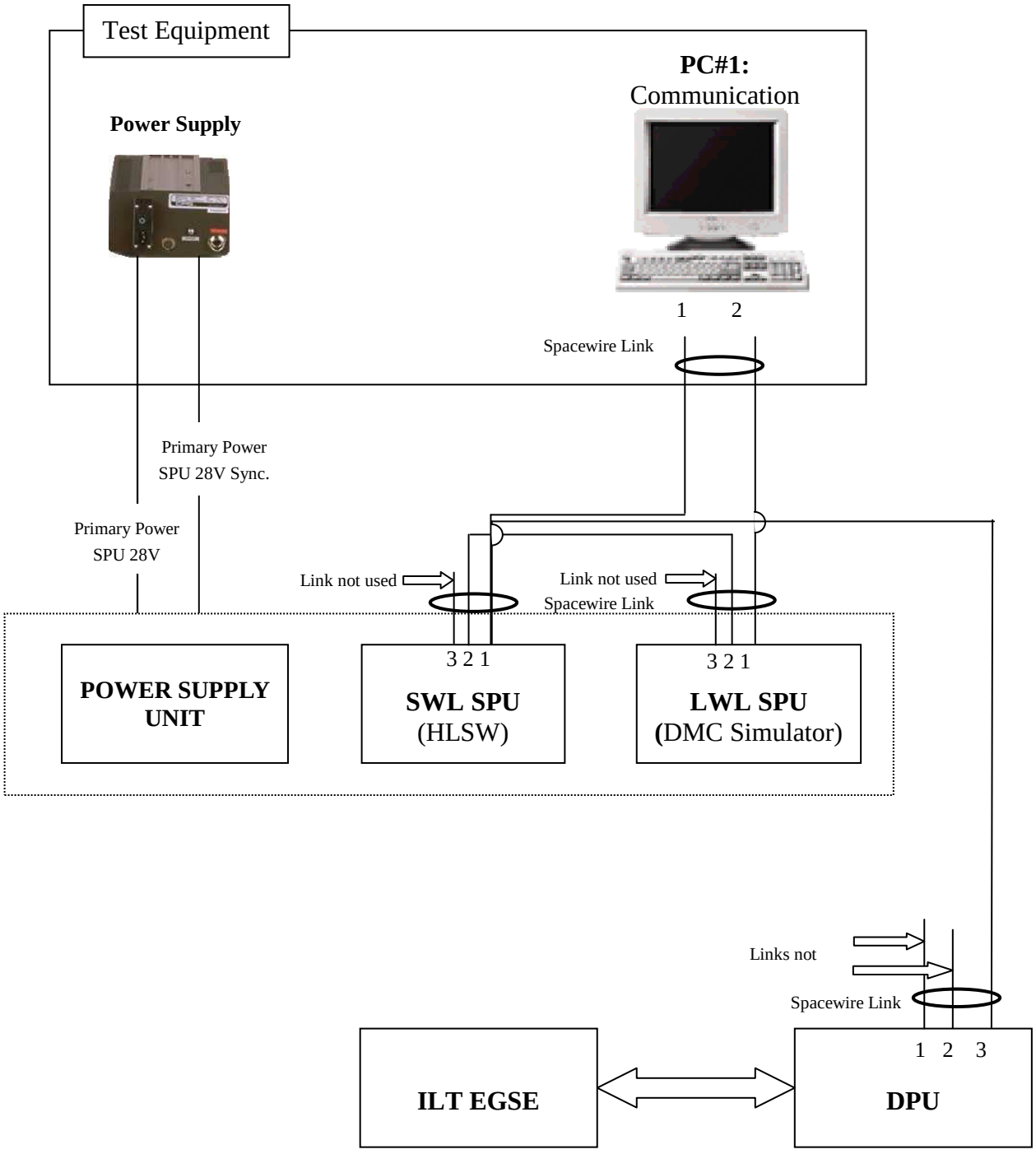

Figure 1. Test equipment for SPU HLSW FM Acceptance Test

2.1.1. PCI Spacewire Board with SMCS Chip

This board is used to interface the PC#1 with the 1355 connectors (from SPU EM). It is used to transport the data to/from PC from/to both SPU boards.

2.1.2. S/C Power Bus Interface Simulator

A power generator provides the Power Supply for the SPU.

2.1.3. SPU Subsystem

The HLSW runs on the SWL SPU while a DMC generator runs on the LWL SPU.

2.1.4. Cables

5 Sets of cables are used to connect the SPU to the testing environment:

1- Four sets of IEEE 1355 connectors

2- One set of Power Supply connectors

3. SPU HLSW Test Description

HLSW is running on SWL SPU while a DMC simulator is running on the LWL SPU. They communicate with each other through Link2. SWL SPU communicates with the DPU using Link1. Link1 of the SWL SPU is also used to download the HLSW to EEPROM. On the other hand, Link1 of the LWL SPU is used to download and control the DMC simulator. Link3 of both SPU boards are not used.

A DPU_2_DMC_SIM program is running on PC#01 to support the download and control of the DMC simulator.

The test results (expected test results aka Nominal Output) are monitored by command acknowledgement (PACK/NACK) and HK fields:

Command Acknowledgement monitoring: The responses of commands sent to SPU HLSW are reflected in PACK or NACK, which are described in RD006.

HK monitoring: The functionality and progress of the SPU HLSW is reflected in the HK. The description of HK parameter and their default values (aka Nominal HK) are described in RD006.

Furthermore, some TM data analysis are necessary to verify the reduction/compression part of the SPU HLSW. This includes the decompression of the data with the decompression SW, which is part of the EGSE.

4. SPU HLSW 13.96 Test

4.1. Participants

_ test conducted by R. Ottensamer _

4.2. Analysis

- The release note is available at CVS-Leuven and it is checked.
- SPU HLSW V12.9 user Manual available.
- HW setup is according to Section 2
- Data generator produces 250Hz spectroscopy and 42Hz photometry.
- All tm files are under _ irsun01 /home/ _
- _ _

4.3. Procedures

Procedure	Comment	Output File	Analysis OK/ NOK
INITIALISATION OF THE SOFTWARE			
Start on January 30th, 2009 at 09h00 1. Switch-on sequence DPU+SPULLSW switchon_DPU_SPUllsw.tcl			
2. Load SPU HLSW V13.96 from PC#09	The load goes only to the blue section.		
3. Load DMC simulator SW V2.4 from PC#09	The load goes only to the red section.		
4. Switch-off Switchoff_withoutBOLC.tcl			

5. Start of the entire setup via: switchon_DPU_SPUSWL.tcl 5.1 Start Spacewire Test program on PC#1 5.2 Type 1 to perform chip reset 5.3 Switch on the DPU, SPU 5.4 Wait 15 seconds 5.5 Connect DPU to SWL SPU LLSW 5.6 Load HLSW from SWL SPU EEPROM to RAM 5.7 Give SWL SPU Control to HLSW Close the Spacewire Test program 5.8 Start SWL SPU Link with LWL SPU as Master 5.9 Start ComExe.exe on PC#1 5.10 Start DPU_2_DMC_SIM program 5.11 Copy DMC Sim from EEPROM to RAM 5.12 Start DMC Sim 5.13 Start the Link between DMC Sim and HLSW as Slave			**OK**
DPU TO SPU COMMUNICATION INTERFACE			
6. Send Load Command to DRAM			
7. Send Dump Command from PRAM			
8. Send Check Command from PRAM			
9. Send Warm Reset Command to PRAM	Should be done at the end of the testing session. The HLSW performs a SMCS reset, therefore the connection to DPU and DMC is lost.		
10. Send Raw Channel Selection Command			
11. Initialise Test in Spectroscopy a) Send Write SDP Command for Spec. b) Send Test Command for Spec. c) Send Stop Command			
12. Initialise Test in Photometry a) Send Write SDP Command for Phot. b) Send Test Command for Photometry c) Send Stop Command			
13. Send Write Detector Constants Command for Spectroscopy			
14. Send Write Detector Constants Command for Photometry			
15. Copy Data from RAM to EEPROM			
16. Send Perform Command with invalid Activity ID			**OK**

TEST1 – Blue Photometry, combined rounding + sync delay test			
17. Setup Data Generator	Photometry blue		
18. Configure SPU PHOT table	Non-default are: SDEL=1		
19. Record tm file		PHOT_default_0bit_1sd.tm	
20. Start	Default		
21. Start Sequence Test	Change label from 0 to 1 and back		
22. Stop	Close tm file		**OK**
23. Configure SPU PHOT table	Non-default are: RND=2 SDEL=1		
24. Record tm file		PHOT_default_2bit_1sd.tm	
25. Start	Default		
26. Start Sequence Test	Change label from 0 to 1 and back		
27. Stop	Close tm file		**OK**
28. Configure SPU PHOT table	Non-default are: RND=1 SDEL=1		
29. Record tm file		PHOT_double_1bit_1sd.tm	
30. Start	Double Compression Mode		
31. Start Sequence Test	Change label from 0 to 1 and back, then check-in default mode		
32. Stop	Close tm file		**OK**

TEST2 – Red Photometry, combined rounding + sync delay test			
33. Setup Data Generator	Photometry red		
34. Configure SPU PHOT table	Non-default are: RND=2 SDEL=1		
35. Record tm file		TEST_photred.tm	
36. Start	Default		
37. Start Sequence Test	Change label from 0 to 1 and back		
38. Stop	Close tm file		**OK**
TEST3 – Spectroscopy, rounding test			
39. Setup Data Generator	Spectroscopy (blue)		
40. Configure SPU SPEC table	Non-default are: RSRR=8 RFAL=1		
41. Record tm file		SPEC_default8_0bit.tm	
42. Start	Default		
43. Test running…			
44. Stop	Close tm file		**OK**
45. Configure SPU SPEC table	Non-default are: RSRR=8 RFAL=1 RND=2		
46. Record tm file		SPEC_default8_2bit.tm	
47. Start	Default		
48. Test running…			
49. Stop	Close tm file		**OK**

TEST4 – Spectroscopy ramp fitting of subslopes of 8 samples			
50. Configure SPU SPEC table	Non-default are: RSRR=8		
51. Record tm file		SPEC_slope8 .tm	
52. Start	Default		
53. Test running…			
54. Stop	Close tm file		**OK**